Understanding Current Fall Prevention Program Design in Community-Based Exercise Programs for Older Adults in Canada

by

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Abstract

Background: Falls – events by which an individual inadvertently comes to rest on the ground, floor, or lower level – present a major public health concern as they have potential to cause serious injury, admission to long-term care, and even death. Research has shown that training balance through exercise is effective at reducing falls in community-dwelling older adults. Specifically, evidence-based fall prevention exercise recommendations include at least three hours of high challenge balance exercise per week, on an ongoing basis. Community exercise programs are a potential delivery mode for implementing effective fall prevention exercises, however, little is known regarding current practice and whether they include effective fall prevention exercise recommendations.

Objective: To describe characteristics of fall prevention and balance training community exercise programs for adults aged 50 years and older in Canada and determine whether the programs include the evidence-based exercise recommendations. To determine instructor and program characteristics associated with the inclusion of evidence-based recommendations.

Methods: Instructors of fall prevention community exercise programs completed an electronic self-report questionnaire following a modified Dillman recruitment strategy. Questions explored program design, exercise content, target population, and demographic information. Exercises were coded for balance challenge using a previous coding scheme based on existing recommendations. Analysis followed stated objectives using descriptive statistics and multiple logistic regression.

Results: 140 completed eligible responses were analyzed. One program (0.7%) included all recommendations for effective fall prevention exercise. 59 programs (42%) were offered on an ongoing basis, 1 program (0.7%) conducted at least three hours of balance exercises a week, and 133 programs (95%) prescribed mostly moderate or high challenge balance exercises. Based on descriptive statistics of programs including the recommendations, exploratory multiple logistic regression was conducted to determine instructor and/program characteristics associated with program

duration. Instructor educational background in a related field and the prescription of home exercises were significantly associated with program duration.

Conclusions: Most programs included at least one recommendation for effective fall prevention exercise, with only one program included all three. Future studies should focus on barriers and facilitators influencing design and delivery of community fall prevention exercise programs.

KEY WORDS: fall prevention, older adults, evidence-based recommendations, community exercise programs

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Chapter 1: Introduction

1.1 Brief Overview of the Topic and Research Methods

Falls, commonly defined as "[…] unexpected event[s] in which the participant comes to rest on the ground, floor, or lower level" (Lamb, Jørstad-Stein, Hauer, & Becker, 2005, p. 1619), are a major public health concern as they can lead to serious physical (Baker & Harvey,1985; Nelson et al., 2003; Tinetti & Williams, 1998; Xiang, Chany, & Smith, 2006), psychological (Iaboni & Flint, 2013; Tinetti & Powell, 1993) and economic consequences (Davis et al., 2010; Hektoen, Aas, & Luras, 2009). As the global population ages at an unprecedented rate (World Health Organization, 2015), the need for effective fall prevention initiatives becomes increasingly important. There are many risk factors for falling, though the most commonly reported risk factors for falling include a history of falls, certain medication, decreased muscle strength, and gait and balance impairments (Tinetti & Kumar, 2010). Although many interventions to address these risk factors have been reported, exercise, specifically exercise that trains balance – briefly defined as the ability to maintain the centre of mass over the base of support (Shumway-Cook & Woollacott, 2007) – had the greatest effects on reducing falls in community-dwelling older adults (Sherrington, Tiedemann, Fairhall, Close, & Lord, 2011; Tricco et al., 2017; Sherrington et al., 2017; Sherrington et al., 2019). Given the critical role of balance exercise for effective fall prevention, evidence-based exercise recommendations for fall prevention have been proposed, namely that exercise programs for fall prevention should include at least three hours of high challenge balance exercise per week, on an ongoing basis (Sherrington et al., 2017).

Many delivery modes have been employed for fall prevention exercises. In particular, group delivered programs offered in the community have the potential for delivering effective evidence-based exercise recommendations for fall prevention and warrant more attention. These community exercise programs have potential because of their ease of accessibility and wide reach (Lau et al.,

2016). As such, if community exercise programs include effective fall prevention exercise components, they could influence the health of a wide range of community-dwelling older adults. However, as of yet, very little is known regarding their current practice in Canada and whether they include effective fall prevention exercise recommendations. Therefore, the purpose of the current study was to describe characteristics of fall prevention and balance training community exercise programs for adults aged 50 years and older in Canada and determine whether the programs include evidence-based exercise recommendations for fall prevention. Moreover, many factors could be influencing the potential of these programs, in terms of program design and delivery. In particular, instructor and program characteristics were examined for associations with the inclusion of evidence-based recommendations for fall prevention, as any relationship found between these characteristics and whether the programs are including the recommendations in their design can then be used to tailor support strategies for modifiable factors.

Specifically, instructor and program characteristics were explored through the administration of an electronic self-report questionnaire following a modified Dillman recruitment strategy. Instructors of community exercise programs targeted for community-dwelling older adults that focused on fall prevention and/or balance training were asked to complete the questionnaire. Prior to data collection, the questionnaire was piloted and reviewed by the research committee. Questions explored program design (i.e., exercise class duration and frequency, home exercises, program duration, challenge), exercise content, target population and inclusion/exclusion criteria, and program demographics and instructor background. Analysis followed stated objectives using descriptive statistics (means, frequencies, proportions) and instructor and program characteristics associated with the inclusion of evidence-based recommendations were examined through multiple logistic regression.

In the following document, background on the topic will be presented through a literature review on the incidence, consequences, and risk factors of falls, followed by a discussion on the

rationale and objective of the study. Next, full methods are reported (i.e., sampling frame and participants, questionnaire instrument, and procedure), and data management and analysis are explained. Results from the stated objectives follow. Last, findings are discussed, strengths and limitations of the study are explained, and implications and future research are explored.

Chapter 2: Literature Review

2.1 Fall Statistics

The occurrence of falls in older adults is concerning – approximately 20-30% of adults 65 years and older living in the community reported experiencing a fall (Campbell et al., 1990; Sibley, Voth, Munce, Straus, & Jaglal, 2014; Tinetti, Speechley, & Ginter, 1988). Falls are the most common injury in Canadian older adults and are the leading cause of injury related hospitalization among older adults (Canadian Institute for Health Information [CIHI], 2019). Falls are also the main reason for emergency department visits in older adults (accounting for 60% of all older adult emergency department visits in Canada) (CIHI, 2019). This recent Canadian Institute for Health Information report highlighted that 81% of older adults hospitalized for injuries were due to a fall (CIHI, 2019), and another Public Health Agency of Canada report found that over one third of older adults who were hospitalized due to a fall were placed in long-term care (Scott, Wagar, & Elliott, 2010).

Moreover, the rate of fall-related injuries has been shown to increase with age (Peel, Kassulke, & McClure, 2002), as well as both risk and perceived risk of experiencing a fall (Pearson, St-Arnaud, & Geran, 2014). For instance, a Public Health Agency of Canada report (2014) highlighted that the crude rate of fall-related hospitalizations remained fairly constant between 2006/2007 and 2010/2011, concluding that the observed increase in fall-related hospitalizations may be due to the increased number of older adults in Canada (Public Health Agency of Canada, 2014). As such, given that older adults are the fastest-growing population in Canada (CIHI, 2019), fall prevention becomes increasingly relevant in order to prevent injuries and hospitalizations to this population.

2.1 Why do Falls Matter?

Physical consequences. Serious injuries such as fractures or broken bones (Baker & Harvey, 1985; Tinetti & Williams, 1998), and more minor injuries, such as bruises and scrapes (Nelson et al., 2003; Xiang et al., 2006), are common consequences of a fall. A Public Health Agency of Canada report (2014) looking into types of injuries and body parts affected by falling from the year 2009-2010 found that 35% of injuries resulting from a fall were broken or fractured bones, followed by sprains or strains (30%), and scrapes, bruises, or blisters (19%). Other injuries included cuts or punctures (6%), dislocation (2%), and concussions (2%) (Public Health Agency of Canada, 2014). Furthermore, approximately 35% of fall-related hospitalizations of older adults aged 65 years and over involved a hip fracture (Public Health Agency of Canada, 2014). Hip fracture complications can be severe and even life threatening as they can include cognitive alterations, cardiac and vascular complications like arrhythmia and heart failure, pneumonia and other pulmonary consequences, ulcers, and gastrointestinal bleeding, urinary tract infections, anemia, diabetes, and pressure scars (Carpintero et al., 2014). In fact, falls are the direct cause of 95% of all hip fractures, even leading to death in 20% of cases (Ioannidis et al., 2009; Jiang et al., 2005; Wolinsky et al., 2009).

Psychological consequences. After an individual experiences a fall, they can suffer emotional and psychological consequences, such as anxiety, depression, and social isolation (Iaboni & Flint, 2013). Falling can also lead to a fear of falling, defined as, […] a lasting concern about falling that leads to an individual avoiding activities that he/she remains capable of performing" (Tinetti & Powell, 1993, p.36) . The fear of falling itself can lead to self-imposed reduced participation in social activities, thus contributing to social isolation and other psychological consequences, and self-imposed physical activity, which in turn can increase the risk of falling (Delbaere, Crombez, Vanderstraeten, Willems, & Cambier, 2004). On the other hand, underestimating the risk of falling can also have negative consequences as this can lead individuals to participate in activities that are

beyond their physical ability, and thus actually increase their risk of falling (Delbaere, Close, Brodaty, Sachdev, & Lord, 2010).

Economic consequences. Falls have many consequences, not only to the individual who fell, but they also present a significant burden on the health care system (Davis et al., 2010; Hektoen et al., 2009). For example, falls that result in hospitalization can cost up to $30,000 CAD per older adult, and falls that lead to hip fractures can cost up to $40,000 CAD per older adult (Woolcott, Khan, Mitrovic, Anis, & Marra, 2012). Additionally, it was reported that falls were the leading cause of emergency room visits, hospitalization, disability, and death in 2010, costing over 8 billion dollars (Parachute, 2015).

Downward Spiral. Not only can the occurrence of a fall trigger a downward spiral of negative consequences for the individual and the health care system, but a fall can also trigger the beginning of a vicious cycle in which the emotional, psychological, and physical consequences interact to foster immobility and self-imposed physical activity restriction (Curcio, Gomez, Reyes-Ortiz, 2009; Lachman et al., 1998; Delbaere et al., 2004). These, in turn, can further increase the risk of yet another fall, starting the cycle over again. Injuries, chronic pain, hospitalization, increased risk of death, and a reduced quality of life are all among the devastating consequences associated with falls and are a main reason why prevention is key (Fletcher, Guthrie, Berg, & Hirdes, 2010; Public Health Agency of Canada, 2014). As such, falls present a major public health concern, as they can cause serious injury and threaten healthy aging.

2.3 Why do People Fall?

There are many risk factors that can lead to falls among community-dwelling older adults. These include being female, a previous fall history, visual impairments, decreased upper or lower muscle strength, gait impairment or walking difficulty, depression, dizziness or orthostasis, low body mass index, urinary incontinence, cognitive impairment, arthritis, diabetes, pain, being over 80 years

of age, certain medications (psychoactive medication use or more than 4 medications), functional limitations or activities of daily living disabilities, and balance impairment (Tinetti & Kumar, 2010). By conducting a systematic review of factors independently contributing to the risk of falling in at least 2 of the 33 studies included in their review, the Tinetti and Kumar identified that the most commonly reported risk factors for falling were a history of falls, certain medication, decreased muscle strength, and gait and balance impairments (Tinetti & Kumar, 2010).

2.4 How to Prevent Falls?

There have been many interventions targeting different risk factors. Different interventions to reduce falls in community-dwelling older adults were investigated in a 2012 systematic review (Gillespie et al., 2012) which synthesized the results of 159 randomized controlled trials of fall prevention interventions in 79,000 community-dwelling older adults. Interventions included in the review were: Exercise (59 trials, 13 264 randomised participants), medication (16 trials, 29 002 randomised participants), surgery (five trials), fluid or nutrition therapy (three trials), psychological interventions (two trials), environment/assistive technology (13 trials), knowledge/education interventions (5 trials), multiple interventions (defined as a combination of two or more categories of interventions delivered to all participants in the intervention group) (18 trials), and multifactorial interventions (defined as more than one category of intervention, with participants receiving different combinations of interventions) (40 trials). Of these interventions, exercise and home safety interventions were found to significantly reduce rate of falls (defined as the total number of falls per unit of person time that falls were monitored – falls per person year), and risk of falling (defined as the risk ratio of people who fell once or more), though home safety interventions were more effective in people at higher risk of falling. On the other hand, exercise, specifically multiple-component group exercises (i.e., exercise programs with a combination of two or more categories of exercises) significantly reduced the rate of falls and the risk of falling, as well reduced the risk of sustaining a

fracture due to a fall, and this regardless of whether the trials had recruited only people at higher risk of falling (Gillespie et al., 2012). Specifically, their results indicated that classes that contained just gait, balance, or functional training significantly reduced the rate of falls, and strength or resistance training programs did not significantly reduce rate of falls, nor number of people falling (Gillespie et al., 2012).

2.5 The Role of Exercise in Reducing Falls

The role of exercise in fall prevention has been confirmed in multiple systematic reviews. For example, the role of exercise was also identified in a systematic review and meta-analysis that examined 54 randomized controlled trials targeting fall prevention exercise in older adults (Sherrington et al., 2011). Specifically, the authors found that exercise alone significantly reduced falls, and that exercise interventions that contained balance training (in the absence of walking exercise) and consisted of a higher dose of exercise (defined in this study as a minimum of 50 hours over the trial period, equating to two hours a week for a 6 month period) had the greatest effect on reducing falls (Sherrington et al., 2011). More recently, a systematic review of 283 fall prevention interventions and a network meta-analysis of 54 studies and 41,596 participants demonstrated that exercise alone and in various combinations of interventions was associated with a lower risk of injurious falls (Tricco et al., 2017). Briefly, a "[n]etwork meta-analysis compares multiple interventions simultaneously by analyzing studies making different comparisons in the same analysis" (Petticrew et al., 2013, p.1237). Because this form of evidence considers all available evidence (not just individual pair-wise comparisons), it provides a "fuller picture" by gaining precision and by more explicitly ranking treatments/interventions (Li, Puhan, Vedula, Singh, & Dickersin, 2011; Petticrew et al., 2013). Based on their network meta-analysis, the authors concluded that exercise is likely the most effective intervention to prevent falls and injuries from falls, such as hip fractures (Tricco et al., 2017). Yet another review and meta-analysis of 99 fall prevention exercise interventions for

community-dwelling older adults conducted by Sherrington and colleagues (2017), found that exercise reduced the rate of falls by 21%, with greater preventative effects seen in programs that provided a challenge to balance and involved more than three hours of exercise per week (Sherrington et al., 2017). Most recently, a 2019 systematic review of 108 randomized controlled trials with 23,407 participants evaluating the effects of any form of exercise as a single intervention on falls in community-dwelling older adults in 25 countries found that exercise reduced the rate of falls by 23%, equating to 195 fewer falls in the exercise group (Sherrington et al., 2019). Moreover, based on their analysis, the authors found that balance and functional exercises can reduce the rate of falls by 24% and the number of people experiencing one or more falls by 13% (Sherrington et al., 2019). Furthermore, exercise may also reduce the number of people experiencing fall-related fractures and the number of people requiring medical attention due to a fall (Sherrington et al., 2019).

2.6 What is Balance?

As noted in the existing systematic reviews, balance has been consistently identified as a critical component of effective fall prevention exercise. Balance has been defined as the ability to control the centre of mass in relationship with the base of support, where the centre of mass is the point at the centre of the total body mass, and the base of support is the area of the body that is in contact with the support surface (Shumway-Cook & Woollacott, 2007). It has been suggested that balance is comprised of six domains, known as the Systems Framework for Postural Control (Horak, 2006). Recently, the six original domains were adapted into nine operational definitions that can be uniquely evaluated (Sibley et al., 2015). These include functional stability limits, defined as the ability to move the centre of mass as far as possible in different directions; underlying motor systems, such as strength and coordination; static stability, defined as the ability to maintain position of the centre of mass during an unsupported stance when the base of support does not change; verticality, which is the ability to orient oneself appropriately with respect to gravity; anticipatory postural control, defined as the ability to shift the centre of mass before a voluntary movement; sensory integration, defined as the

ability to re-weight sensory information when this information changes; cognitive influences, which is the ability to maintain stability while attending to additional tasks; and reactive postural control, defined as the ability to recover stability after an external perturbation; and dynamic stability defined as the ability to maintain control over the centre of mass while the base of support is changing (Sibley, Beauchamp, Van Ooteghem, Straus, & Jaglal, 2015).

Put simply, balance is the ability to stay upright and steady while in movement (i.e., walking, running, etc.) and when stationary (i.e., standing, sitting, etc.). As such, balance is critical for daily activity and ultimately preventing falls (Tinetti & Kumar, 2010). Although standing and walking is usually done without conscious effort, controlling upright posture is a highly complex task that integrates sensory, neuromuscular, and central nervous system inputs (Maki & McIlroy, 2006).

The role of balance in fall avoidance. Static, dynamic, and anticipatory postural control are of particular importance in fall prevention because a dysfunction in these processes have been found to be significant predictors of future fall risk (Maki, Holliday, & Topper, 1994), and have been demonstrated in recurrent fallers (Maki, 1993), respectively. Reactive postural control, however, can be argued to be of most importance in preventing a fall because falls are ultimately avoided by having the ability to respond appropriately to external (i.e., slips or trips) or internal (i.e., self-initiated movement) balance perturbations (Maki & McIlroy, 1996). Therefore, balance recovery reactions, such as quickly grasping a nearby object (i.e., a railing) and taking a step (Mansfield, Peters, Liu, & Maki, 2010) are particularly key in fall prevention. However, the framework stipulates that each component can lead to a balance impairment and so each should be individually considered and trained.

Balance exercise for fall prevention. Evidence-based exercise recommendations for fall prevention have been proposed based on results from Sherrington and colleagues' meta-analysis (2017). The authors of the recommendations first conducted an update of their previous systematic

reviews (Sherrington et al., 2008; Sherrington et al., 2011). They searched through seven electronic databases and extracted data on study design, sample characteristics, intervention design, and estimates of exercise effects. The recommendations were developed through meta-regressions exploring the effects of intervention components (i.e., moderate and/or high intensity strength training, moderate and/or high challenge balance training, walking training or practice, two or more or three or more hours of exercise intervention per week).

Separate analyses were conducted by settings and conditions. As such, the evidence-based recommendations specify:

1. That exercise programs should aim to provide a high challenge to balance through reducing the base of support, moving the centre of mass and controlling body position while standing, and standing without using the arms for support. In other words, exercises for fall prevention should be relevant to fall avoidance by training balance during different tasks, with different body postures and bases of support (i.e., challenge balance in varying positions through exercises such as tandem stance and walking, and sideways walking (Sherrington & Henschke, 2013);
2. That at least 3 hours of exercise should be conducted per week;
3. That ongoing participation in exercise is necessary or benefits will be lost;
4. That fall prevention exercise should be targeted at the general community as well as community-dwellers with an increased risk of falls;
5. That fall prevention exercise may be undertaken in a group or home-based setting;
6. That walking training may be included in addition to balance training, but high-risk individuals should not be prescribed brisk walking programs;
7. That strength training may be included in addition to balance training;
8. That exercise providers should refer clients for other risk factors; and

9. That exercise alone may prevent falls in certain clinical populations (i.e., people with Parkinson's disease or cognitive impairment) and that exercise providers with specific expertise should deliver exercise to these groups (Sherrington et al., 2017).

2.7 Community Exercise Programs as a Potential Delivery Mode of Evidence-Based Fall Prevention Exercise

Many delivery modes have been employed for fall prevention exercises (i.e., home based exercise programs, one-on-one balance assessment and training with physical therapists, group-based, etc.). Group delivered programs offered in community settings warrant consideration because they are easily accessible (Lau et al., 2016) and have the potential of influencing older adults' health on a widespread scale. Group-delivered community exercise programs also provide social interaction for older adults, which can help reduce social isolation and feelings of loneliness (Hwang, Wang, Siever, Medico, & Jones, 2019), as well as act as a significant predictor of exercise adherence (Oka, King, & Young, 1995). Moreover, the World Health Organization (2008) emphasized that effective and successful uptake of community programs for fall prevention targeted for older adults are crucial for reducing the demands on the health-care system. As such, if these community exercise programs include effective fall prevention exercise components, they could influence the health of a wide range of community-dwelling older adults.

As such, community-based exercise programs may be a potential implementation strategy for group-delivered balance exercise that warrant more attention. These programs have been defined as exercise programs that intend to promote the health and well-being of its members (Lau et al., 2016). They may be publicly or privately funded (Lau et al., 2016), and are usually delivered by fitness instructors who have received specific training. This training may be done through partnerships between health care and recreational organizations wherein the fitness instructors are trained and supported by physical therapists (Harrington, Taylor, Hollinghurst, Reed, Kay, & Wood, 2010;

Salbach, Howe, Brunton, Salisbury, & Bodiam, 2014; Stuart et al., 2009b). Most programs involve group task-oriented exercises, including balance and mobility training, and take place in community centres usually run by non-profit organizations (i.e., YMCA), or municipal recreation divisions (Cramp, Greenwood, Gill, Lehmann, Rothwell, & Scott, 2010; Harrington et al., 2010; Salbach et al., 2014; Stuart et al., 2009b).

As such, a wide variety of community exercise programs has been reported in the literature. Many reported programs focus on general exercise (with components of stretching, strengthening, endurance, and aerobic exercises) and can target specific clinical populations, such as cancer survivors (Leach, Danyluk, Nishimura, & Culos-Reed, 2015; Musanti, Chao, & Collins, 2019), or other disabilities/chronic illnesses (Stuart, Chard, Benvenuti, & Steinwachs, 2009a), as well as non-clinical populations living in the community (Hwang et al., 2019). Community exercise programs for older adults focusing on balance exercises have also been reported. Namely, these can target clinical populations with balance or mobility impairments, such as older adults with cognitive impairments living in the community (Lewis, Peiris, & Shields, 2017), older adults with Osteoporosis (Carter, Khan, McKay, & Petit, 2002), and older adults with chronic strokes (Eng et al., 2003; Pang, Eng, Dawson, McKay, & Harris, 2005; Stuart et al., 2009a). Moreover, many exercise programs targeting posture, balance, gait, coordination, and hip and trunk stabilization have been developed and subsequently implemented in community settings, such as the Osteofit program developed and offered in British Columbia community centres to people with osteoporosis (Carter et al., 2001; Carter et al., 2002), and the Together In Movement and Exercise (TIME) program developed and implemented in Ontario targeted for individuals with stroke, acquired brain injury, multiple sclerosis or other mobility concerns (Salbach et al., 2014). However, as of yet very little is known regarding other existing community exercise programs for fall prevention offered across Canada. A 2010 Public Health Agency of Canada report conducted a scan of fall prevention programs and initiatives across Canada.

They identified 282 fall prevention initiatives, 205 of which reported using exercise (Scott et al., 2010). However, the report does not provide detail regarding the nature of the exercise initiatives, such as program delivery characteristics (i.e., frequency and length of classes, challenge of exercises, etc.) and exercise content, and thus it is not possible to determine whether the identified exercise initiatives are including evidence-based exercise recommendations for fall prevention.

A recent study conducted in Winnipeg, Manitoba attempted to bridge this knowledge gap by surveying community exercise programs for older adults to describe program delivery, exercise content, and assessment characteristics, and determine whether these programs included effective fall prevention exercises (Sibley, Touchette, Singer, Dubberley, & Oates, 2019). This was done through a cross-sectional self-report survey questionnaire administered in 2016 by telephone interview. Thirty-three eligible programs were identified through an existing inventory of Winnipeg community exercise programs for older adults. The inventory was developed through an environmental scan conducted by the Winnipeg Regional Health Authority. Of the 33 identified programs, nine individuals identified through the organization as most appropriate (usually program coordinators, managers, or instructors) participated in the telephone interview. Most of the participating programs did not explicitly focus on balance and/or fall prevention. Despite perceived effects on balance, most did not include all components of effective fall prevention exercise, though most programs included one or two of the recommendations. Specifically, two programs (22%) included the recommendation of conducting a total of three hours of exercise per week, eight programs (89%) prescribed mostly moderate or high challenge exercises, and three programs (33%) were offered on an ongoing basis (Sibley et al., 2019). Although this study contributed to the existing literature on community exercise programs by providing additional detail on program design and delivery characteristics, the scope was limited to one city in Canada and the sample size was small. Therefore, additional investigation into the potential for community exercise programs – in terms of what is currently being done in the

programs and whether they are including the evidence-based recommendations for effective fall prevention exercise – as implementation models for effective fall prevention exercises for older adults is warranted.

Moreover, there are many factors that could be influencing the potential of these programs, in terms of program design and delivery. For example, instructor characteristics may affect the inclusion of certain recommendations (i.e., conducting exercises that are a high challenge to balance), since instructors presumably have a strong influence on exercise class content as they can offer exercise modifications for clients to make the exercises more or less challenging. Program characteristics, such as frequency of classes offered, can also presumably have an impact on whether programs include the recommendations. For instance, if a program is only offered once a week, it is likely not able to offer the sufficient dose of balance exercises recommended per week. As such, in addition to further exploration into content, program design, and delivery characteristics of community exercise programs in Canada, investigation of factors that could influence these characteristics is needed. This information is crucial since any relationship found between instructor and program characteristics and whether the programs are including the recommendations in their design can then be used to tailor support strategies for modifiable factors.

A 2015 report emphasized that 4400 lives and 10.8 billion dollars could be saved by reducing falls by 20% across Canada within the next 20 years (Parachute, 2015). As the population ages and risk factors increase, finding effective methods in which to promote effective fall prevention exercises to reduce falling is crucial. Ensuring the availability of and accessibility to effective balance exercises is critical to help prevent falls. If community-based exercise programs include key components of evidence-based recommendations for fall prevention exercises, they could be an effective implementation strategy for widespread fall prevention in older adults. Describing existing programs, exploring whether they include evidence-based exercise recommendations for fall prevention, and

examining characteristics that may be associated with the inclusion of these recommendations is important because identifying strengths of existing programs, as well as any gaps highlighting the need for additional supports is a crucial first step to supporting implementation of effective fall prevention exercise (Graham et al., 2006; Straus, Tetroe, & Graham, 2013).

2.8 Theoretical Underpinning

The current study and its stated objectives are guided by the Knowledge to Action Framework – a conceptual framework developed and used to promote and drive knowledge creation and implementation (Graham et al., 2006). According to the framework, identifying the "gap" between the evidence (i.e., evidence-based recommendations) and actual practice (i.e., what is currently being done in community exercise programs for fall prevention) is the starting point of implementation of knowledge (Graham et al., 2006; Straus et al., 2013). This is an important first step to the implementation of knowledge because identified strengths of existing programs can then be used as examples of facilitators to knowledge use and identified gaps can help fuel research into barriers and tailored interventions for knowledge use. Without this crucial theory-driven first step in the process of knowledge translation, implementation efforts would be considered "[…] an expensive version of trial-and-error with no a priori reason to expect success […]" (Eccles, Grimshaw, Walker, Johnston, & Pitts, 2005, p.108). As such, the current study first describes the current state of community exercise programs in Canada, examines whether they are including the recommendations for effective fall prevention exercise, and explores instructor and programs characteristics that may be associated with whether the programs are indeed including the recommendations.

2.9 Objectives

The first objective of the study was to describe characteristics of fall prevention and balance training community exercise programs for adults aged 50 years and older in Canada. Specifically, this study described program design (i.e., exercise class duration and frequency, home exercises, program

duration, challenge), exercise content, target population and inclusion/exclusion criteria, and program demographics and instructor background. The second objective was to determine whether the programs included evidence-based practice recommendations for fall prevention (Sherrington et al., 2017). Specifically, the recommendations consist of programs offering at least three hours of challenging balance exercises per week, on an ongoing basis throughout the year. The third objective was to determine which program and/or instructor characteristics were associated with the inclusion of evidence-based recommendations for fall prevention.

Chapter 3: Methods

3.1 Study Design

The study applied a quantitative cross-sectional design. This was done through the administration of an electronic self-report survey questionnaire following a modified Dillman recruitment strategy. The Checklist for Reporting Results of Internet E-Surveys (CHERRIES) recommendations for survey conduct and reporting was adopted where appropriate (Eysenbach, 2004). The CHERRIES checklist was developed to ensure complete descriptions and quality of reporting electronic survey methodology. The checklist includes items regarding the study design (i.e., survey design, ethics approval, consent information, and data protection), development and testing of the questionnaire, recruitment process and sample description, administration of the questionnaire, response rates, prevention multiple entries from the same individual, and analysis. The checklist focuses on Web-based surveys (i.e., administered on the internet), though it is also valid for questionnaires administered via e-mail, such as the questionnaire used in this study (Eysenbach, 2004). Refer to Appendix A for the completed CHERRIES checklist. Ethics approval was obtained from the University of Manitoba health research ethics board prior to any research activity. All communications with participants were available in both official languages, with French immediately following English and with the option to complete the translated French questionnaire.

3.2 Sampling Frame

Group community exercise programs targeting community-dwelling older adults (minimum 50 years and older) that focused on fall prevention or balance training, specifying the reduction of falls and/or the improvement of balance as a primary goal of the program constituted the sample for this study. For the purpose of the current study, the age limit for these programs was a minimum of 50 years and older in order to include programs that may have had different age restrictions. Results from a preliminary study (Sibley et al., 2019), which examined program design and assessment characteristics of older adult community exercise programs in Winnipeg, Manitoba, demonstrated that general exercise programs, tai chi programs, or yoga programs did not explicitly focus on training balance or preventing falls. Therefore, the scope of the current study was to explore characteristics of programs that focused on fall prevention and balance training and determine whether they were including the evidence-based exercise recommendations for fall prevention in their design. This first step is done prior to increasing the scope to general exercise programs or other types of exercise programs (i.e., yoga, tai chi, pilates, etc.) since it has been suggested that programs that did not focus on fall prevention may simply not prioritize the fall prevention recommendations if this was not a primary goal of the program (Sibley et al., 2019).

Furthermore, given the current stigma involved in “fall prevention initiatives” language, in which older adults may not want to participate due to fear of stigma and stereotyping (McInnes, & Askie, 2004) or because it does not seem relevant to them (i.e., they do not see themselves as “at risk” of falling) (Yardley & Todd, 2005), eligible programs did not require “fall prevention” language in the title of the program or organization. However, to ensure that they were indeed eligible, they needed to focus on fall prevention or balance training, specifying the reduction of falls and/or the improvement of balance as a primary goal.

Specifically, eligible programs included the following criteria:

1) Group exercise classes offered to community-dwelling older adults (minimum of 50 years or older) living independently outside of government-funded healthcare (Chateau et al., 2019);
2) Take place within the community (i.e., facilities such as community centres, recreational facilities, churches, etc.); and
3) Fall prevention and/or improving balance as a primary goal.

If programs consisted of multiple components (i.e., education module, assessment, etc.) only the exercise component was explored.

3.3 Participants

Questionnaire participants were instructors/leaders of the exercise program. The instructor/leader was the individual who may have been in charge of any and/or all of the following tasks: Planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc. The instructor was chosen as the questionnaire participant for this study as it is presumed that they could offer important information regarding on scene exercise modifications, client behaviours, and could provide the most detail on what is actually happening within the exercise program classes. The instructors/leaders were either identified by the organization/program coordinator or self-identified as the instructor/leader during the recruitment process. Informed consent was assumed for all individual participants who returned the electronic questionnaire.

3.4 Search Strategies

Four online search strategies conducted through Google Chrome were used to identify potentially eligible programs to contact, informed in part by previously-published search strategies for identifying community exercise and fall prevention programs (Fullerton et al., 2008; Scott et al., 2010). Overall, this consisted of 1) searching regional health authorities for each Canadian province

and territory (n=13 total), 2) searching through the organization Finding Balance (https://findingbalance.ca), 3) conducting four separate iterations of key words “fall prevention”, “balance training”, “exercise classes”, and “programs” in combination with the province name in the Google search engine and 4) searching for programs through the YMCA Canada webpage (https://ymca.ca/Locations), as they provide a comprehensive list of all older adult exercise programs they offer. Searching through the organization Finding Balance was done because this organization works in partnership with regional health authorities, public health organizations, community health groups, various seniors’ groups, health care organizations, and clinicians across Canada to provide older adults and practitioners with information and resources (https://findingbalance.ca). The student principal investigator and the research assistant conducting the online searches manually reviewed the search results for websites or resources that included the words or phrases “mobility”, “balance”, “physical activity”, “fall prevention”, “fall initiatives”, “fall intervention”, “exercise”, and/or “resources”. Any website or webpage that included these terms was investigated further. In order to eliminate non-eligible programs prior to contact, program names and information were included only if they specified fall prevention and/or balance in the description, if they were group delivered, and conducted in the community for community-dwelling older adults (i.e., no one-on-one in hospital/physio). Programs identified as potentially relevant based on the publicly available information were added to an excel spreadsheet containing the name of the organization/program, the province, the city, and any contact information for the program/organization. A detailed description of the online search strategies can be found in Appendix B.

A first complete search was conducted from November 2018 to December 2018 by the student principal investigator and a research assistant (divided the provinces and territories), identifying 326 programs. During the piloting phase of the study (January 2019-March 2019), the eligibility criteria was expanded to include programs led by peers/volunteer. In order to identify potentially eligible

programs that fit the expanded eligibility criteria, another complete search was conducted by a research assistant in March 2019, identifying an additional 127 potentially eligible programs to be contacted. The combined searches identified a total of 453 potentially eligible programs ([BC (n=76), AB (n=37), SK (n=54), MB (n=32), ON (n=184), QC (n=37), NL (n=8), NS (n=11), NB (n=9), PEI (n=2), NT (n=1), YT (n=2)].

Given that there are no comprehensive lists of all fall prevention/balance training community exercise programs for older adults throughout Canada, an additional recruitment strategy consisted of asking instructors, program coordinators, and community centres identified through the above searches to forward the study's information to any other instructor, program coordinator, or community centre who may be eligible to participate. Any additionally identified programs or persons were then added to the excel spreadsheet.

3.5 Questionnaire Instrument

Questionnaire development. A self-administered cross-sectional electronic questionnaire was developed for this study. Draft questions were adapted and modified from a similar study conducted in Winnipeg, Manitoba (Sibley et al., 2019) to fit the stated objectives of the current study. Specifically, questions were informed by aspects of the fundamental principles of exercise design, often referred to as the FITT principle (American College of Sports Medicine, 2014). The components of the FITT principle, namely frequency, intensity, time, and type, constitute the exercise dose, quantity, and type of exercises needed in order to improve health (Billinger, Boyne, Coughenour, Dunning, & Mattlage, 2015). The questionnaire also included clarifying/specifying questions for more detail.

The questionnaire was piloted with a total of 14 participants prior to the data collection phase, and all changes from piloting the questionnaire were discussed and approved by the research committee. The piloting phase participants were identified and recruited using a snowball sampling

strategy through the research team contacts and networking (i.e., conferences, community presentations, workshops, etc.). Identified participants were asked about other relevant programs and instructors, who were then contacted by the student principal investigator. Initial responses were limited to Saskatchewan (n=1), Manitoba (n=3), and Ontario (n=7). Targeted recruitment was done for programs in British Columbia (n=3), Alberta (n=4), Nova Scotia (n=1), and Quebec (n=1) by randomly selecting from the list of programs identified through the online searches. Following this targeted recruitment, three additional participants were included in the piloting phase [BC (n=2), SK (n=1), MB (n=3), ON (n=7), QC (n=1)].

Piloting the questionnaire was done through an iterative process wherein each participant received an updated version of the questionnaire based on the previous participant's feedback. Overall, pilot participants were asked to think out loud and comment on their thought processes in answering the questions and using the online questionnaire platform, while on the phone with the student principal investigator. The French translated questionnaire was also piloted in order to ensure clarity and appropriate translations. Refer to Appendix D for more detail regarding the piloting phase.

Final questionnaire instrument. The final questionnaire (please refer to Appendix C) contained 5 sections (20 total pages, excluding branching logic) with open- and closed-ended questions and took approximately 15-25 minutes to complete. The first page of the questionnaire consisted of the consent disclosure form. Consent was assumed if participants moved forward in the questionnaire. The first section of the questionnaire consisted of eligibility questions. If participant responses indicated they were not eligible, they were brought to the last page of the questionnaire which thanked them for their participation and concluded the questionnaire. If participants were eligible, they were brought to the next sections which asked about program design (21 questions, section 2). The Program design section focused on the first two objectives (i.e., describe characteristics of fall prevention and balance training community exercise programs for adults aged 50

years and older in Canada; determine whether the programs include evidence-based practice recommendations for fall prevention). Specifically, variables included program frequency (i.e., how often were classes conducted per week), length of classes for both total exercise time and balance specific time, program duration (i.e., whether the program was offered continually throughout the year or for a fixed period of time, and whether there were any restrictions on times an individual could sign up for the program), and balance challenge. Balance challenge was explored through multiple variables in different ways. For instance, variables assessed exercise modifications for making the exercises more or less challenging, exercise challenge progression, how exercise challenge was determined, how instructors perceived the balance challenge level (Littbrand, Rosendahl, & Lindelöf, 2014), and client behaviours that have been identified as potential markers for differentiating balance challenge level (Farlie, Molloy, Keating, & Haines, 2016). Additionally, the program design section of the questionnaire included variables relating to the prescription of home exercises and the provision of home and/or class resources. Overall, these questionnaire variables were used either directly (i.e., frequency) or indirectly through the creation of derived variables (i.e., frequency and length of class to calculate total exercise time per week) to determine whether the programs included evidence-based practice recommendations for fall prevention (objective two).

The exercise content section of the questionnaire (6 questions, section 3) included a list of 39 exercises organized into table matrices by type of exercise (i.e., 17 standing balance exercises, 17 walking exercises, 5 strength exercises) in which the instructors indicated whether they conducted the exercise, and if so, whether the clients performed them with or without arm support (for the balance and walking exercises) or while sitting or standing (for the strength exercises). The questions were organized as such to evaluate balance exercise challenge based on a previous coding scheme (Sibley et al., 2019). The next sections of the questionnaire asked about target population and inclusion/exclusion criteria (4 questions, section 4), such as whether the program targets any specific

older adult population, or has specific inclusion or exclusion criteria for participation, and demographic information about the program and the participant's background (8 questions, section 5), such as the province where the program is located, the first three digits of the postal code where the program is delivered, title/role, education background, specific training, and years of experience of the instructor. These questions, in addition to the previous sections were included in the final questionnaire as important variables for evaluating whether instructor and/or program characteristics were associated with the inclusion of the evidence-based exercise recommendations (objective three).

A "previous page" button was provided in order to allow participants to review and change their answers, and progress report was shown by a progress bar at the bottom of each page. In order to calculate whether the program was held in an urban or rural setting, participants were asked to report the first three digits of the postal code where they teach the program with the help of a postal code finder provided in the questionnaire. If participants taught the exercise program at multiple locations, they were asked to provide the first three digits of the postal code of each location. Refer to Table 1 for a list of the variables in the questionnaire.

Table 1: *List of Variables in the Questionnaire*

Survey Section	Question	Variable Name	Level	Coding	Used for derived variables (yes/no)*
Eligibility (section 1)	1. Is fall prevention and/or improving balance a primary goal of the exercise program?	Eligibility_goals	Dichotomous	0 = No 1 = Yes	No
	2. Is the exercise program directed for community-dwelling older adults (minimum 50+)?	Eligibility_population	Dichotomous	0 = No 1 = Yes	No
	3. Are you a primary instructor of the exercise program? The primary instructor is the individual who may be in charge of planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc.	Eligibility_instructor	Dichotomous	0 = No 1 = Yes	No
Program Design (section 2)	4. How many sessions/groups of the exercise program do you teach?	Sessions	Ordinal (3 levels)	1= 1 session 2= 2 sessions 3= 3 sessions or more	No
	5. How often are classes conducted per week?	Frequency	Ordinal (5 levels)	1= once per week 2= twice per week 3= three times per week 4= four times per week 5= five or more times per week	Yes
	6. How long is each class in hours?	Length_hrs	Ordinal (“other” responses coded	1= 0.5 2= 0.75	Yes

		into categories - 10 levels)	3= 0.92 4= 1 5= 1.25 6= 1.5 7= 1.75 8= 2 9= 2.25 10= 2.5	
7. How long is the exercise program offered?	Duration_1	Dichotomous	0= Fixed 1= Ongoing	Yes
8. Is there a maximum number of times that an individual can register for the exercise program?	Duration_2	Dichotomous	1= No 0= Yes	Yes
9. Please specify how many times a year the exercise program is offered and for how many weeks:	Duration_1_specify	Open ended question, coded into continuous values for sessions per year and weeks per session (ranges were kept)		No
10. Please specify the maximum number of times that an individual can register for the exercise program:	Duration_2_specify	Open ended question, coded	1= One to two times 2= More than two times 3= Other/depends	No
12. Are there significant differences in the fitness/ functional level of participants in the different sessions/ groups of the program that you teach (i.e., session/group A consists of older adults with lower	Sessions_differences	Dichotomous	0= No 1= Yes	No

functional level and session/group B consists of older adults with higher functional level)?				
13. In a typical class, how much time in minutes is spent on exercises targeting balance in standing or walking?	Length_2	Open ended question, coded into continuous values (ranges were kept)		Yes
14. When prescribing balance exercises, are options provided to allow participants to make the exercises more or less challenging?	Options_mods	Dichotomous	0= No 1= Yes	No
15. In general, how does the level of balance challenge change over the duration of the exercise program?	Challenge_progression	Nominal (3 levels)	0= Stays the same 1= Becomes less challenging 2= Becomes more challenging	No
16. What is the primary way in which you determine how challenging the balance exercises are for the participants?	Challenge_determine	Nominal (5 levels)	0= Time based (as weeks progress) 1= Participant's decision 2= Based on successful performance of exercises 3= Based on the recommendation/prescription of a doctor/physical therapist 4= Combination of factors 5= Other	No
17. In your opinion, do the majority (50% or more) of participants experience exercises which:	Perceived_challenge	Nominal	0= Never challenge balance 1= Exercises do not fully challenge balance or challenges balance only in a minority of exercises	No

				2= Exercises fully challenge balance in the majority of clients	
	18: During a typical balance exercise section of the exercise program, do you see any of the following behaviours in your participants? Check all that apply.	Exercise_behaviours	Nominal	0= Not seen 1= Seen in minority (<50%) of clients 2= Seen in majority (>=50%) of clients	
	20. Do you prescribe home exercises to participants?	Home_exercises	Dichotomous	0= No 1= Yes	No
	21. Do you provide out of class/home resources to participants?	Resources_home	Dichotomous	0= No 1= Yes	No
	22. Please specify what home exercises are prescribed to participants and how often they are prescribed:	Home_specify	Open ended question, coded	1= Exercises done in class 2= Brochure 3= Exercise journal 4= Other/unclear	No
	23. Please specify the out of class/home resources that are provided to participants:	Resources_specify	Open ended question, coded	1= Exercise sheets/brochure 2= Exercise equipment 3= Other/unclear	No
Exercise Content (section 3)	25. In a typical class, which of the following standing balance exercises do the majority (>=50%) of your participants perform? If yes, please check whether the majority (>=50%) of participants perform the exercise with or without arm support (i.e., chair, counter, wall, cane). Please note that support may be available for safety reasons.	Exercise_balance	Nominal	0= Does not prescribe 1= Yes- and the majority perform with arm support 2= Yes- and the majority perform without arm support	Yes

	26. In a typical class, which of the following walking balance exercises do the majority (>=50%) of your participants perform? If yes, please check whether the majority (>=50%) of participants perform the exercise with or without arm support (i.e., chair, counter, wall, cane). Please note that support may be available for safety reasons.	Exercise_walking	Nominal	0= Does not prescribe 1= Yes- and the majority perform with arm support 2= Yes- and the majority perform without arm support	Yes
	27. In a typical class, which of the following strength training exercises (i.e., using free weights and/or resistance bands and/or bodyweight only) do the majority (>=50%) of your participants perform? If yes, please check whether the majority (>=50%) of participants perform the exercise while standing or sitting.	Exercise_strength	Nominal	0= Does not prescribe 1= Yes- and the majority perform while sitting 2= Yes- and the majority perform while standing	No
Target Population (section 4)	31. Does the exercise program target any specific older population? Check all that apply.	Targ_pop_full	Nominal (4 levels)	1= Healthy older adults 2= Older adults with a previous fall history 3= Older adults with a specific health condition (i.e. Parkinson's, MS, arthritis, etc.) 4= Other	No
	32. Are there any specific inclusion and/or exclusion criteria of the exercise program?	inclu_exclu_full	Dichotomous	0 = No 1 = Yes	No

	33. Please check all the inclusion and/or exclusion criteria that apply from the list below, or specify other criteria:	Inclu_specify	Nominal (5 levels)	1= Minimum independence level (ex: walk independently, go to the washroom independently, etc.) 2= Minimum strength level (ex: able to do the lowest modification of the exercise) 3= Completion of medical clearance (ex: valid PAR-Q, doctor's note, etc.) 4= Minimum performance of specific tasks (ex: Standing on one leg for 2 seconds, standing for 20 minutes, etc.) 5= Other	No
Demographic Information (section 5)	35. In which province/territory is the exercise program located?	Province	Nominal (8 levels)	1= British Columbia 2= Alberta 3= Saskatchewan 4= Manitoba 5= Ontario 6= Quebec 7= Nova Scotia 8= New Brunswick	No
	36. What are the first three digits of the postal code of the location of the exercise program? If you teach the exercise program at multiple locations, please provide the first three digits of the postal code of each location.	Postal_digits	Open ended question, coded for Setting (see derived variables in Table 2)		Yes
	37. The exercise program is delivered by a:	Delivery	Nominal (4 levels)	1= Certified fitness professional 2= Health professional 3= Peer leader	No

			4= Other	
38. How many years of experience have you had instructing the exercise program?	Yrs_experience	Ordinal (6 levels)	1= 1 year or less 2= 2 years 3= 3 years 4= 4 years 5= 5 years 6= 6 years or more	No
39. What is your educational background/training? Check all that apply.	Ed_background_full	Nominal (5 levels)	1= Exercise Physiology/Kinesiology degree 2= Physical therapy degree 3= Nursing degree 4= Fitness professional (i.e., Can-Fit Pro, CSEP) 5= Other	Yes
40. Have you received any specific training or education in falls prevention?	Training	Dichotomous	0 = No 1 = Yes	No
41. Please specify the name of the falls prevention course/ training program that you received:	Training_specify	Open ended question, coded	1= Specific program training 2= University or health professional training 3= Older adult training 4= Other/unclear	No

Note. Open ended questions asking if there is anything else participants would like to share about a specific section of their exercise program are not included in this table.
* See Table 2 for list of derived variables.

Instructions were provided at the beginning of each section of the survey, and additional instructions were specified for questions with different response options (i.e., check all that apply (3 questions), please specify, etc.). To address a potential issue identified during the piloting phase wherein instructors taught multiple sessions/classes of the same program, further instructions were added at the beginning of every section to ask instructors to think of the classes they teach as a whole rather than focussing on one specific class/session. Additionally, at the end of each section, there was an open ended question which allowed instructors to share additional information about that section of their exercise program.

At the end of the questionnaire, participants were asked if they would be willing to be contacted about future studies. A link to a separate page was provided, where participants could enter their contact information if they were willing to be contacted about future studies. This contact information was stored in a different database separate from their questionnaire responses. On the next page, respondents were asked if they would like to receive a summary of the findings of the study. A link to another separate page was provided where participants could enter their contact information. This information was stored in a different database separate from their questionnaire responses.

The electronic questionnaire was created using SurveyMonkey online questionnaire software (Premier account). SurveyMonkey is a secure and user-friendly electronic data tool with multiple features conducive to data collection and analysis (i.e., multiple data collection methods such as a web link and an e-mail collector, multiple data export options, etc.). SurveyMonkey encrypts data throughout the entire research process (i.e., in transit and at rest) and names and e-mail addresses were excluded from the results. SurveyMonkey allowed for programming individualized custom variables into the questionnaire. This was important for the present study since it addressed the possibility of a single instructor teaching multiple classes/sessions within a single program, or an instructor teaching multiple programs. Creating a custom variable for the name of the program of interest ensured that

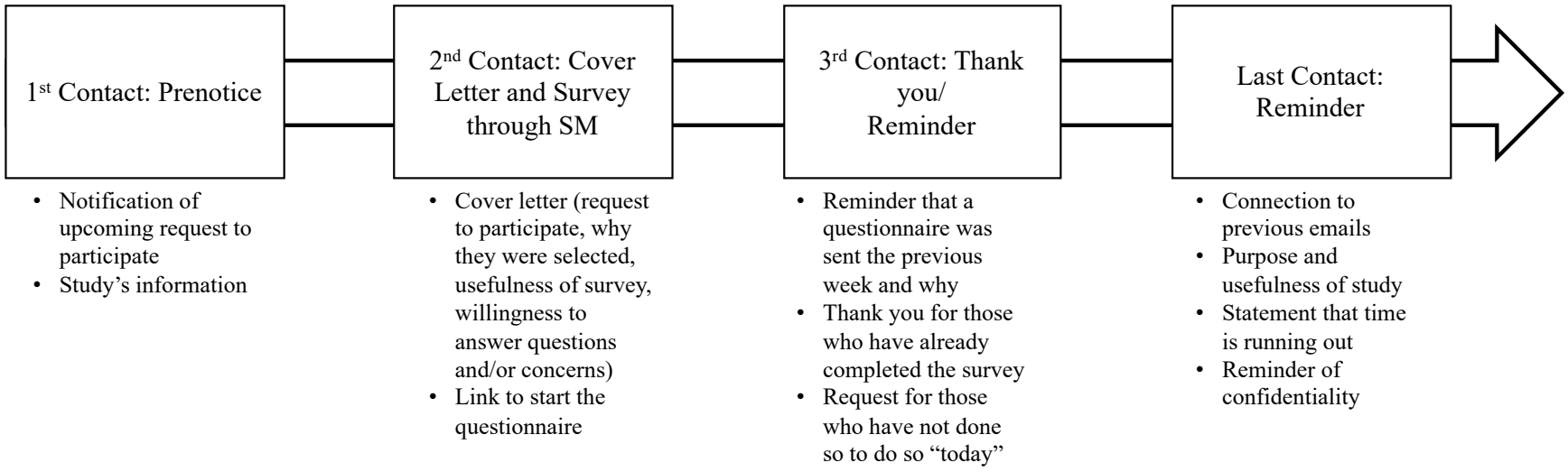
when the questionnaire was sent to participants, they received a personalized questionnaire with the name of the program of interest embedded into the questions. This, in addition to instructions throughout the questionnaire on how to respond to questions, reduced ambiguity and participant confusion by explicitly stating for which program participants should be answering. In short, SurveyMonkey was chosen for this study because the questions were low risk (i.e., descriptive of an exercise program) and no personal information was being collected into the results. Furthermore, SurveyMonkey allowed for branching logic (i.e., adaptive questioning/skip logic), in which certain questions were skipped based on the participant's previous responses. This reduced the number and complexity of questions and has been suggested to help response rates (de Leuuw et al., 2008; Dillman, 2007).

3.6 Procedure

The above mentioned online searches identified a total of 453 potentially eligible programs. This equated to a total of 334 potentially eligible participants/persons to contact, as many programs listed in the excel spreadsheet provided classes at multiple locations but only had one contact person listed. A modified Dillman approach was used for recruitment as this has been shown to increase response rates (Dillman, 2007; Fullerton et al., 2008). The modified Dillman approached utilized in this study involved four contact attempts, in which a prenotice e-mail was sent a week prior to the questionnaire and non-responders were sent a follow up e-mail reminder every week for two weeks. Given the different types of contact information gathered during the online searches, a recruitment contingency plan was developed depending on the available contact information. The overall goal of the recruitment contingency plan was to receive contact information for instructors when their e-mail/contact information was not publicly available through the online searches. Therefore, four modified recruitment templates were developed. The first option was to send a recruitment e-mail to the instructor if the potentially eligible program found through the online searches identified an

instructor and provided their e-mail address. However, if the primary instructor's e-mail address was not available through the searches but the program specified a program coordinator/contact person and provided their e-mail address, a modified e-mail was sent to this individual, asking their help to identify instructors. If both these options were not publicly available through the online searches, yet the e-mail address of the community centre where the program takes place was provided, a third modified e-mail was used, again asking for help identify instructors. As a last option, if the phone number of the community centre where the program takes place was the only contact information available, the student principal investigator and a research assistant used a telephone template to call the centre. All data collection phase e-mail/telephone invitations are attached in Appendix E. Figure 1 summarizes the Modified Dillman approach for recruitment contacts explained below.

Instructor Recruitment Plan:



Program Coordinator and Community Centre Recruitment Plan:

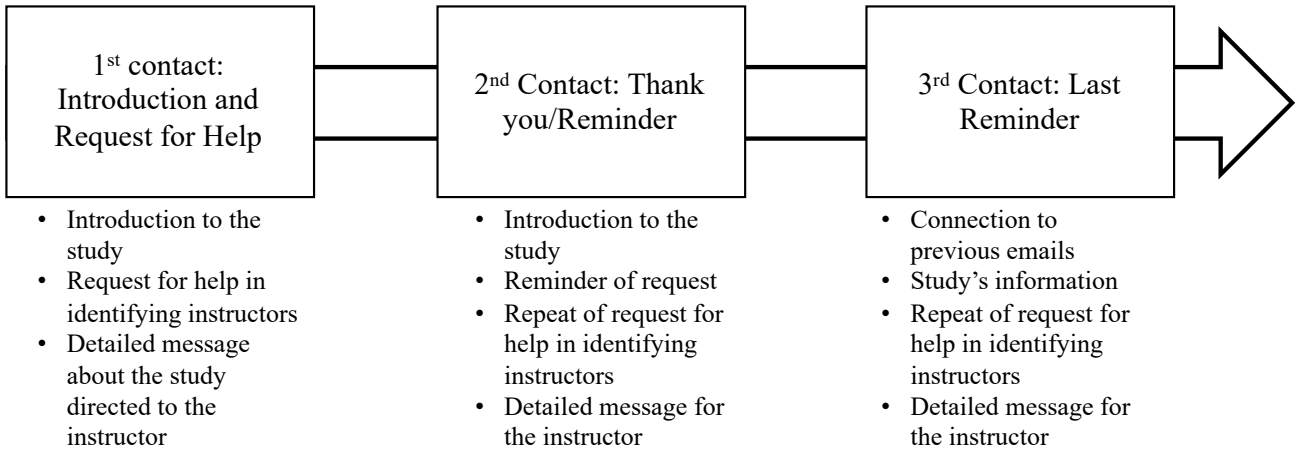


Figure 1. Modified Dillman approach for recruitment contacts. Contacts were done one week apart from one another. In the program coordinator and centre recruitment plans, if a primary instructor responded, further communications were directed to them.

Instructor plan. The first instructor contact consisted of a short and positive prenotice e-mail sent from the student principal investigator's e-mail which was sent a week prior to the questionnaire and stated that the e-mail was intended for the primary instructor of the program and kindly asked the recipient to forward the e-mail to the instructor if this was not them. A week later, the instructors would receive their second contact through SurveyMonkey, which consisted of the cover letter and link to begin the questionnaire. The cover letter followed the example provided by Dillman (2007, p.162), containing information on the request to participate in the study, why they were selected, the usefulness of the survey, confidentiality, willingness to answer questions or concerns, and a thank you.

A week after the cover letter and questionnaire were sent to the instructors, a thank you/reminder e-mail was sent via SurveyMonkey. According to Dillman (2007), one week is an appropriate interval of time to convey importance, without sounding impatient or unreasonable. The fourth and last contact consisted a last effort to encourage completion of the questionnaire. The e-mail sent via SurveyMonkey followed the template laid out by Dillman (2007, p. 185), containing a connection to previous e-mails, purpose and usefulness of the survey, a statement that time was running out, confidentiality, and a thank you statement. This e-mail also provided a link to the survey. No further reminders were done.

Program coordinator and community centre plans. The contact efforts directed to the program coordinators and community centres followed a similar pattern, though more detail about the study was added for the program coordinators. The first contact consisted of an introduction to the study and a request for help in identifying primary instructors by responding to the e-mail with the instructors' contact information or forwarding the content of the e-mail to the instructors of the program. A more detailed message directed to the instructors followed, consisting of an introduction to the study, the purpose of the study, a request to participate, why they were selected, the usefulness

of the questionnaire, confidentiality, willingness to answer questions or concerns, the contact information of the student principal investigator and the supervisor if the instructor is interested in participating, and a thank you statement. If a primary instructor responded, further communications were directed to them. Any questions or concerns were answered as promptly as possible by the student principal investigator.

The second contact directed to program coordinators and community centres was sent one week after the first contact and consisted of an introduction to the study, a reminder and repeat of the request to respond to the e-mail with the contact information of the instructors or to forward the content of the e-mail to the instructors, and a message directed to the instructors containing further information. If an instructor responded, further communications were directed to them.

A week after this second contact, a third and last e-mail was sent containing a connection to previous e-mails and a repeat of the request to respond to the e-mail with the contact information of the instructors or to forward the content of the e-mail to instructors. A more detailed message directed to the instructors followed. If a primary instructor responded, further communications were directed to them.

Phoned individuals. If the phone number of the centre where the program takes place was the only contact information available, the student principal investigator and a research assistant phoned the centre, using a telephone template. The template included a general introduction to the study, why they were being phoned, and a request to forward the student principal investigator's information to the instructor or for the primary instructor's contact information. If there was no answer, a message was left with a general introduction to the study, why they were being phoned, and a request to forward the student principal investigator's and the supervisor's contact information to the primary instructor. This was done once a week for three weeks as a reminder if there was no response or

contact with the student principal investigator. E-mail addresses received from these telephone contacts were added to the excel spreadsheet and further communications were directed there.

3.7 Data Management

Data from the questionnaires were entered into a password protected Microsoft Excel database. Open-ended questions were reviewed and coded into categories. Table 2 summarizes all derived variables. The urban and rural setting was manually coded by the student principal investigator by searching through a web-based list of Canadian postal codes for the corresponding city/town (https://en.wikipedia.org/wiki/Category:Postal_codes_in_Canada). This was done for each postal code and a new variable was created with the following coding scheme: 0= rural setting, 1= urban setting, 99= both rural and urban settings. A list of most frequently prescribed exercises was obtained based on whether participants prescribed the exercises listed in the questionnaire (regardless of form), and whether they were prescribed by at least three quarters of programs. For regression analyses, responses from Nova Scotia and New Brunswick were combined as Maritime provinces in order to have a minimum of five cases per predictor variable level.

Table 2: *List of Derived Variables*

Derived Variable Name	Label	How it was calculated	Coding
Total_time	Total exercise time per week	Frequency x Length_hrs	N/A (continuous variable)
3hr_total	At least 3 hours of total exercise per week	Total_time > 3	0= No 1= Yes
Ongoing	Offered on an ongoing basis	Duration_1 = 1 (offered on ongoing basis) AND Duration_2 = 1 (no restriction on number of times an individual can sign up for the program)	0= No 1= Yes
Total_balance_time	Total balance exercise time per week	Frequency x Length_2	N/A (continuous variable)
3hr_balance	At least 3 hours of balance specific exercise per week	Total_balance_time > 3	0= No 1= Yes

Exercise_challenge score	Total balance challenge score (max 5)	Using previous codes (Sibley et al., 2019), the exercises prescribed by the instructors (Exercise_balance and Exercise_walking) were given a balance challenged score	Low challenge= 0-1 Moderate challenge= 2-3 High challenge = 4-5
modhigh_challenge	Moderate to high challenge to balance	Exercise_challenge_score >=2	0= No 1= Yes
Setting_rural_urban	Setting in which program takes place	Responses in variable Postal_digits were manually coded by searching through a web-based list of Canadian postal codes for the corresponding city/town. (See variable Postal_digits in Table 1).	0= Rural 1= Urban 99= Both
Ed_back	Instructor educational background in health, falls prevention, older adults, or exercise	Responses in variable Ed_background_full were manually coded into dichotomous groups for educational background in related field.	0= No 1= Yes
targ_pop	Target any specific older adult population	Responses in variable Targ_pop_full were manually coded into dichotomous groups.	0= No 1= Yes
inclu_exclu	Presence of inclusion and/or exclusion criteria	Responses in variable inclu_exclu_full were manually coded into dichotomous groups.	0= No 1= Yes

All responses from instructor educational background were coded into a dichotomous variable for education in a related field (i.e., health, falls prevention, older adults, or exercise). Responses for target population and inclusion/exclusion criteria were coded into dichotomous groups (1= the program targeted a specific older adult population/had inclusion/exclusion criteria; 0= the program did not target a specific older adult population/does not have inclusion/exclusion criteria).

Total exercise time was calculated based on frequency and length of classes, and total balance specific exercise time was calculated based on frequency of classes and coded open-ended responses. Using previous codes (Sibley et al., 2019), the exercises prescribed by the instructors were given a balance challenge score. The coding scheme is based on the evidence-based practice recommendations and utilized a five-point summary score based on arm challenge, base of support challenge, and centre of mass challenge (Sibley et al., 2019). As with the original coding scheme which was developed with a typical community-dwelling older adult population, a total balance challenge score equal to or less than one was considered a low challenge, a score between two and three were considered a moderate challenge, and a total balance score equal to 4 or more were considered a high challenge. Program duration was calculated based on restrictions to registration and whether participants responded that the program was offered continually throughout the year or for a fixed period of time.

Inclusion of recommendations was coded into dichotomous variables (1= yes, 0= no) for each recommendation. Inclusion of recommendations was defined as conducting a total of at least three hours of balance specific exercise per week, prescribing mostly (>=50%) moderate to high balance challenge exercises, and being offered on an ongoing basis (i.e., offered continually throughout the year) with no restrictions on number of times an individual could sign up for the program. If any of these variables (or the variables used to calculate these outcomes) were unclear or missing, it was assumed that the recommendation was not included in the program. The current project mainly

focused on these first three recommendations in the analysis, though questions in the questionnaire touched on the others. These were chosen because the authors of the recommendations highlight that exercise programs that contained a high challenge to balance and conducted more than three hours of exercise a week reduced the rate of falls by 39%, and thus have larger preventative effects on falls (Sherrington et al., 2017). The ongoing recommendation was analyzed in the current study as well because it is important to consider sustainability of balance exercise benefits in order to have a continued impact on falls.

Questionnaire responses were kept for analysis unless they were incomplete (i.e., missing more than one full section), or if they were missing variables used to calculate two or more of the three recommendation variables. For example, if a questionnaire response was missing variables to calculate whether their program conducts three hours of exercise per week, but all other variables to calculate whether the program was ongoing, and the exercise challenge level was complete, the questionnaire response was included in the analysis. “Other” response options were coded into the available response options or coded into new categories when appropriate. If the response was unclear or there was a small number (<5) of responses in a given category, the responses were kept as “other”.

3.8 Data Analysis

Demographics of the questionnaire respondents were summarized using descriptive statistics. The first and second objectives (describe characteristics [program design, exercise content, and target population] of fall prevention and balance training community exercise programs for adults aged 50 years and older in Canada and determine whether they include evidence-based exercise recommendations for fall prevention) were analyzed using descriptive statistics (means, frequencies, proportions).

Regression analysis followed the purposeful selection approach outlined by Hosmer, Lemeshow, and Sturdivant (2013). As a first step, individual logistic regression was conducted to

identify which program and instructor characteristics (independent variables) were associated with whether the exercise program was offered on an ongoing basis (dependent variable). Individual regressions were first conducted for each independent variable, and those found to be significantly associated with the dependent variable ($p < 0.20$) were considered for the final model. The use of a significance level of .20 is based on the recommendation of Hosmer et al. (2013), as they highlight that a lower significance level of .05 or .01 often fails to identify potentially important variables that could be contributing in a clinically significant manner. Although using a higher significance level as a screening criterion can lead to the inclusion of variables that are not important at this initial stage of the model, the next steps of the purposeful selection reviews the variables more critically. A summary of the variable codes used for the regression are provided in Table 3.

Table 3: *List of Variables Included in Regression Analyses*

Variable names	Variable Label	Coding
3hr_total	At least 3 hours of total exercise per week	0= No 1= Yes
modhigh_challenge	Moderate to high challenge to balance	0= No 1= Yes
Options_mods	Options provided for increasing or decreasing balance challenge level	0= No 1= Yes
Challenge_progression	How balance challenge progressed	0= Stays the same 1= Becomes less challenging 2= Becomes more challenging
Challenge_determine	How balance challenge was determined	0= Time based (as weeks progress) 1= Participant's decision 2= Based on successful performance of exercises 3= Based on the recommendation/prescription of a doctor/physical therapist 4= Combination of factors 5= Other

Perceived_challenge	Instructor perceived challenge	1= Exercises do not fully challenge balance or challenges balance only in a minority of exercises 2= Exercises fully challenge balance in the majority of clients
Home_exercises	Prescription of home exercises	0= No 1= Yes
Resources_home	Provision of class/home resources	0= No 1= Yes
targ_pop	Target any specific older adult population	0= No 1= Yes
inclu_exclu	Presence of inclusion and/or exclusion criteria	0= No 1= Yes
delivery	Who delivers the exercise program	1= Certified fitness professional 2= Health professional 3= Peer leader 99= Other
yrs_experience	Years of experience instructing the exercise program	1= 1 year or less 2= 2 years 3= 3 years 4= 4 years 5= 5 years 6= 6 years or more
Ed_back	Instructor educational background in health, falls prevention, older adults, or exercise	0= No 1= Yes
training	Instructor fall prevention specific training	0= No 1= Yes
Province_maritimes	Province where the program takes place (Maritimes combined together)	1= British Columbia 2= Alberta 3= Saskatchewan 4= Manitoba 5= Ontario 6= Quebec 7= Maritimes
Setting_rural_urban	Setting in which program takes place	0= Rural 1= Urban 99= Both

As a second step, a multiple logistic regression was conducted with all combinations of program and instructor characteristics found to be significant in the individual regressions, and predictors were eliminated from the model if they were not significant ($p < 0.05$). Next (step three), estimated coefficients of variables in significant reduced models ($p < 0.05$) were compared for changes in magnitude (a change in magnitude over 20% indicated that one or more of the excluded predictor variables are important and should be added back into the model). For example, the estimated coefficient for variable X in the larger model with more predictors was compared to the estimated coefficient for variable X in the reduced model. If the change in magnitude is over 20% between variable X in the reduced model and variable X in the larger model, the excluded predictor Y was added back into the model.

The next step in purposeful selection was to add each predictor variable that was not significant by themselves in the individual analysis to the model obtained at the end of step three. This was done to ensure that the variables that were not significant by themselves were not contributing in a significant way when in the presence of other predictor variables.

Interaction effects among the variables included in the model based on the previous steps were examined as a sixth step of purposeful selection. If the new model with the interaction effects was found to be statistically significant ($p < 0.05$), the interaction was kept in the final model.

Goodness-of-fit of the model was assessed with the Hosmer–Lemeshow statistic (a non-significant result indicated a good fit) and by calculating the area under the Receiver Operating Characteristic (ROC) curve (generates a value between 0.5 and 1.0 with higher values indicating better discriminative power) (Hosmer et al., 2013).

Odds ratios (ORs) and associated 95% confidence intervals are reported for significant associations in the individual and final model. Data analysis was conducted using IBM SPSS Statistics Premium.

Chapter 4: Results

4.1 Recruitment

Data collection occurred between May 2019 and July 2019. Recruitment flow is illustrated in Figure 2 below. Initial recruitment consisted of contacting a total of 334 potentially eligible persons. Reasons for ineligibility from the initial contacts were the program was no longer offered (n=9), and program did not fit eligibility criteria (n=4) (i.e., 1:1 assessment, offered for nursing home residents only, offered for all ages). Reasons for declining to participate included the instructor was contracted through a different company (n=4), the instructor no longer working at the facility (n=5), no sessions offered during the data collection period (n=5), and no reason was specified (n=3). A total of 232 instructors were identified through snowball sampling (24 from the online searches and 208 from the snowball sampling approach) to receive the questionnaire through SurveyMonkey. Questionnaires were returned in the SurveyMonkey portal for 171 participants (74% response rate calculated from the total number of submitted questionnaires [171] divided by the total number of sent questionnaires [232] (Eysenbach, 2004)). Of the returned 171 questionnaires, 21 participants were not eligible, and ten participants did not complete the questionnaire. Analysis was conducted on 140 completed questionnaires. Demographic information for the program locations and settings are provided in Table 4 below.

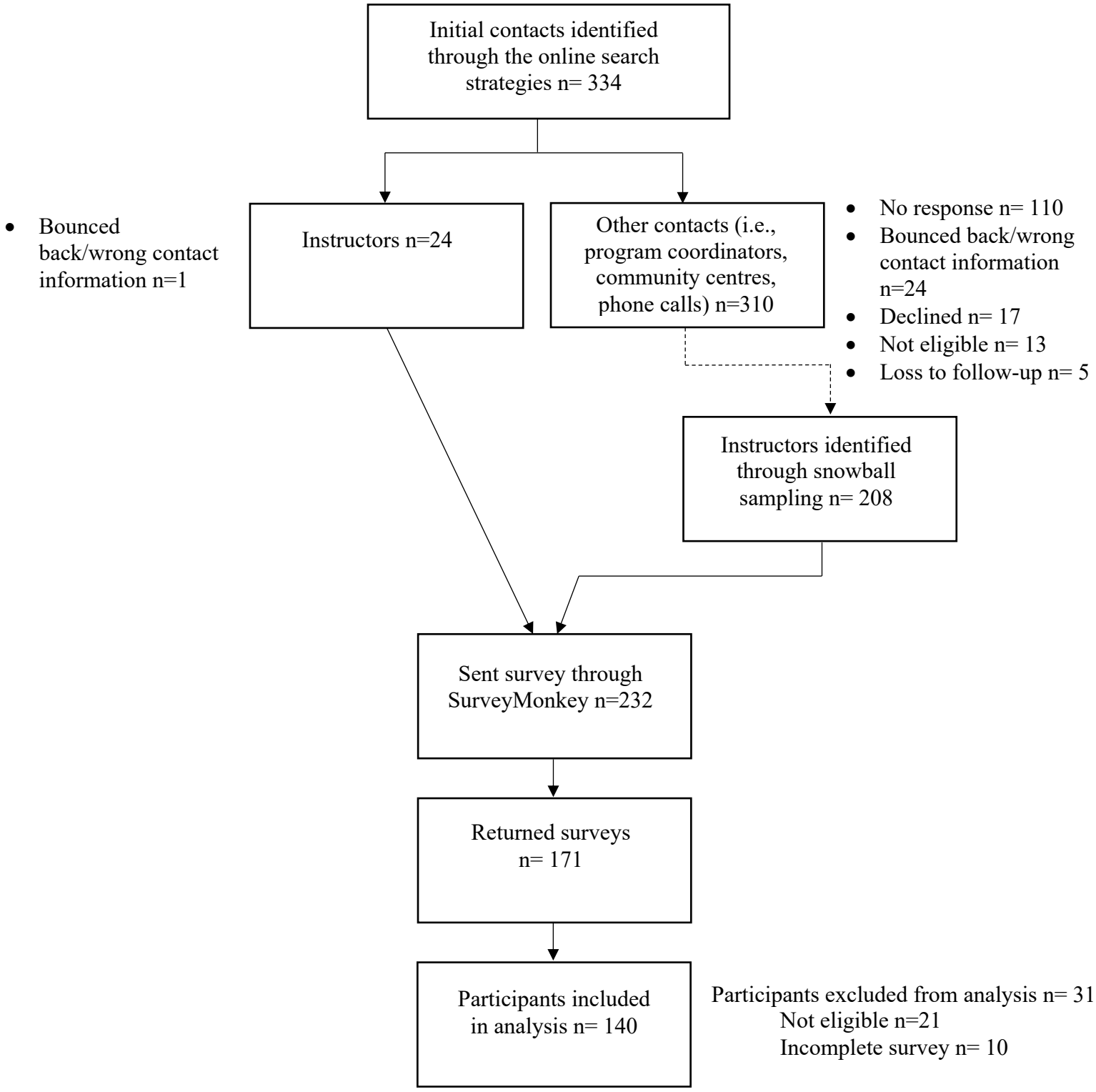


Figure 2. Recruitment flowchart. The dotted line indicates the non-linear process in which instructors were identified through program coordinators, other instructors, and community centres forwarding the study's information, or the student PI receiving the instructor's e-mail addresses from the other contacts.

Table 4: *Demographic Information for Program Location and Setting*

Province	Number of programs	Percent of programs
British Columbia	20	14%
Alberta	14	10%
Saskatchewan	15	11%
Manitoba	13	9%
Ontario	66	47%
Quebec	6	4%
Maritimes	5	4%
Skipped	1	0.7%
Setting		
Urban	92	66%
Rural	34	24%
Both	8	6%
Skipped/Unclear	6	4%

4.2 Instructor and Program Characteristics *(Objective one: describe characteristics of fall prevention and balance training community exercise programs for adults aged 50 years and older in Canada [target population and inclusion/exclusion criteria, program design, and exercise content]).*

A summary of instructor and program characteristics can be found in Table 5. Participants reported a range of educational backgrounds, the most frequently reported being some sort of certification (i.e., CAN FIT PRO, CSEP, CCAA, personal trainer certificate, group fitness, provincial certification, etc.) (n=81, 58%), and health care professional (n=62, 44%), with the majority of participants reporting receiving specific training or education in falls prevention (n=109, 78%). The majority of participants reported having 4 or more years of experience in their role (n=73, 52%).

Table 5: *Summary of Instructor and Program Characteristics*

Characteristics		Number of programs	Percent of programs
Instructor educational background			
	Certification	81	58%
	Health care professional	62	44%
	Other fitness/sports/physical training	22	16%
	Specific fall prevention/older adult training	16	11%
	Education/teaching degree	12	9%
	None	8	6%
	Other	6	4%
Specific training or education in falls prevention?	Yes	109	78%
	No	30	21%
	Skipped	1	0.7%
Years of experience in their role	1 year or less	25	18%
	2 years	17	12%
	3 years	24	17%
	4 years	17	12%
	5 years	13	9%
	6 years or more	43	31%
	Skipped	1	0.7%
Program delivered by			
	Certified fitness professional	69	49%
	Health professional	34	24%
	Peer-leader	29	21%
	Other	7	5%
	Skipped	1	0.7%
Different sessions/groups taught	1	53	38%
	2	35	25%
	3 or more	52	37%
Significant differences in fitness/ functional level of different sessions/groups	Yes	59	68%
	No	28	32%

Specific older adult population targeted	No	21	15%
	Yes	119	85%
	Healthy older adults*	48	28%
	Older adults with a previous fall history*	41	24%
	Older adults with a specific health condition*	20	12%
	All of the above*	47	27%
	Others:*	16	9%
	Anyone at risk of falls/trouble with balance*	9	5%
	Anyone with mobility difficulties*	7	4%
Specific inclusion criteria	No	78	56%
	Yes	62	44%
	Minimum strength level**	61	98%
	Completion of medical clearance**	35	56%
	Minimum performance of specific tasks**	48	77%
	Minimum independence level**	27	44%
	No serious/unstable medical or neurological disorders**	5	8%
	Other (age, transportation, language, income, falls history/risk)**	7	11%
Exercise frequency (# classes/week)	1 per week	33	24%
	2 per week	83	59%
	3 per week	10	7%
	4 or more per week	8	6%
	Other/unclear	6	4%
Class length (in hours)	<1hr	39	28%
	1hr	81	58%
	>1hr - <2hr	17	12%
	2hr	2	1%
	Other/unclear	1	0.7%
Prescription of home exercises	Yes	93	66%
	No	47	35%
Provision of class/home resources	Yes	93	66%
	No	47	35%

Program duration	Continually throughout the year	63	45%
	Fixed period of time	77	55%
Exercise challenge (perceived challenge)	Fully challenge balance	108	77%
	Do not fully challenge balance or challenge balance only in a minority (<50%) of exercises	32	23%
	Never challenge balance	0	0%
Provision of options to allow participants to make the exercises more or less challenging	Yes	135	96%
	No	3	2%
	Other	2	1%
Progression of balance exercise challenge over the duration of the exercise program	Stays the same	27	19%
	Becomes less challenging	4	3%
	Becomes more challenging	109	78%
Primary way in which the balance exercise challenge is determined	As weeks progress, challenge increases	32	23%
	Client's successful performance of previously completed balance exercises	58	41%
	Client's own decision	32	23%
	Combination of factors	12	9%
	Other	6	4%

**Note.* Proportions calculated based on total number of programs that targeted a specific older adult population (n=172).
***Note.* Proportions calculated based total number of programs that had specific inclusion/exclusion criteria (n=62).

Most participants reported that the program was delivered either by a certified fitness professional (i.e., CAN FIT PRO, CSEP, CCAA, etc.) or a health professional (i.e., kin, physiotherapist, etc.) (n=103, 74%). The majority of participants reported teaching two or more separate sessions/groups of the exercise program (n=87, 62%) and of those that reported teaching

more than one session, the majority responded that there were significant differences in the fitness/ functional level of participants in the different sessions/groups (n=59, 42%).

Most participants reported that their programs targeted at least one specific older population (n=172, 123%) and had specific inclusion criteria (n=62, 44%). The inclusion/exclusion criteria most frequently reported was a minimum strength level (ex: able to do the lowest modification of the exercise, ability to move around for an hour, etc.) (n=61, 44%).

The majority of participants (n=83, 59%) reported that their programs were offered twice a week. Length of class per week ranged from 0.5 hours to 2 hours per class, with the majority of participants (n=81, 58%) reporting each class lasting one hour. A majority of participants (n= 84, 60%) reported a total of at least 2 hours of exercise offered per week. The majority of participants (n=93, 66%) reported both prescribing/recommending exercises to be done at home and providing class/home resources to clients, while 38 participants (27%) reported doing one or the other, and 28 (20%) of participants reported doing neither.

The majority of participants (n=77, 55%) reported that their programs were offered for a fixed period of time, ranging from one to ten times per year, ranging from 3 to 40 weeks per session. Many programs varied per season, and a few were offered at various times throughout the year except for the summer. Of those programs that were offered continually throughout the year (n=63, 45%), four programs (6%) had a restriction on the amount of times an individual could register (2 times; depending on registration [accepting new participants first and depending on room will accept repeaters; restricted to 5 days a week; not specified). The remaining 59 programs (42%) did not have a restriction on registration.

Regarding perceived challenge of balance exercises, the majority of participants (n=108, 77%) estimated that the majority (50% or more) of their clients were being fully challenged (i.e., the balance exercises performed near the limits of postural stability). When asked about exercise options to allow

clients to make the exercises more or less challenging, almost all participants (n=135, 96%) reported providing options/modifications. When probed about the progression of balance exercise challenge over the duration of the exercise program, the majority of participants (n=109, 78%) reported that the balance exercises became more challenging. Out of the 140 participants, 32 (23%) reported that the primary way in which they determine the balance exercise challenge level was time based (i.e., as weeks progress, challenge increases).

Of the 17 balance/stability exercises, 12 exercises (regardless of form) were prescribed by three-quarters of programs. Of the 17 walking exercises, five exercises were prescribed by three-quarters of programs. Over 80% of participants (n>112) reported that they conducted all five categories of strength exercises with the majority of their clients. Put together, of the 39 balance, walking, and strength training exercises listed in the questionnaire, 21 (54%) were prescribed by three-quarters of programs. A summary of the most frequently prescribed exercises with their respective challenge scores can be found in Table 6.

Table 6: *Most Frequently Prescribed Exercises and Their Challenge Scores*

Exercises and Form	Number of Programs (%)		Challenge Score (max = 5)	
	The majority perform with arm support	The majority perform without arm support	With arm support	Without arm support
Sit to stand (up from chair)	31(22%)	107 (76%)	3	4
Raising arms- any direction	20 (14%)	115 (82%)	1	2
Heel raises	70 (50%)	63 (45%)	2	4
One-legged stance	91 (65%)	42 (30%)	1	3
Basic standing, focused on not leaning/staying upright relative to the floor/gravity	23 (16%)	108 (77%)	0	1
Walking (comfortable pace)	10 (7%)	121 (86%)	2	3
Basic standing comfortable position	14 (10%)	116 (83%)	0	1
Standing narrow stance	40 (29%)	89 (64%)	1	2
Standing tandem (toe-heel directly in front of one another)	64 (46%)	65 (46%)	1	3
Standing wide stance	13 (9%)	115 (82%)	0	1
Shifting weight as far as possible in either direction	60 (43%)	68 (49%)	1	3
Hip strategy weight shifts	52 (37%)	70 (50%)	1	3

Ankle strategy weight shifts	55 (39%)	67 (48%)	1	3
Walking sideways- side steps	18 (13%)	98 (70%)	2	3
Heel to toe (tandem) walking	45 (32%)	67 (48%)	3	4
Walking while talking	12 (9%)	99 (71%)	1	3
Walking and changing directions (i.e., a turn of more than 45 degrees)	22 (16%)	83 (59%)	3	5
Strength Exercises and Forms	The majority perform while sitting	The majority perform while standing		
Legs (e.g., squats, lunges, etc.)	16 (11%)	117 (84%)		N/A
Arms (e.g., bicep curl, triceps extension, etc.)	50 (36%)	77 (55%)		N/A
Chest (e.g., wall push-ups, chest press, etc.)	31 (22%)	92 (66%)		N/A
Shoulders (e.g., overhead press, deltoid lateral raise, etc.)	57 (41%)	65 (46%)		N/A
Core (e.g., plank, seated ab crunch, rows, etc.)	91 (65%)	24 (17%)		N/A

4.3 Evidence-Based Fall Prevention Exercise Recommendations *(objective two: determine whether the programs include evidence-based practice recommendations for fall prevention).*

A summary of programs including the effective fall prevention exercise recommendations can be found in Table 7. Regarding inclusion of the duration recommendation, a number of participants (n= 16, 11%) reported that their exercise program offered at least 3 hours of total exercise per week. However, when looking specifically at total time spent on balance exercises (as per the recommendation), participants reported spending a wide range of time on balance specific exercises per week (range from 5 minutes to 200 minutes), with only one participant (0.7%) specifying that their program spent at least three hours on balance specific exercises per week. A quarter of programs (n=35, 25%) spent a minimum of 20 minutes or less on specific balance exercises.

Table 7: *Summary of Programs Including Effective Fall Prevention Exercise Recommendations*

Recommendations	Number of programs	Percent of programs
Moderate to high challenge to balance	133	95%
At least 3 hours of exercise per week	1	0.7%
Offered on an ongoing basis	59	42%
Programs including more than one component*	55	39%
Moderate to high challenge to balance and at least 3 hours of exercise per week	1	0.7%
Moderate to high challenge to balance and offered on an ongoing basis	55	39%
Offered on an ongoing basis and at least 3 hours of exercise per week	1	0.7%

Note. One program included all three components.

Regarding the balance exercise challenge, 7 programs (5%) prescribed mostly (>50%) low challenge balance exercises, 100 programs (71%) prescribed mostly moderate balance exercises, and none prescribed mostly high balance exercises. However, 32 programs (23%) prescribed a

combination of either low, moderate, or high challenge balance exercises, with no majority in either category. When combining the moderate and high challenge balance exercises, the majority of programs (n=133, 95%) prescribed mostly moderate or high challenge balance exercises (>=50%).

According to the information provided by participants, just below half of the programs were offered on an ongoing basis (n=63, 45%), with 59 (42%) programs being offered continually throughout the year and without any restrictions on registration, thus including the duration exercise recommendation.

Of the 140 participants surveyed, one program (0.7%) included all three recommendations, while 55 programs (39%) included two recommendations (regardless of which two). The majority of programs (n=137, 98%) included at least one of the three effective fall prevention exercise recommendations, while three programs (2%) included none.

4.4 Instructor and Program Characteristics Associated with Program Duration *(objective three: determine which program and/or instructor characteristics were associated with the inclusion of evidence-based recommendations for fall prevention).*

Initially, a multiple logistic regression examining program and instructor characteristics associated with the inclusion of all three recommendations was proposed (objective three: determine which program and/or instructor characteristics were associated with the inclusion of evidence-based recommendations for fall prevention). However, preliminary descriptive analyses showed that only one program included all three recommendations. Therefore, it was not feasible to conduct regression analyses with only one program including the outcome variable (i.e., including all three recommendations). As an alternative, individual recommendations were considered as separate outcome variables. However, preliminary descriptive analyses showed that almost all programs (95%) offered a moderate to high challenge to balance (see results section 4.3), and again only one program (0.7%) included at least 3 hours of balance specific exercises per week. Regression analyses were

therefore not feasible with these two outcome variables. Preliminary results showed that there was a more even distribution of programs that were offered on an ongoing basis (42%) and programs that were not offered on an ongoing basis (58%) (i.e., offered for a fixed period of time). Therefore, in light of statistical recommendations for regression analysis, it was decided to conduct regression analyses on this outcome variable only. This revised analysis was exploratory and followed the purposeful selection approach outlined in the methods. To determine factors associated with whether a program was offered on an ongoing basis or offered for a fixed period of time, the dependent variable (ongoing) was coded as 1 = ongoing, 0 = not ongoing.

Results from the individual logistic regressions (step one of purposeful selection) showed that the only program and instructor characteristics with significant associations ($p < 0.20$) with whether a program was offered on an ongoing basis were: prescription of home exercises, provision class/home resources, who delivered the program, presence of inclusion/exclusion criteria, and instructor having a related educational background. Specifically, programs offered on an ongoing basis were less likely to include the prescription of home exercises (OR= 0.389, 95% CI .189 - .798), provide class or home resources (OR= 0.444, 95% CI .217 - .908), be delivered by a health professional (OR= .497, 95% CI .202 – 1.221), have specific inclusion or exclusion criteria (OR= 0.476, 95% CI .238 - .952), and have an instructor with an educational background in a related field (OR= 0.166, 95% CI .044 - .628). Results of all individual logistic regressions are summarized in Table 8.

Table 8: *Results of Individual Logistic Regression Analyses*

Predictor variables	Odds ratio (95% CI)	Significance level
3hr total exercise (yes vs. no)	1.431 (.504 – 4.063)	*p = .500*
Mod/high challenge yes (vs. not)	.529 (.114 – 2.458)	*p = .416*
Challenge_determine		*p = .232*
Participant's decision (vs. time based)	3.000 (1.041 – 8.646)	*p = .042*
Successful performance (vs. time based)	2.613 (1.008 – 6.770)	*p = .048*
Doc/PT prescribed (vs. time based)	3.000 (.168 – 53.710)	*p = .455*
Combination of factors (vs. time based)	1.500 (.355 – 6.347)	*p = .582*
Other/Unclear (vs. time based)	9.000 (.816 – 99 .254)	*p = .073*
Fully challenged perceived challenge (vs. do not fully challenge/only in minority)	1.284 (.571 – 2.888)	*p = .545*
Prescription of home exercises (vs. no prescription of home exercises)	**0.389 (.189 - .798)**	***p* = .010**
Provision of class/home resources (vs. no provision of class/home resources)	**0.444 (.217 - .908)**	***p* = .026**
Specification of target population (vs. no target population)	1.109 (.422 – 2.910)	*p = .834*
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	**0.476 (.238 - .952)**	***p* = .036**
Delivery		***p = .117***
Health Professional (vs. Certified fitness professional)	.497 (.202 – 1.221)	*p = .127*
Peer Leader (vs. Certified fitness professional)	1.698 (.708 – 4.069)	*p = .235*
Other (vs. Certified fitness professional)	1.839 (.382 – 8.852)	*p = .447*
Years of experience		*p = .446*
2 years (vs. 1 year or less)	1.889 (.530 – 6.727)	*p = .326*

3 years (vs. 1 year or less)	1.275 (.392 – 4.143)	*p = .686*
4 years (vs. 1 year or less)	.885 (.232 – 3.380)	*p = .859*
5 years (vs. 1 year or less)	3.400 (.840 – 13.761)	*p = .086*
6 years or more (vs. 1 year or less)	1.848 (.658 – 5.187)	*p = .244*
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	**0.166 (.044 - .628)**	***p* = .008**
Instructor having received training (vs. not received training)	1.095 (.481 – 2.495)	*p = .829*
Province_maritimes		*p = .520*
Alberta (vs. British Columbia)	1.630 (.411 – 6.459)	*p = .487*
Saskatchewan (vs. British Columbia)	1.397 (.364 – 5.353)	*p = .626*
Manitoba (vs. British Columbia)	.367 (.077 – 1.749)	*p = .208*
Ontario (vs. British Columbia)	.958 (.350 – 2.620)	*p = .933*
Quebec (vs. British Columbia)	.244 (.024 – 2.489)	*p = .234*
Maritimes (vs. British Columbia)	0 (0 – N/A)	*p = .999*
Setting		*p = .771*
Urban (vs. Rural)	1.036 (.456 – 2.349)	*p = .933*
Both (vs. Rural)	1.538 (.437 – 5.418)	*p = .502*

Note. Values and predictors in bold were significant at the $p < 0.20$ level.

Multiple logistic regression results from all combinations of significant program and instructor characteristics (step two) showed that the only combination of predictors with significant associations ($p < 0.05$) were: Educational background and home exercises (Model 19), and educational background and class/home resources (Model 22). Results of all combinations of program and instructor characteristics are summarized in Table 9.

Table 9: *Multiple Logistic Regression Results of All Combinations of Instructor and Program Characteristics*

Predictor variables	Odds ratio (95% CI)	Significance level
Model with all five predictors:		
Model 1		
Prescription of home exercises (vs. no prescription of home exercises)	0.560 (.241 – 1.302)	$p = .178$
Provision of class/home resources (vs. no provision of class/home resources)	0.629 (.273 – 1.449)	$p = .276$
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	0.227 (.047 – 1.101)	$p = .066$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	0.777 (.352 – 1.717)	$p = .533$
Delivery		$p = .753$
Health Professional (vs. Certified fitness professional)	.621 (.238 – 1.621)	$p = .330$
Peer Leader (vs. Certified fitness professional)	.983 (.327 – 2.954)	$p = .976$
Other (vs. Certified fitness professional)	1.375 (.261 – 7.233)	$p = .707$
Models with four predictors:		
Model 2		
Prescription of home exercises (vs. no prescription of home exercises)	.552 (.238 – 1.278)	$p = .166$
Provision of class/home resources (vs. no provision of class/home resources)	.606 (.265 – 1.385)	$p = .235$
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.226 (.047 – 1.088)	$p = .064$
Delivery		
Health Professional (vs. Certified fitness professional)		$p = .596$

Peer Leader (vs. Certified fitness professional)	.570 (.227 – 1.433)	$p = .232$
Other (vs. Certified fitness professional)	1.012 (.339 – 3.022)	$p = .982$
	1.456 (.280 – 7.581)	$p = .656$
Model 3		
Prescription of home exercises (vs. no prescription of home exercises)	.519 (.232 – 1.158)	$p = .109$
Provision of class/home resources (vs. no provision of class/home resources)	.657 (.293 – 1.476)	$p = .309$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.719 (.332 – 1.560)	$p = .404$
Delivery		$p = .451$
Health Professional (vs. Certified fitness professional)	.625 (.239 – 1.633)	$p = .338$
Peer Leader (vs. Certified fitness professional)	1.548 (.626 – 3.830)	$p = .344$
Other (vs. Certified fitness professional)	1.534 (.302 – 7.784)	$p = .606$
Model 4		
Prescription of home exercises (vs. no prescription of home exercises)	.464 (.215 – 1.003)	$p = .051$
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.248 (.052 – 1.187)	$p = .081$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.732 (.335 – 1.6002)	$p = .435$
Delivery		$p = .760$
Health Professional (vs. Certified fitness professional)	.616 (.237 – 1.602)	$p = .321$
Peer Leader (vs. Certified fitness professional)	1.004 (.337 – 2.993)	$p = .994$
Other (vs. Certified fitness professional)	1.274 (.240 – 6.771)	$p = .776$
Model 5		
Prescription of home exercises (vs. no prescription of home exercises)	.541 (.234 – 1.249)	$p = .150$
Provision of class/home resources (vs. no provision of class/home resources)	.634 (.276 – 1.455)	$p = .282$

Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.211 (.053 – .837)	$p = .027$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.670 (.318 – 1.410)	$p = .292$
Model 6		
Provision of class/home resources (vs. no provision of class/home resources)	.500 (.233 – 1.071)	$p = .075$
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.189 (.040 – .892)	$p = .035$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.752 (.341 – 1.655)	$p = .479$
Delivery		$p = .694$
Health Professional (vs. Certified fitness professional)	.609 (.234 – 1.583)	$p = .309$
Peer Leader (vs. Certified fitness professional)	.942 (.317 – 2.800)	$p = .915$
Other (vs. Certified fitness professional)	1.534 (.298 – 7.880)	$p = .609$
Models with three predictors:		
Model 7		
Prescription of home exercises (vs. no prescription of home exercises)	.447 (.208 – .962)	$p = .039$
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.249 (.053 – 1.183)	$p = .080$
Delivery		$p = .568$
Health Professional (vs. Certified fitness professional)	.554 (.222 – 1.383)	$p = .205$
Peer Leader (vs. Certified fitness professional)	1.045 (.354 – 3.087)	$p = .936$
Other (vs. Certified fitness professional)	1.361 (.260 – 7.116)	$p = .715$

Model 8		
Prescription of home exercises (vs. no prescription of home exercises)	.511 (.229 – 1.138)	$p = .100$
Provision of class/home resources (vs. no provision of class/home resources)	.627 (.282 – 1.395)	$p = .252$
Delivery		$p = .262$
Health Professional (vs. Certified fitness professional)	.560 (.222 – 1.408)	$p = .217$
Peer Leader (vs. Certified fitness professional)	1.600 (.651 – 3.936)	$p = .306$
Other (vs. Certified fitness professional)	1.660 (.331 – 8.329)	$p = .538$
Model 9		
Prescription of home exercises (vs. no prescription of home exercises)	.450 (.209 – .967)	$p = .041$
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.226 (.057 – .887)	$p = .033$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.632 (.304 – 1.315)	$p = .220$
Model 10		
Prescription of home exercises (vs. no prescription of home exercises)	.444 (.211 – .936)	$p = .033$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.681 (.317 – 1.463)	$p = .325$
Delivery		$p = .476$
Health Professional (vs. Certified fitness professional)	.621 (.239 – 1.616)	$p = .329$
Peer Leader (vs. Certified fitness professional)	1.515 (.615 – 3.729)	$p = .366$
Other (vs. Certified fitness professional)	1.411 (.276 – 7.205)	$p = .679$
Model 11		
Prescription of home exercises (vs. no prescription of home exercises)	.521 (.228 – 1.194)	$p = .123$

Provision of class/home resources (vs. no provision of class/home resources)	.594 (.262 – 1.346)	$p = .212$
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.196 (.050 – .769)	$p = .019$
Model 12		
Prescription of home exercises (vs. no prescription of home exercises)	.501 (.229 – 1.096)	$p = .083$
Provision of class/home resources (vs. no provision of class/home resources)	.640 (.290 – 1.409)	$p = .267$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.569 (.277 – 1.170)	$p = .125$
Model 13		
Provision of class/home resources (vs. no provision of class/home resources)	.478 (.225 – 1.013)	$p = .054$
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.186 (.040 – .875)	$p = .033$
Delivery		$p = .510$
Health Professional (vs. Certified fitness professional)	.551 (.221 – 1.375)	$p = .202$
Peer Leader (vs. Certified fitness professional)	.973 (.330 – 2.874)	$p = .961$
Other (vs. Certified fitness professional)	1.645 (.322 – 8.412)	$p = .550$
Model 14		
Provision of class/home resources (vs. no provision of class/home resources)	.497 (.233 – 1.060)	$p = .071$
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.178 (.046 – .691)	$p = .013$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.640 (.306 – 1.336)	$p = .234$

Model 15		
Provision of class/home resources (vs. no provision of class/home resources)	.515 (.244 – 1.087)	$p = .082$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.699 (.324 – 1.508)	$p = .361$
Delivery		$p = .329$
Health Professional (vs. Certified fitness professional)	.608 (.235 – 1.577)	$p = .307$
Peer Leader (vs. Certified fitness professional)	1.642 (.672 – 4.012)	$p = .276$
Other (vs. Certified fitness professional)	1.800 (.364 – 8.890)	$p = .471$
Model 16		
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.201 (.043 – .939)	$p = .041$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.669 (.310 – 1.445)	$p = .306$
Delivery		$p = .674$
Health Professional (vs. Certified fitness professional)	.587 (.228 – 1.510)	$p = .269$
Peer Leader (vs. Certified fitness professional)	.949 (.323 – 2.791)	$p = .925$
Other (vs. Certified fitness professional)	1.423 (.279 – 7.261)	$p = .671$
Models with two predictors:		
Model 17		
Prescription of home exercises (vs. no prescription of home exercises)	.474 (.218 – 1.029)	$p = .059$
Provision of class/home resources (vs. no provision of class/home resources)	.586 (.270 – 1.272)	$p = .176$
Model 18		
Prescription of home exercises (vs. no prescription of home exercises)	.427 (.204 – .896)	$p = .024$
Delivery		$p = .261$

Health Professional (vs. Certified fitness professional)	.544 (.218 – 1.361)	p = .193
Peer Leader (vs. Certified fitness professional)	1.571 (.642 – 3.841)	p = .323
Other (vs. Certified fitness professional)	1.533 (.306 – 7.687)	p = .604
Model 19		
Prescription of home exercises (vs. no prescription of home exercises)	**.419 (.197 – .890)**	***p* = .024**
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	**.211 (.054 – .818)**	***p* = .024**
Model 20		
Prescription of home exercises (vs. no prescription of home exercises)	.428 (.206 – .890)	p = .023
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.537 (.264 – 1.094)	p = .087
Model 21		
Provision of class/home resources (vs. no provision of class/home resources)	.486 (.233 – 1.014)	p = .055
Delivery		p = .155
Health Professional (vs. Certified fitness professional)	.537 (.216 – 1.338)	p = .182
Peer Leader (vs. Certified fitness professional)	1.704 (.702 – 4.138)	p = .239
Other (vs. Certified fitness professional)	1.979 (.402 – 9.740)	p = .401
Model 22		
Provision of class/home resources (vs. no provision of class/home resources)	**.456 (.217 – .958)**	***p* = .038**
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	**.161 (.042 – .617)**	***p* = .008**
Model 23		

Provision of class/home resources (vs. no provision of class/home resources)	.500 (.241 – 1.040)	$p = .064$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.538 (.264 – 1.096)	$p = .088$
Model 24		
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.198 (.043 – .921)	$p = .039$
Delivery		$p = .415$
Health Professional (vs. Certified fitness professional)	.508 (.206 – 1.249)	$p = .140$
Peer Leader (vs. Certified fitness professional)	.997 (.342 – 2.905	$p = .996$
Other (vs. Certified fitness professional)	1.560 (.311 – 7.838)	$p = .589$
Model 25		
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.625 (.295 – 1.325)	$p = .220$
Delivery		$p = .323$
Health Professional (vs. Certified fitness professional)	.598 (.230 – 1.512)	$p = .271$
Peer Leader (vs. Certified fitness professional)	1.618 (.670 – 1.908)	$p = .285$
Other (vs. Certified fitness professional)	1.646 (.337 – 8.041)	$p = .538$
Model 26		
Instructor educational background in health, falls prevention, older adults, or exercise (vs. no educational background in related fields)	.188 (.049 – .716)	$p = .014$
Presence of inclusion/exclusion criteria (vs. no inclusion/exclusion criteria)	.565 (.276 – 1.157)	$p = .118$

Note. Models in bold were significant at the $p < .05$ level.

Given that educational background appeared in both significant models, estimated coefficients for this variable were compared when alone in a model to its values in each Model 19 (educational background and home exercises) and Model 22 (educational background and class/home resources) (step three). This showed a change in magnitude of 21% when home_exercises was added into the model and a change of 3% when class/home resources was added into the model. Based on Hosmer et al. (2013), the higher change in magnitude for home exercises showed that it was an important contributor and therefore was added into the final model, whereas the lower change in magnitude associated with class/home resources showed that it was not an important contributor.

No other predictor variables were found to be contributing in a significant way when each predictor that was not significant by themselves during the individual logistic regression was added, one at a time, to the model from Step three (step four/five). The Ed_back*home_resources interaction was explored in the model (step six) but was nonsignificant and thus removed from the final model.

Therefore, the final model (Model 19 in Table 9) included home exercises and educational background. Specifically, programs offered on an ongoing basis were less likely to include the prescription of home exercises (OR= .211, 95% CI .054 – .818), and have an instructor with an educational background in a related field (OR= .419, 95% CI.197 – .890). The final model met the criteria for appropriate goodness-of fit (Hosmer–Lemeshow test p = .821), but had poor discrimination (*ROC* = .656, 95% CI .561 – .750), as specified by Hosmer et al. (2013).

Chapter 5: Discussion

To our knowledge, this was the first national study that investigated the content of community exercise programs for fall prevention targeted to older adults. The study's stated objectives were met by exploring instructor and program characteristics (i.e., program design, exercise content, target population and inclusion/exclusion criteria, and program demographics and instructor background) of community group exercise programs targeted for community-dwelling older adults for fall prevention

in Canada, finding that only one program of the total 140 surveyed included all three evidence-based exercise recommendations for fall prevention. Moreover, participant and program factors found to be associated with whether a program was offered on an ongoing basis were instructor educational background in a related field, and prescription of home exercises. The next section will discuss these findings in further detail, explain strengths and limitations of the current study, and suggest future research in this field.

5.1 Inclusion of Evidence-Based Recommendations

The major finding of the current study was the varied distribution of programs including the recommendations. Specifically, virtually all programs (95%) reported including a moderate to high challenge to balance, only one program (0.7%) included at least three hours of balance exercises per week, and just below half of programs (42%) were offered on an ongoing basis. With regards to the balance challenge recommendation, virtually all programs (95%) reported including a moderate to high challenge to balance. Similarly, most instructors estimated that the majority of their clients were being fully challenged during balance exercises (i.e., the balance exercises performed near the limits of postural stability). The method in which balance challenge was quantified was very different for these two variables. Perceived challenge was based on the instructor's self-report and overall response for all clients, whereas the coding scheme was based on exisiting recommendations, quantifying challenge based on exercises prescribed. Moreover, given that the client population for the programs were community-dwelling older adults, programs that prescribed mostly moderate and high challenge exercises were considered as including the balance challenge recommendation and although the coding framework utilized in this study addressed issues in previous balance challenge measurement, additional considerations are recommended in future studies (Sibley et al., 2019). As such, considering the self-report nature of the perceived challenge, and the current study's combination of moderate to high challenge as including the challenge recommendation, and the coding framework

used, these results should be interpreted with caution as they may be inaccurately representing the true level of balance challenge. Furthermore, the different insight into balance challenge levels highlight the need for a comprehensive method in which to effectively measure the complex nature of balance challenge.

Regarding the inclusion of at least three hours of balance exercise, only one program included the recommended three hours per week. It is beyond the scope of the current study to speculate as to the reasons behind the limited inclusion of the time recommendation. However, there is evidence in the literature regarding challenges in implementation of fall prevention programs (Child et al., 2012). Moreover, personal barriers such as lack of time and lack of education have also been reported in previous research as important barriers to providing evidence-based practice (Salbach, Jaglal, Korner-Bitensky, Rappolt, & Davis, 2007; Sibley, Straus, Inness, Salbach, & Jaglal, 2013). Another common barrier to uptake of strength and balance exercise programs highlighted in a recent report is the lack of appropriate community venues available in an area (i.e., recreation or leisure centres, community venues, gyms, etc.) (Centre for Ageing Better, 2019). Therefore, it may not be feasible for some programs to include three hours of balance specific exercises per week due to various personal, organizational, and systemic barriers. However, future research investigating potential barriers to the inclusion of three hours a week of balance exercise is warranted.

In regard to the ongoing duration recommendation, 42% of programs were offered on an ongoing basis. Although ongoing exercise is necessary to maintain its effects (Sherrington et al., 2017), two things are important to consider: 1) although the majority of programs included a moderate to high challenge to balance, none included mostly high challenge exercises, and only one program conducted 3 hours of balance challenge per week; and related, 2) progression in challenge of exercises has been highlighted as a key component to promote improvements and benefits of the exercise program (Centre for Ageing Better, 2019). These are important to consider because first, although

more than half of the programs were offered on an ongoing basis, as a whole, findings from this study showed that they were not including the two other characteristics of effective exercise programs (i.e., high challenge to balance, and 3 hours of balance exercise per week). Although these programs included at least one of the effective characteristics, it is important to consider the recommendations as a whole in order to distinguish successful interventions from less successful interventions (Sherrington et al., 2017). Second, the related component of progression in challenge is important to consider because, although balance challenge was scored as a whole in the current study, not everyone has the same abilities or will progress at the same rate. In other words, certain exercises may be very challenging to some, and very easy to others. Therefore, in certain cases, progression to a potentially more challenging program would not be appropriate (Centre for Ageing Better, 2019), and so having a program that is offered on an ongoing basis could be beneficial for individuals who were being sufficiently challenged in a program and would like to continue within that same program. Yet, as mentioned, it is important to consider the recommendations as a whole for components of effective fall prevention exercise.

5.2 Instructor and Program Characteristics Associated with Ongoing Recommendation

The exploratory analysis revealed that instructor educational background in a related field and the prescription of home exercises were the only variables significantly associated with whether a program was offered on an ongoing basis. Education (i.e., entry-to-practice degree, highest degree obtained) has been shown to influence implementation of evidence-based practice in physical therapy, where lack of education acted as a barrier for the implementation of evidence-based practice (Salbach et al., 2007). The difference in the present study around the influence of educational background may be due to the small number of instructors with an educational background not relevant to the field, or due to the wide range of educational backgrounds reported. Furthermore, given that the revised plan

for the regression analysis was exploratory in nature, the results should be interpreted with caution, implications are limited, and further investigation into these relationships is warranted.

The results of the current study showed that programs that were offered on an ongoing basis were less likely to prescribe exercises at home. It is beyond the scope of the current study's results to speculate at the rationale behind the association between the prescription of home exercises and the ongoing duration of programs. Notably, the importance of home exercises has been demonstrated in the literature as a method of reaching a fuller dose of exercise required to see results (Centre for Ageing Better, 2019; Sherrington et al., 2017). Although the current study did not analyze the exercises prescribed at home, nor investigate client's adherence to these exercises, future studies should investigate the role of home exercises in the implementation of evidence-based group delivered fall prevention exercise programs.

In contrast, many program and instructor characteristics known to influence evidence-based practice were not significantly associated with whether a program was offered on an ongoing basis. For example, a study investigating barriers to evidence-based practice in physical therapists showed that rural settings were less likely to receive sufficient organizational resources to support evidence-based practice, compared to urban settings (Salbach et al., 2007). Moreover, it is likely that the variables included in the survey may not have touched on factors that have stronger predictive effects on the inclusion of the recommendations. Many personal, organizational, or systemic barriers could affect whether a program is offered on an ongoing basis. For instance, commonly cited organizational barriers to providing evidence-based practice in the literature include the location and type of facility, the number of full time staff, funding (Salbach et al., 2007), and unavailable tools and lack of equipment (Sibley et al., 2013). As such, it is critical for instructors to receive the appropriate support they need in order to deliver evidence-based exercises (Centre for Ageing Better, 2019).

Another notable finding to consider is that the program delivery variable (i.e., who delivers the exercise program) was not a significant predictor for whether a program was offered on an ongoing basis. This result was somewhat surprising given the important role of education in the implementation of evidence-based practice in physical therapy (Salbach et al., 2007). However, most participants (74%) reported that the program was delivered either by a certified fitness professional or a health professional, with less than a quarter of the programs reported to be led by a peer leader/volunteer. It is therefore possible that the sample size of the current study was unable to capture significant differences in this variable. In contrast, a report highlights that including trained volunteers can be mutually beneficial for them as well as for the clients (Centre for Ageing Better, 2019). Further investigation into this relationship, and the influence of delivery characteristics on implementation of evidence-based practice is needed as training volunteers to deliver programs could have important implications as a potential method of reaching more older adults by increasing the number of available programs, especially in remote or rural areas.

5.3 Strengths, Limitations, and Considerations

Overall, the study was strengthened by an extensive piloting phase, as this crucial step allowed for the questionnaire to be tested by real instructors of community exercise programs for fall prevention in different contexts. In particular, the piloting phase provided feedback for the development of clear, appropriate, and relevant questions. Feedback from the piloting phase also led to the development of the recruitment contingency plans, which ultimately increased the sample size. For example, it has been suggested that contacting potential participants through telephone can increase response rates compared to e-mail (Danko, Dahabreh, Ivers, Moher, & Grimshaw, 2019). This was demonstrated in the current study as the rate of non-responders contacted through phone calls in the current study was low (15%) and provided an additional 56 e-mail addresses of potentially eligible participants. As such, this recruitment method may be an option for future research in this

area given that many programs did not provide an e-mail address, and in order to reduce the risk of recruitment e-mails being misidentified as spam or junk. However, recruitment through phone calls requires more time than contacting through e-mail, and can cost more (Danko et al., 2019).

Furthermore, the use of an online questionnaire through SurveyMonkey allowed for programming individualized custom variables into the questionnaire, thus reducing ambiguity and participant confusion by explicitly stating for which program participants should be answering. Furthermore, SurveyMonkey allowed for branching logic, which helps reduce the number and complexity of questions and may increase response rates (de Leuuw et al., 2008; Dillman, 2007). However, the self-report nature of the study is a limitation of the study, as this can lead to response bias (Liamputtong, 2017). Other survey research limitations include that they rely on participants' interpretations of questions (Liamputtong, 2017) and that the data can lack detail or depth on the topic (Kelley, Clark, Brown, & Sitzia, 2003). Therefore, future studies should consider conducting long-term observation and qualitative interviews of these programs in addition to self-report questionnaires.

Given the nature of the online search strategies and the recruitment contingency plans, recruitment largely depended on potentially eligible participants distributing the study's information to other instructors. Therefore, it is impossible to know, with the methods used in this study, the total number of instructors or programs in Canada.

An important consideration when interpreting the results is the observation that many instructors who participated in this study taught more than one session or class of their fall prevention exercise program. Although the questionnaire contained instructions for participants to think of their classes as a whole while responding to the questions, this method has its drawbacks (i.e., ambiguity in responding and analyzing because of potential double-barrel issue, unsure if participants are answering properly, etc.). However, this method was chosen over asking participants to answer for a specific class (i.e., the one you teach the most, the class they taught most recently, the class with the

best/worst ability, etc.) for several reasons. By asking participants to answer for one specific class, important relevant information about other exercise classes would be missed. Furthermore, outcome variables such as frequency or challenge level could potentially be biased by directing participants to think of a specific class rather than all their classes as a whole. For example, if participants we asked to answer for the class they teach most often, relevant information about other classes they teach less frequently would be completely lost, and the potential for bias regarding frequency of classes would increase. As such, instructing participants to answer for all their classes as a whole provided a fuller snapshot of the current state of programs in Canada.

Although the national scope of the study allowed for a wider glimpse into the current state of fall prevention community exercise programs across Canada, it is important to consider that each province differs in context and administration of community exercise programs. For example, some provinces provide provincial funding, and certain programs are medically endorsed, while others are offered through private recreation centres. As such, the developed survey required a general structure in order for participants from different contexts to be included. To address the potential loss of detail and/or the potential non-relevant questions, an option at the end of each survey section was provided for participants to share any other relevant information if they so desired.

5.4 Knowledge Added, Implications, and Future Research

This study added to the current literature by providing additional detail regarding exercise content and program characteristics of these programs in Canada. The most important finding in the current study was the limited inclusion of the three evidence-based recommendations for fall prevention analyzed in the current study. This is the most important finding because based on high level evidence, exercise programs that contained a high challenge to balance and more than three hours a week of balance exercises had larger effects on fall prevention in community-dwelling older adults (Sherrington et al., 2017). As such, if programs that specify fall prevention and/or balance

training as a primary goal are not including these key exercise characteristics required for reducing falls, then this may have implications for their potential effectiveness as an implementation strategy for group delivered fall prevention exercise. However, it is important to note that based on the interpretation of the findings of this study, virtually all programs (95%) prescribed mostly moderate to high balance challenge exercises. Furthermore, the majority of participants (78%) reported that exercises became more challenging over the duration of the program. These findings are important because they suggest that although most of the programs were not including all key recommendations for effective fall prevention exercise, most programs were containing recommended balance exercise challenge. Identifying these strengths of existing programs is crucial in order to help support these programs and encourage others to follow suit.

Future research should therefore investigate the potential factors influencing program design and delivery decisions that could be acting as barriers and facilitators to the inclusion of effective fall prevention exercise characteristics. These next steps should likely be focused at the program organization level, rather than individual class level, in order to identify organizational barriers and facilitators to the inclusion of the recommendations in designing the programs. Future studies should also investigate program funding and cost per client/participant as these factors can influence structure, design, and clientele (Centre for Ageing Better, 2019). This investigation into the barriers, facilitators, and other influential factors of program design could be done through qualitative interviews with representative subsamples of program coordinators and/or instructors in order to understand the context in which these programs are administered and delivered.

Although not explored in the current study, it would be important to investigate whether community exercise programs affect fear of falling. It has been shown that among older adults who had not fallen, their initial fear of falling increased their probability of falling later on, while among older adults who were initially not scared, those who fell were more likely to report a fear of falling

20 months later (Friedman, Munoz, West, Rubin, & Fried, 2002). Therefore, a fall can lead to the development of fear of falling. Therefore, if community exercise programs address fear of falling, they could make an impact on falls themselves.

5.5 Knowledge Translation

The study will be presented and made available to both the academic population through journals and conferences (i.e., Canadian Fall Prevention Conference, Canadian Association on Gerontology Conference), and at a community level through symposiums and community presentations (i.e., LOOP Fall Prevention Community of Practice webinar).

The overarching plan for the study was guided by the Knowledge to Action Framework (Graham et al., 2006). The study was within the "determine the know/do gap" phase of the cycle as we attempted to identify strengths of existing programs and the "gap" between the evidence (i.e., evidence-based recommendations) and actual practice (i.e., what is currently being done in community exercise programs for fall prevention). Findings from this crucial first step in the implementation process model will help further research in this field. For instance, next steps can involve adapting knowledge to local context and assessing barriers and facilitators to including the evidence-based recommendations in the programs. Future collaborative work interacting with decision-makers of community-based exercise program in order to include the effective evidence-based exercise recommendations for fall prevention is warranted.

5.6 Conclusion

This study explored instructor and program characteristics of fall prevention community group exercise programs targeted for community-dwelling older adults in Canada. One program, out of a total of 140 surveyed included a total of three hours of challenging balance exercises, offered on an ongoing basis. Instructor educational background in a related field and prescription of home exercises were the only instructor and program characteristics found to be associated with whether a program

was offered on an ongoing basis. These findings have implications for the potential effectiveness of these programs as an implementation strategy for group delivered fall prevention exercise. Given the devastating physical, psychological, and economic consequences associated with falls, there is a major public health movement to improve balance. Reducing the discrepancies between research and what is actually done in the programs can help improve individual balance and could ultimately decrease the frequency of falls and accidents. Collaborative work between researchers, public health directors, providers and instructors of community exercise programs for fall prevention is critical in order to ensure effective fall prevention exercises are accessible and available to community-dwelling older adults.

References

American College of Sports Medicine. (2010). In Thompson W. R., Gordon N. F. and Pescatello L. S. (Eds.), *ACSM's guidelines for exercise testing and prescription* (8th ed.).

Baker, S. P., & Harvey, A. H. (1985). Fall injuries in the elderly. *Clin Geriatr Med, 1*(3), 501-512.

Billinger, S. A., Boyne, P., Coughenour, E., Dunning, K., & Mattlage, A. (2015). Does aerobic exercise and the FITT principle fit into stroke recovery? *Curr Neurol Neurosci Rep, 15*(2), 519. doi:10.1007/s11910-014-0519-8

Campbell, A. J., Borrie, M. J., Spears, G. F., Jackson, S. L., Brown, J. S., & Fitzgerald, J. L. (1990). Circumstances and consequences of falls experienced by a community population 70 years and over during a prospective study. *Age and Ageing, 19*(2), 136-141.

Canadian Institute for Health Information. (2019). Falls and vehicle collisions top causes of injury hospitalizations for seniors. Retrieved from https://www.cihi.ca/en/falls-and-vehicle-collisions-top-causes-of-injury-hospitalizations-for-seniors

Carpintero, P., Caeiro, J. R., Carpintero, R., Morales, A., Silva, S., & Mesa, M. (2014). Complications of hip fractures: A review. *World journal of orthopedics, 5*(4), 402-411. doi:10.5312/wjo.v5.i4.402

Carter, N. D., Khan, K. M., Petit, M. A., Heinonen, A., Waterman, C., Donaldson, M. G., . . . McKay, H. A. (2001). Results of a 10 week community based strength and balance training programme to reduce fall risk factors: a randomised controlled trial in 65–75 year old women with osteoporosis. *British Journal of Sports Medicine, 35*(5), 348. doi:10.1136/bjsm.35.5.348

Carter, N., Khan, K., McKay, H., & Petit, M. (2002). Community-based exercise program reduces risk factors for falls in 65- to 75-year-old women with osteoporosis: Randomized controlled trial. *Canadian Medical Association. Journal, 167*(9), 997-1004.

Centre for Ageing Better. (2019). Raising the bar on strength and balance: The importance of community-based provision. Retrieved from https://www.ageing-better.org.uk/publications/raising-bar-strength-balance

Chateau, D., Doupe, M., Prior, H., Soodeen, R., Sarkar, J., Dragan, R., … Rajotte, L. (2019). The health status of community-dwelling older adults in Manitoba. *Manitoba Centre for Health Policy*. Retrieved from http://mchp-appserv.cpe.umanitoba.ca/reference/Senior2_Report_web.pdf

Child, S., Goodwin, V., Garside, R., Jones-Hughes, T., Boddy, K., & Stein, K. (2012). Factors influencing the implementation of fall-prevention programmes: a systematic review and synthesis of qualitative studies. *Implementation Science, 7*(1), 91. doi:10.1186/1748-5908-7-91

Cramp, M. C., Greenwood, R. J., Gill, M., Lehmann, A., Rothwell, J. C., & Scott, O. M. (2010). Effectiveness of a community-based low intensity exercise programme for ambulatory stroke survivors. *Disability and Rehabilitation, 32*(3), 239-247. doi:10.3109/09638280903095916

Curcio, C. L., Gomez, F., & Reyes-Ortiz, C. A. (2009). Activity restriction related to fear of falling among older people in the Colombian Andes mountains: are functional or psychosocial risk factors more important? *J Aging Health, 21*(3), 460-479. doi:10.1177/0898264308329024

Danko, K. J., Dahabreh, I. J., Ivers, N. M., Moher, D., & Grimshaw, J. M. (2019). Contacting authors by telephone increased response proportions compared with e-mailing: results of a randomized study. *Journal of Clinical Epidemiology, 115*, 150-159. doi:10.1016/j.jclinepi.2019.05.027

Davis, J., Robertson, M., Ashe, M., Liu-Ambrose, T., Khan, K., & Marra, C. (2010). International comparison of cost of falls in older adults living in the community: A systematic review. *Osteoporosis International, 21*(8), 1295-1306. doi:10.1007/s00198-009-1162-0doi:35/suppl_2/ii12

De Leeuw, E., Hox, J. J, Dillman, Don A., & European Association of Methodology. (2008). *International handbook of survey methodology / [edited by] Edith D. de Leeuw, Joop J. Hox, Don A. Dillman.*(European Association of Methodology series). New York: L. Erlbaum Associates.

Delbaere, K., Close, J. C. T., Brodaty, H., Sachdev, P., & Lord, S. R. (2010). Determinants of disparities between perceived and physiological risk of falling among elderly people: cohort study. *BMJ, 341*. doi:10.1136/bmj.

Delbaere, K., Crombez, G., Vanderstraeten, G., Willems, T., & Cambier, D. (2004). Fear-related avoidance of activities, falls and physical frailty. A prospective community-based cohort study. *Age and Ageing, 33*(4), 368-373. doi:10.1093/ageing/afh106

Dillman, D. (2007). Mail and internet surveys : The tailored design method / Don A. Dillman. (2nd ed., 2007 update with new internet, visual, and mixed-mode guide.. ed.). Hoboken, N.J.: Wiley.

Eccles, M., Grimshaw, J., Walker, A., Johnston, M., & Pitts, N. (2005). Changing the behavior of healthcare professionals: The use of theory in promoting the uptake of research findings. *Journal of Clinical Epidemiology, 58*(2), 107-112.

Eng, J. J., Chu, S. K., Maria Kim, S. C., Dawson, E. A., Carswell, E. A., & Hepburn, E. K. (2003). A community-based group exercise program for persons with chronic stroke. *Medicine & Science in Sports & Exercise, 35*(8), 1271-1278. doi:10.1249/01.MSS.0000079079.58477.0B

Eysenbach, G. (2004). Improving the quality of web surveys: the checklist for reporting results of internet e-surveys (CHERRIES). *J Med Internet Res, 6*(3), e34. doi:10.2196/jmir.6.3.e34

Farlie, M. K., Molloy, E., Keating, J. L., & Haines, T. P. (2016). Clinical markers of the intensity of balance challenge: observational study of older adult responses to balance tasks. *Physical Therapy, 96*(3), 313. doi:10.2522/ptj.20140524

Fletcher, P. C., Guthrie, D. M., Berg, K., & Hirdes, J. P. (2010). Risk factors for restriction in activity associated with fear of falling among seniors within the community. *J Patient Saf, 6*(3), 187-191.

Friedman, S. M., Munoz, B., West, S. K., Rubin, G. S., & Fried, L. P. (2002). Falls and fear of falling: which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. *Journal of the American Geriatrics Society, 50*(8), 1329-1335. doi:10.1046/j.1532-5415.2002.50352.x

Fullerton, A., Macdonald, M., Brown, A., Ho, P. L., Martin, J., Tang, A., . . . Brooks, D. (2008). Survey of fitness facilities for individuals post-stroke in the Greater Toronto Area. *Appl Physiol Nutr Metab, 33*(4), 713-719. doi:10.1139/h08-037

Gillespie, L.D., Robertson, M.C., Gillespie, W.J., Sherrington, C., Gates, S., Clemson, L.M., & Lamb, S.E. (2012). Interventions for preventing falls in older people living in the community. *Cochrane Database of Systematic Reviews*, *9*, CD007146. DOI: 10.1002/14651858.CD007146.pub3

Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: Time for a map? *The Journal of Continuing Education in the Health Professions, 26*(1), 13-24. 10.1002/chp.47

Harrington, R., Taylor, G., Hollinghurst, S., Reed, M., Kay, H., & Wood, V. A. (2010). A community-based exercise and education scheme for stroke survivors: A randomized controlled trial and economic evaluation. *Clinical Rehabilitation, 24*(1), 3-15. doi:10.1177/0269215509347437

Hektoen, L., Aas, E., & Lurås, H. (2009). Cost-effectiveness in fall prevention for older women. *Scandinavian Journal of Public Health*, *37*(6), 584–589. https://doi.org/10.1177/1403494809341093

Horak, F. B. (2006). Postural orientation and equilibrium: What do we need to know about neural control of balance to prevent falls? *Age and Ageing, 35 Suppl 2*, ii7.

Hosmer, J. D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied Logistic Regression, 3rd Edition* (3 ed.): John Wiley & Sons.

Hwang, J., Wang, L., Siever, J., Medico, T. D., & Jones, C. A. (2019). Loneliness and social isolation among older adults in a community exercise program: A qualitative study. *Aging & Mental Health, 23*(6), 736-742. doi:10.1080/13607863.2018.1450835

Iaboni, A., & Flint, A. (2013). The complex interplay of depression and falls in older adults: A clinical review. *American Journal Of Geriatric Psychiatry, 21*(5), 484-492. doi:10.1016/j.jagp.2013.01.008

Ioannidis, G., Papaioannou, A., Hopman, W. M., Akhtar-Danesh, N., Anastassiades, T., Pickard, L., . . . Adachi, J. D. (2009). Relation between fractures and mortality: results from the Canadian Multicentre Osteoporosis Study. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne, 181*(5), 265-271. doi:10.1503/cmaj.081720

Jiang, H. X., Majumdar, S. R., Dick, D. A., Moreau, M., Raso, J., Otto, D. D., & Johnston, D. W. C. (2005). Development and initial validation of a risk score for predicting in-hospital and 1-year mortality in patients with hip fractures. *Journal of bone and mineral research : the official journal of the American Society for Bone and Mineral Research, 20*(3), 494-500.

Kelley, K., Clark, B., Brown, V., & Sitzia, J. (2003). Good practice in the conduct and reporting of survey research. *International Journal for Quality in Health Care, 15*(3), 261-266. doi:10.1093/intqhc/mzg031

Lachman, M. E., Howland, J., Tennstedt, S., Jette, A., Assmann, S., & Peterson, E. W. (1998). Fear of falling and activity restriction: the survey of activities and fear of falling in the elderly (SAFE). *J Gerontol B Psychol Sci Soc Sci, 53*(1), P43-50.

Lamb, S. E., Jørstad-Stein, E. C., Hauer, K., & Becker, C. (2005). Development of a common outcome data set for fall injury prevention trials: The prevention of falls network Europe consensus. *Journal of the American Geriatrics Society, 53*(9), 1618-1622. doi:10.1111/j.1532-5415.2005.53455.x

Lau, C., Chitussi, D., Elliot, S., Giannone, J., McMahon, M. K., Sibley, K. M., . . . Salbach, N. M. (2016). Facilitating community-based exercise for people with stroke: Cross-sectional e-survey of physical therapist practice and perceived needs. *Physical Therapy, 96*(4), 469-478. doi:10.2522/ptj.20150117

Leach, J. H., Danyluk, M. J., Nishimura, C. K., & Culos-Reed, N. S. (2015). Evaluation of a Community-Based Exercise Program for Breast Cancer Patients Undergoing Treatment. *Cancer Nursing, 38*(6), 417-425. doi:10.1097/NCC.0000000000000217

Lewis, M., Peiris, C. L., & Shields, N. (2017). Long-term home and community-based exercise programs improve function in community-dwelling older people with cognitive impairment: a systematic review. *Journal of Physiotherapy, 63*(1), 23-29. doi:10.1016/j.jphys.2016.11.005

Li, T., Puhan, M. A., Vedula, S. S., Singh, S., & Dickersin, K. (2011). Network meta-analysis-highly attractive but more methodological research is needed. *9*(1), 79-79. doi:10.1186/1741-7015-9-79

Liamputtong, P. (2017). *Research methods in health : Foundations for evidence-based practice / edited by Pranee Liamputtong.* (Third ed.). South Melbourne, Australia: Oxford University Press.

Littbrand, H., Rosendahl, E., & Lindelöf, N. (2014). The HIFE program. Prepared on behalf of the Department of Community Medicine and Rehabilitation. Umeå, Sweden. Retrieved from: https://www.hifeprogram.se/media/1017/engelsk-version-2014-28-nov.pdf

Maki, B. E. (1993). Biomechanical approach to quantifying anticipatory postural adjustments in the elderly. *Med Biol Eng Comput, 31*(4), 355-362.

Maki, B. E., & McIlroy, W. E. (1996). Postural control in the older adult. *Clin Geriatr Med, 12*(4), 635-658.

Maki, B. E., & McIlroy, W. E. (2006). Control of rapid limb movements for balance recovery: Age-related changes and implications for fall prevention. *Age and Ageing, 35 Suppl 2*, ii12-ii18. doi:35/suppl_2/ii12

Maki, B. E., Holliday, P. J., & Topper, A. K. (1994). A prospective study of postural balance and risk of falling in an ambulatory and independent elderly population. *J Gerontol, 49*(2), M72-84.

Mansfield, A., Peters, A. L., Liu, B. A., & Maki, B. E. (2010). Effect of a perturbation-based balance training program on compensatory stepping and grasping reactions in older adults: A randomized controlled trial. *Physical Therapy, 90*(4), 476-491. 10.2522/ptj.20090070

McInnes, E., & Askie, L. (2004). Evidence review on older people's views and experiences of falls prevention strategies. *Worldviews Evid Based Nurs, 1*(1), 20-37. doi:10.1111/j.1741-6787.2004.04013.x

Musanti, R., Chao, Y.-Y., & Collins, K. (2019). Fitness and quality of life outcomes of cancer survivor participants in a community exercise program. *Journal of the Advanced Practitioner in Oncology, 10*(1), 24. doi:10.6004/jadpro.2019.10.1.2

Nelson, A., Ahmed, S., Harrow, J., Fitzgerald, S., Sanchez-Anguiano, A., & Gavin-Dreschnack, D. (2003). Fall-related fractures in persons with spinal cord impairment: A descriptive analysis. *SCI Nurs, 20*(1), 30-37.

Oka, R.K., King, A.C., & Young, D.R. (1995). Sources of social support as predictors of exercise adherence in women and men ages 50 to 65 years. *Women's Health, 1*(2), 161- 175.

Pang, M. Y. C., Eng, J. J., Dawson, A. S., McKay, H. A., & Harris, J. E. (2005). A community-based fitness and mobility exercise program for older adults with chronic stroke: A randomized, controlled trial. *Journal of the American Geriatrics Society, 53*(10), 1667-1674. doi:10.1111/j.1532-5415.2005.53521.x

Parachute. (2015). The Cost of Injury in Canada. Parachute: Toronto, ON

Pearson, C., St-Arnaud, J., & Geran, L. (2014). Understanding seniors' risk of falling and their perception of risk" *Health at a Glance.* October. Statistics Canada Catalogue no. 82-624-X.

Peel, N. M., Kassulke, D. J., & McClure, R. J. (2002). Population based study of hospitalised fall related injuries in older people. *Injury Prevention : Journal of the International Society for Child and Adolescent Injury Prevention, 8*(4), 280-283.

Petticrew, M., Rehfuess, E., Noyes, J., Higgins, J. P. T., Mayhew, A., Pantoja, T., . . . Sowden, A. (2013). Synthesizing evidence on complex interventions: how meta-analytical, qualitative, and mixed-method approaches can contribute. *Journal of Clinical Epidemiology, 66*(11), 1230-1243. doi:10.1016/j.jclinepi.2013.06.005

Public Health Agency of Canada. (2014). Seniors' falls in Canada: Second report. Retrieved from: https://www.canada.ca/en/public-health/services/health-promotion/aging-seniors/publications/publications-general-public/seniors-falls-canada-second-report.html#s3

Salbach, N. M., Howe, J., Brunton, K., Salisbury, K., & Bodiam, L. (2014). Partnering to increase access to community exercise programs for people with stroke, acquired brain injury, and multiple sclerosis. *Journal of Physical Activity & Health, 11*(4), 838. doi:10.1123/jpah.2012-0183

Salbach, N., Jaglal, S., Korner-Bitensky, N., Rappolt, S., & Davis, D. (2007). Practitioner and organizational barriers to evidence-based practice of physical therapists for people with stroke. *Physical Therapy, 87*(10), 1284-1303. doi:10.2522/ptj.20070040

Scott, V., Wagar, L., & Elliott, S. (2010). Falls & related injuries among older Canadians: fall-related hospitalizations & intervention initiatives. Prepared on behalf of the Public Health Agency of Canada, Division of Aging and Seniors. Victoria BC: Victoria Scott Consulting.

Sherrington, C., & Henschke, N. (2013). Why does exercise reduce falls in older people? Unrecognised contributions to motor control and cognition? *British Journal of Sports Medicine, 47*(12), 730. doi:10.1136/bjsports-2012-091295

Sherrington, C., Fairhall, N. J., Wallbank, G. K., Tiedemann, A., Michaleff, Z. A., Howard, K., . . . Lamb, S. E. (2019). Exercise for preventing falls in older people living in the community. *The Cochrane database of systematic reviews, 1*(1), CD012424-CD012424. doi:10.1002/14651858.CD012424.pub2

Sherrington, C., Michaleff, Z., Fairhall, N., Paul, S., Tiedemann, A., Whitney, J., . . . Lord, S. (2017). Exercise to prevent falls in older adults: An updated systematic review and meta-analysis. *British Journal of Sports Medicine, 51*(24), 1750-1758.

Sherrington, C., Tiedemann, A., Fairhall, N., Close, J. C. T., & Lord, S. R. (2011). Exercise to prevent falls in older adults: an updated meta-analysis and best practice recommendations. *NSW Public Health Bulletin, 22*(3-4), 78-83. doi:10.1071/NB10056

Sherrington, C., Whitney, J. C., Lord, S. R., Herbert, R. D., Cumming, R. G., & Close, J. C. T. (2008). Effective exercise for the prevention of falls: A systematic review and meta-analysis. *Journal of the American Geriatrics Society, 56*(12), 2234-2243. doi:10.1111/j.1532-5415.2008.02014.x

Shumway-Cook, A., & Woollacott, M.H. (2007). *Motor control translating research into clinical practice*. Philadelphia, Lippincott Williams and Wilkins.

Sibley, K. M., Beauchamp, M. K., Van Ooteghem, K., Straus, S. E., & Jaglal, S. B. (2015). Using the systems framework for postural control to analyze the components of balance

evaluated in standardized balance measures: A scoping review. *Archives of Physical Medicine and Rehabilitation, 96*(1), 122-132.e29. doi:10.1016/j.apmr.2014.06.021

Sibley, K. M., Touchette, A. J., Singer, J. C., Dubberley, K. M. A., & Oates, A. R. (2019). To what extent do older adult community exercise programs in Winnipeg, Canada address balance and include effective fall prevention exercise? A descriptive self-report study. *BMC Geriatrics, 19*(1). doi:10.1186/s12877-019-1224-x

Sibley, K., Straus, S., Inness, E., Salbach, N., & Jaglal, S. (2013). Clinical balance assessment: perceptions of commonly-used standardized measures and current practices among physiotherapists in Ontario, Canada. *Implementation Science, 8*(1), 33. doi:10.1186/1748-5908-8-33

Sibley, K., Voth, J., Munce, S., Straus, S., & Jaglal, S. (2014). Chronic disease and falls in community-dwelling Canadians over 65 years old: A population-based study exploring associations with number and pattern of chronic conditions. *Bmc Geriatrics, 14*(1), 22.

Straus, S. (2013). In Tetroe J. G., Ian D. (Ed.), *Knowledge translation in health care: Moving from evidence to practice*. West Sussex (UK): John Wiley & Sons.

Stuart, M., Benvenuti, F., Macko, R., Taviani, A., Segenni, L., Mayer, F., . . . Weinrich, M. (2009a). Community-based adaptive physical activity program for chronic stroke: Feasibility, safety, and efficacy of the empoli model. *Neurorehabilitation and Neural Repair, 23*(7), 726-734. doi:10.1177/1545968309332734

Stuart, M., Chard, S., Benvenuti, F., & Steinwachs, S. (2009b). Community exercise: A vital component to healthy aging. *HealthcarePapers, 10*(1), 23-28; discussion 79-83. doi:10.12927/hcpap.2009.21219

Tinetti, M. E., & Kumar, C. (2010). The patient who falls: "It's always a trade-off". *Jama, 303*(3), 258-266. doi:10.1001/jama.2009.2024

Tinetti, M. E., & Powell, L. (1993). Fear of falling and low self-efficacy – A cause of dependence in elderly persons. *Journals Of Gerontology, 48*, 35-38.

Tinetti, M. E., & Williams, C. S. (1998). The effect of falls and fall injuries on functioning in community-dwelling older persons. *J Gerontol A Biol Sci Med Sci, 53*(2), M112-119.

Tinetti, M. E., Speechley, M., & Ginter, S. F. (1988). Risk factors for falls among elderly persons living in the community. *The New England Journal of Medicine, 319*(26), 1701-1707.10.1056/NEJM198812293192604

Tricco, A. C., Thomas, S. M., Veroniki, A. A., Hamid, J. S., Cogo, E., Strifler, L., . . . Straus, S. E. (2017). Comparisons of interventions for preventing falls in older adults: A systematic review and meta-analysis. *Jama, 318*(17), 1687-1699. doi:10.1001/jama.2017.15006

Wolinsky, F. D., Bentler, S. E., Liu, L., Obrizan, M., Cook, E. A., Wright, K. B., . . . Wallace, R. B. (2009). Recent hospitalization and the risk of hip fracture among older Americans. *Journals of Gerontology: Series A, 64A*(2), 249-255. doi:10.1093/gerona/gln027

Woolcott, J. C., Khan, K. M., Mitrovic, S., Anis, A. H., & Marra, C. A. (2012). The cost of fall related presentations to the ED: A prospective, in-person, patient-tracking analysis of health resource utilization. *Osteoporosis International : A Journal Established as Result of Cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA,23*(5), 1513-1519. doi:10.1007/s00198-011-1764-1

World Health Organization. (2008).WHO global report on falls prevention in older age. Geneva: World Health Organization. Retrieved from http://www.who.int/ageing/publications/Falls_prevention7March.pdf

World Health Organization. (2015). World report on ageing and health. Retrieved from https://www.who.int/ageing/events/world-report-2015-launch/en/

Xiang, H., Chany, A. M., & Smith, G. A. (2006). Wheelchair related injuries treated in US emergency departments. *Inj Prev, 12*(1), 8-11. doi:10.1136/ip.2005.010033

Yardley, L., & Todd, C. (2005). Encouraging positive attitudes to falls prevention in later. *Report from Help the Aged,* 207-221.

Appendix A: Checklist for Reporting Results of Internet E-Surveys (CHERRIES)

	Checklist for Reporting Results of Internet E-Surveys (CHERRIES)			**Specification:**
Item Category	***Checklist Item***	***Explanation***		
Design				
	Describe survey design	Describe target population, sample frame. Is the sample a convenience sample? (In "open" surveys this is most likely.)	☑	Section 3.2 Sampling Frame, and section 3.3 Participants.
IRB (Institutional Review Board) approval and informed consent process				
	IRB approval	Mention whether the study has been approved by an IRB.	☑	p.16: "Ethics approval was obtained from the University of Manitoba health research ethics board prior to any research activity."
	Informed consent	Describe the informed consent process. Where were the participants told the length of time of the survey, which data were stored and where and for how long, who the investigator was, and the purpose of the study?	☑	Section 3.6 Procedure, and Appendix C (Questionnaire Instrument).
	Data protection	If any personal information was collected or stored, describe what mechanisms were used to protect unauthorized access.	☑	Refer to Appendix C (Questionnaire Instrument), p. 101: " All respondent

	Checklist for Reporting Results of Internet E-Surveys (CHERRIES)			**Specification:**
Item Category	***Checklist Item***	***Explanation***		
				information (i.e., name, e-mail addresses, IP addresses, and program name) will not be collected into the survey results."
Development and pre-testing				
	Development and testing	State how the survey was developed, including whether the usability and technical functionality of the electronic questionnaire had been tested before fielding the questionnaire.	☑	Refer to p.118 and Appendix D (piloting phase).
Recruitment process and description of the sample having access to the questionnaire				
	Open survey versus closed survey	An "open survey" is a survey open for each visitor of a site, while a closed survey is only open to a sample which the investigator knows (password-protected survey).	N/A	Questionnaire was sent through e-mail to identified participants (no password required).
	Contact mode	Indicate whether or not the initial contact with the potential participants was made on the Internet. (Investigators may also send out	N/A	Initial contact was done through the student principal investigator e-mail.

	Checklist for Reporting Results of Internet E-Surveys (CHERRIES)			**Specification:**
Item Category	***Checklist Item***	***Explanation***		
		questionnaires by mail and allow for Web-based data entry.)		
	Advertising the survey	How/where was the survey announced or advertised? Some examples are offline media (newspapers), or online (mailing lists – If yes, which ones?) or banner ads (Where were these banner ads posted and what did they look like?). It is important to know the wording of the announcement as it will heavily influence who chooses to participate. Ideally the survey announcement should be published as an appendix.	N/A	No advertisement was done.
Survey administration				
	Web/E-mail	State the type of e-survey (eg, one posted on a Web site, or one sent out through e-mail). If it is an e-mail survey, were the responses entered manually into a database, or was there an automatic method for capturing responses?	☑	Refer to p.20: "A self-administered cross-sectional electronic questionnaire" and Refer to p.31: "The electronic questionnaire was created using SurveyMonkey online questionnaire software (Premier account)."
	Context	Describe the Web site (for mailing list/newsgroup) in which the survey was posted. What is the Web site about, who is visiting it, what are visitors normally looking for? Discuss to what degree the content of the Web site could pre-select the sample or influence the results. For	N/A	The electronic questionnaire was hosted on SurveyMonkey and sent to participants through e-mail.

	Checklist for Reporting Results of Internet E-Surveys (CHERRIES)			**Specification:**
Item Category	***Checklist Item***	***Explanation***		
		example, a survey about vaccination on a anti-immunization Web site will have different results from a Web survey conducted on a government Web site		
	Mandatory/voluntary	Was it a mandatory survey to be filled in by every visitor who wanted to enter the Web site, or was it a voluntary survey?	N/A	Questionnaire was sent through e-mail.
	Incentives	Were any incentives offered (eg, monetary, prizes, or non-monetary incentives such as an offer to provide the survey results)?	N/A	No incentives were given.
	Time/Date	In what timeframe were the data collected?	☑	Refer to p.45: "Data collection occurred between May 2019 and July 2019."
	Randomization of items or questionnaires	To prevent biases items can be randomized or alternated.	N/A	Was not appropriate for the current study.
	Adaptive questioning	Use adaptive questioning (certain items, or only conditionally displayed based on responses to other items) to reduce number and complexity of the questions.	☑	Refer to p.32: "…SurveyMonkey allowed for branching logic…"
	Number of Items	What was the number of questionnaire items per page? The number of items is an important factor for the completion rate.	☑	Section 3.5 Questionnaire Instrument.

	Checklist for Reporting Results of Internet E-Surveys (CHERRIES)			**Specification:**
Item Category	***Checklist Item***	***Explanation***		
	Number of screens (pages)	Over how many pages was the questionnaire distributed? The number of items is an important factor for the completion rate.	☑	Section 3.5 Questionnaire Instrument.
	Completeness check	It is technically possible to do consistency or completeness checks before the questionnaire is submitted. Was this done, and if "yes", how (usually JAVAScript)? An alternative is to check for completeness after the questionnaire has been submitted (and highlight mandatory items). If this has been done, it should be reported. All items should provide a non-response option such as "not applicable" or "rather not say", and selection of one response option should be enforced.	N/A	
	Review step	State whether respondents were able to review and change their answers (eg, through a Back button or a Review step which displays a summary of the responses and asks the respondents if they are correct).	☑	Refer to p.23: "A "previous page" button was provided in order to allow participants to review and change their answers."
Response rates				
	Unique site visitor	If you provide view rates or participation rates, you need to define how you determined a unique visitor. There are different techniques available, based on IP addresses or cookies or both.	N/A	Questionnaire sent through e-mail.
	View rate (Ratio of unique survey	Requires counting unique visitors to the first page of the survey, divided by the number of	N/A	Questionnaire sent through e-mail.

	Checklist for Reporting Results of Internet E-Surveys (CHERRIES)			**Specification:**
Item Category	***Checklist Item***	***Explanation***		
	visitors/unique site visitors)	unique site visitors (not page views!). It is not unusual to have view rates of less than 0.1 % if the survey is voluntary.		
	Participation rate (Ratio of unique visitors who agreed to participate/unique first survey page visitors)	Count the unique number of people who filled in the first survey page (or agreed to participate, for example by checking a checkbox), divided by visitors who visit the first page of the survey (or the informed consents page, if present). This can also be called "recruitment" rate.	N/A	Section 4.1 Recruitment Results, and Figure 2: Recruitment Flowchart for recruitment results.
	Completion rate (Ratio of users who finished the survey/users who agreed to participate)	The number of people submitting the last questionnaire page, divided by the number of people who agreed to participate (or submitted the first survey page). This is only relevant if there is a separate "informed consent" page or if the survey goes over several pages. This is a measure for attrition. Note that "completion" can involve leaving questionnaire items blank. This is not a measure for how completely questionnaires were filled in. (If you need a measure for this, use the word "completeness rate".)	N/A	Section 4.1 Recruitment Results and Figure 2: Recruitment Flowchart for recruitment results.
Preventing multiple entries from the same individual				
	Cookies used	Indicate whether cookies were used to assign a unique user identifier to each client computer. If	N/A	Questionnaire sent through e-mail.

	Checklist for Reporting Results of Internet E-Surveys (CHERRIES)			**Specification:**
Item Category	***Checklist Item***	***Explanation***		
		so, mention the page on which the cookie was set and read, and how long the cookie was valid. Were duplicate entries avoided by preventing users access to the survey twice; or were duplicate database entries having the same user ID eliminated before analysis? In the latter case, which entries were kept for analysis (eg, the first entry or the most recent)?		
	IP check	Indicate whether the IP address of the client computer was used to identify potential duplicate entries from the same user. If so, mention the period of time for which no two entries from the same IP address were allowed (eg, 24 hours). Were duplicate entries avoided by preventing users with the same IP address access to the survey twice; or were duplicate database entries having the same IP address within a given period of time eliminated before analysis? If the latter, which entries were kept for analysis (eg, the first entry or the most recent)?	N/A	All respondent information (i.e., name, e-mail addresses, IP addresses, and program name) were not be collected into the survey results.
	Log file analysis	Indicate whether other techniques to analyze the log file for identification of multiple entries were used. If so, please describe.	N/A	
	Registration	In “closed” (non-open) surveys, users need to login first and it is easier to prevent duplicate entries from the same user. Describe how this was done. For example, was the survey never displayed a second time once the user had filled	N/A	Questionnaires sent through e-mail.

	Checklist for Reporting Results of Internet E-Surveys (CHERRIES)			**Specification:**
Item Category	***Checklist Item***	***Explanation***		
		it in, or was the username stored together with the survey results and later eliminated? If the latter, which entries were kept for analysis (eg, the first entry or the most recent)?		
Analysis				
	Handling of incomplete questionnaires	Were only completed questionnaires analyzed? Were questionnaires which terminated early (where, for example, users did not go through all questionnaire pages) also analyzed?	☑	Refer to p.41: "Questionnaire responses were kept for analysis unless they were incomplete (i.e., missing more than one full section), or if they were missing variables used to calculate two or more of the three recommendation variables."
	Questionnaires submitted with an atypical timestamp	Some investigators may measure the time people needed to fill in a questionnaire and exclude questionnaires that were submitted too soon. Specify the timeframe that was used as a cut-off point, and describe how this point was determined.	N/A	Time to complete the questionnaire was not measured.
	Statistical correction	Indicate whether any methods such as weighting of items or propensity scores have been used to adjust for the non-representative sample; if so, please describe the methods.	N/A	

Note. Checklist provided by Eysenbach, G. (2004). Improving the quality of Web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). *J Med Internet Res, 6*(3), e34. doi:10.2196/jmir.6.3.e34.

Appendix B : Online Search Strategies

Strategy 1:

Search for the different regional health authorities in the province. For example, in British Columbia there are five regional health authorities (https://www2.gov.bc.ca/gov/content/health/about-bc-s-health-care-system/partners/health-authorities/regional-health-authorities), which would equate to five separate searches for this first strategy. Once on the official website for the regional health authority, use the search tab from the website with the key words "fall prevention". Manually review the first 50 results for any websites or resources that included the words or phrases "mobility", "balance", "physical activity", "fall prevention", "fall initiatives", "fall intervention", "exercise", and/or "resources". Click on the link and investigate further. Program names and information are included if they specified fall prevention or balance in the program description and if they were group delivered and conducted in the community, for community-dwelling older adults (i.e., no one-on-one in hospital/physical therapy).

Strategy 2:

Search through the organization Finding Balance (http://findingbalancealberta.ca/). This is a falls prevention program developed and coordinated by the Injury Prevention Centre in partnership with seniors' groups, health care organizations and clinicians across Canada. This program works in partnership with regional health authorities, public health organizations, and community health groups. Finding Balance provides older adults and practitioners with information and resources to help older adults reduce their risk of falling through a variety of life strategies such as strength and balance exercise, reviewing medications yearly, and visiting the eye doctor for a yearly eye exam. Google search "Finding Balance _____ (province)", then manually review the results for any websites or resources that include the words or phrases "mobility", "balance", "physical activity", "fall prevention", "fall initiatives", "fall intervention", "exercise", and/or "resources". Click on the link and investigate further. Program names and information are included if they specified fall prevention or balance in the program description and if they were group delivered and conducted in the community, for community-dwelling older adults (i.e., no one-on-one in hospital/physical therapy).

Strategy 3:

Google search "Province name fall prevention program"

Google search "Province name balance training program"

Google search "Province name balance exercise classes"

Google search "Province name fall prevention exercise classes"

Manually review the first 3 pages of results (n= 27) for any websites/resources that seem relevant (i.e., including the words/phrases “mobility, balance, physical activity, fall prevention, fall initiatives, fall intervention, exercise, resources”. Click on the link and investigate further. Program names and information were included if they specified fall prevention or balance in the program description and if they were group delivered and conducted in the community, for community-dwelling older adults (i.e., no one-on-one in hospital/physical therapy).

Strategy 4:

Search through the YMCA Canada webpage (http://ymca.ca/Find-Your-Y?Sectioncode=HealthFitness). Click on the cities/regions/locations under the province of interest. On each website, search for the resources and/or programs offered, and search “fall prevention” and “balance” in the website search engine. Manually review the first 50 results for any websites or resources that included the words or phrases “mobility”, “balance”, “physical activity”, “fall prevention”, “fall initiatives”, “fall intervention”, “exercise”, and/or “resources”. Click on the link and investigate further. Program names and information are included if they specified fall prevention or balance in the program description and if they were group delivered and conducted in the community, for community-dwelling older adults (i.e., no one-on-one in hospital/physical therapy).

Appendix C: Questionnaire Instrument

Consent Disclosure

Thank-you for accessing the Understanding Current Fall Prevention Program Design in Community-Based Exercise Programs for Older Adults in Canada online survey. This survey is part of a research study conducted at the University of Manitoba as partial fulfillment of the Masters of Science program with Community Health Sciences.

This survey is being conducted to describe characteristics of fall prevention and balance training exercise programs for community-dwelling older adults living independently outside of government-funded healthcare (aged 50 years and older) in Canada.

Information about the exercise program you are affiliated with will be collected through an online survey which will ask you a series of questions and should take approximately between 15-25 minutes to complete.

Your participation in this survey is completely voluntary. You are not required to provide any personal information such as your name, address or telephone number, and you don't have to answer any questions you don't want to. All respondent information (i.e., name, e-mail addresses, IP addresses, and program name) will not be collected into the survey results.

The risks of participating are low. Possible risks include tiring from answering questions and potential loss of confidentiality, though precautions are in place to reduce these risks.

If you agree to participate in the survey, the survey system will automatically save your progress so you can close the survey and return to complete it at a later time. If you choose to do this, to get back to the survey click on the "Begin Survey" link in the recruitment e-mail that was sent to you.

Please note that when you submit your response, you will not be able to withdraw or change them as we cannot link the survey responses back to you.

Information from this study may be published and/or presented in public forums, but your name and the name of your associated exercise program will not be used or disclosed. All participating programs and participants will be assigned a unique study ID. No names or identifying information will be collected. All information provided will be kept confidential and will only be used for research purposes. All information will be kept for 5 years after completion of the study in case further analysis is needed. After 5 years, physical information will be destroyed via shredding and digital information will be deleted from hard drives.

Your participation is important to us and will give us valuable insight on the resources available for community dwelling older adults interested in fall prevention and balance training exercise programs. Information from this study will be used to understand current practices in older adult fall prevention and balance training community exercise programs. If you have any questions about this survey study, please do not hesitate to contact Alexie Touchette, MSc Student at

_____ or at _____ or Dr. Kathryn Sibley at _____ or _____.

Consent Disclosure

This study is funded in part by the Canada Research Chairs program through Dr. Sibley's Canada Research Chair in Integrated Knowledge Translation in Rehabilitation Sciences.

This study has been approved by the University of Manitoba Health Research Ethics Board.

By continuing on and completing the online survey you are consenting to participate in the online survey.

Section 1: Eligibility

Thank you for agreeing to participate in this study. The purpose of the study is to describe characteristics of fall prevention and balance training exercise programs for community-dwelling older adults living independently outside of government-funded healthcare (aged 50 years and older) in Canada. Your participation is highly valued. Please answer the following questions as truthfully as possible.

If you teach multiple sessions/classes of the exercise program identified in the recruitment e-mail and throughout the survey, please think of all the sessions you teach of that program as a whole (i.e., not individual sessions/classes) when answering the questions.

1. Is fall prevention and/or improving balance a primary goal of the {{ contact.custom1 }} exercise program?

- ☐ Yes
- ☐ No

2. Is the {{ contact.custom1 }} exercise program directed for community-dwelling older adults (any age group of at least 50 years or older)?

- ☐ Yes
- ☐ No

3. Are you a primary instructor of the {{ contact.custom1 }} exercise program? The primary instructor is the individual who may be in charge of planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc.

- ☐ Yes
- ○ No

Section 2: Program Design

The next questions refer to the design and delivery of the exercise program. Please check the best answer and specify if needed.

If you teach multiple sessions/classes of the exercise program identified in the recruitment e-mail and throughout the survey, please think of all the sessions you teach of that program as a whole (i.e., not individual sessions/classes) when answering the questions.

4. How many sessions/groups of the {{ contact.custom1 }} do you teach?

- ○ 1
- ○ 2
- ○ 3 or more

5. How often are classes conducted per week?

- ○ Once per week
- ○ Twice per week
- ○ Three times per week
- ○ Four times per week
- ○ Five or more times per week
- ○ Other, please specify: _____

6. How long is each class in hours?

- ○ 0.5 hours
- ○ 0.75 hours
- ○ 1 hour
- ○ 1.25 hours
- ○ 1.5 hours
- ○ 1.75 hours
- ○ 2 hours
- ○ Other (please specify) _____

7. How long is the {{ contact.custom1 }} exercise program offered?

- ○ Continually throughout the year
- ○ For a fixed period of time (e.g. 12 week sessions offered 3 times a year).

8. Is there a maximum number of times that an individual can register for the {{ contact.custom1 }} exercise program?

- ○ No
- ○ Yes

Section 2: Program Design

9. Please specify how many times a year the {{ contact.custom1 }} exercise program is offered and for how many weeks:

10. Please specify the maximum number of times that an individual can register for the {{ contact.custom1 }} exercise program:

11. Is there anything else you would like to tell us about the delivery of the {{ contact.custom1 }} exercise program?

Section 2: Program Design

The next questions ask about the portion of the exercise program focused on fall prevention and/ or improving balance. Please check the best answer and specify if needed.

12. Are there significant differences in the fitness/ functional level of participants in the different sessions/ groups of the {{ contact.custom1 }} program that you teach (i.e., session/group A consists of older adults with lower functional level and session/group B consists of older adults with higher functional level)?

- ☐ Yes
- ☐ No

13. In a typical class, how much time in minutes is spent on exercises targeting balance in standing or walking?

14. When prescribing balance exercises, are options provided to allow participants to make the exercises more or less challenging?

- ☐ Yes, options are provided
- ☐ No, everyone does the same exercise
- ☐ Other, please describe:

15. In general, how does the level of balance challenge change over the duration of the {{ contact.custom1 }} exercise program?

- ☐ Stays the same
- ☐ Becomes more challenging
- ☐ Becomes less challenging

16. What is the primary way in which you determine how challenging the balance exercises are for the participants?

- ☐ Based on recommendation/ prescription of a doctor or physical therapist
- ☐ Based on participant's successful performance of previously completed balance exercises
- ☐ Participant's decision
- ☐ As weeks progress, challenge increases
- ○ Other, please specify:

17. In your opinion, do the majority (50% or more) of participants experience exercises which:

- ○ Fully challenge balance (i.e., the balance exercises performed near the limits of postural stability)
- ○ Do not fully challenge balance or challenge balance only in a minority (<50%) of exercises
- ○ Never challenge balance

18. During a typical balance exercise section of the {{ contact.custom1 }} exercise program, do you see any of the following behaviours in your participants? Check all that apply.

	No- not seen	Yes- seen in the majority (>=50%)	Yes- seen in the minority (<50%)
Increased sway compared with resting position	○	○	○
Ankle strategy (small corrective balance reaction resulting primarily from movement at the ankle- completed without taking a step)	○	○	○
Hip strategy (small corrective balance reaction resulting primarily from movement at the hip- completed without taking a step)	○	○	○
Step strategy (taking a step to regain balance/prevent a fall)	○	○	○
Reaching (towards something/someone else to hold on to)	○	○	○
Flailing arms	○	○	○
Holding arms, legs, or trunk stiff in any position	○	○	○
Making fist(s)	○	○	○
Pulling/tugging on own clothing	○	○	○

Other, please specify:

19. Is there anything else you would like to tell us about the fall prevention and/or improving balance focus of the {{ contact.custom1 }} exercise program?

Section 2: Program Design

The next questions ask about home exercise prescription. Please check the best answer and specify if needed.

20. Do you prescribe home exercises to participants?

- ○ No
- ○ Yes

21. Do you provide out of class/home resources to participants?

- ○ No
- ○ Yes

Section 2: Program Design

22. Please specify **what home exercises** are prescribed to participants and **how often** they are prescribed:

23. Please specify the out of class/home resources that are provided to participants:

24. Is there anything else you would like to tell us about the home exercise prescription portion of the {{ contact.custom1 }} exercise program?

Section 3: Exercise Content

The next section will focus on the exercise content of the exercise program. For each exercise, please check the appropriate boxes and specify if needed.

If you teach multiple sessions/classes of the exercise program identified in the recruitment e-mail and throughout the survey, please think of all the sessions you teach of that program as a whole (i.e., not individual sessions/classes) when answering the questions.

25. In a typical class, which of the following **standing balance exercises** do the majority (>=50%) of your participants perform?

If yes, please check whether the majority (>=50%) of participants perform the exercise with or without arm support (i.e., chair, counter, wall, cane). Please note that support may be available for safety reasons.

	No	Yes- and the majority perform **with arm support** (i.e., chair, counter, wall)	Yes- and the majority perform **without arm support** (support may be available for safety)
Basic standing, focused on not leaning/staying upright relative to the floor/gravity	○	○	○
Basic standing comfortable position	○	○	○
Standing wide stance	○	○	○
Standing narrow stance	○	○	○
Standing tandem (toe-heel directly in front of one another)	○	○	○
One-legged stance	○	○	○
Shifting weight as far as possible in either direction	○	○	○
Standing with eyes closed	○	○	○
Toe taps on bench step- any direction	○	○	○
Sit to stand (up from chair)	○	○	○
Raising arms- any direction	○	○	○
Heel raises	○	○	○
Hip strategy weight shifts	○	○	○
Ankle strategy weight shifts	○	○	○
Obstacle course	○	○	○
Pushing/nudging/perturbing/throwing off balance	○	○	○
Catching ball or other projectile	○	○	○

Other (please specify)

26. In a typical class, which of the following **walking balance exercises** do the majority (>=50%) of your participants perform?

If yes, please check whether the majority (>=50%) of participants perform the exercise with or without arm support (i.e., chair, counter, wall, cane). Please note that support may be available for safety reasons.

	No	Yes- and the majority perform **with arm support** (i.e., chair, counter, wall)	Yes- and the majority perform **without arm support** (support may be available for safety)
Walking (comfortable pace)	○	○	○
Walking (fast pace) for short duration (10 meters)	☐	☐	☐
Walking (fast pace) extended cardio (2 minutes)	○	○	○
Walking on toes	☐	☐	☐
Walking on heels	○	○	○
Heel to toe (tandem) walking	☐	☐	☐
Heel to toe (tandem) backwards walking	○	○	○
Walking backwards	☐	☐	☐
Walking sideways- cross over	○	○	○
Walking sideways- side steps	☐	☐	☐
Walking and changing directions (i.e., a turn of more than 45 degrees)	○	○	○
Walking with frequent starts and stops	☐	☐	☐
Walking with head turns	○	○	○
Walking in different directions (i.e., a change of 45 degrees or less)	○	○	○
Walking and picking up objects	○	○	○
Walking while talking	☐	☐	☐
Walking while holding a static object	○	○	○

Other, please specify:

27. In a typical class, which of the following **strength training exercises (i.e., using free weights and/or resistance bands and/or bodyweight only)** do the majority (>=50%) of your participants perform?

If yes, please check whether the majority (>=50%) of participants perform the exercise while standing or sitting.

	No	Yes- and the majority perform while **standing**	Yes- and the majority perform while **sitting**
Legs (e.g., squats, lunges, etc.)	○	○	○
Core (e.g., plank, seated ab crunch, rows, etc.)	○	○	○
Chest (e.g., wall push-ups, chest press, etc.)	○	○	○
Arms (e.g., bicep curl, triceps extension, etc.)	○	○	○
Shoulders (e.g., overhead press, deltoid lateral raise, etc.)	○	○	○

Other, please specify:

28. Do you conduct any other exercises in the {{ contact.custom1 }} exercise program not mentioned in the above lists?

29. Is there anything else you would like to tell us about the exercise content of the {{ contact.custom1 }} exercise program?

Section 3: Exercise Content

30. Please describe the obstacle course exercise that you prescribe:

Section 4: Target population and inclusion/exclusion criteria

The next section will focus on target population and inclusion/exclusion criteria of the exercise program. Please check the best answer and specify if needed.

If you teach multiple sessions/classes of the exercise program identified in the recruitment e-mail and throughout the survey, please think of all the sessions you teach of that program as a whole (i.e., not individual sessions/classes) when answering the questions.

31. Does the {{ contact.custom1 }} exercise program target any specific older population? (check all that apply)

- [ ] Healthy older adults
- [ ] Older adults with a previous fall history
- [ ] Older adults with a specific health condition (i.e. Parkinson's, MS, arthritis, etc.)
- [ ] Other, please specify:

32. Are there any specific inclusion and/or exclusion criteria of the {{ contact.custom1 }} exercise program?

- ○ No
- ○ Yes

Section 4: Target population and inclusion/exclusion criteria

33. Please check all the inclusion and/or exclusion criteria that apply from the list below, or specify other criteria:

- [ ] Minimum independence level (ex: walk independently, go to the washroom independently, etc.)
- [ ] Minimum strength level (ex: able to do the lowest modification of the exercise)
- [ ] Completion of medical clearance (ex: valid PAR-Q, doctor's note, etc.)
- [ ] Minimum performance of specific tasks (ex: Standing on one leg for 2 seconds, standing for 20 minutes, etc.)
- [ ] Other, please specify:

34. Is there anything else you would like to tell us about the target population/inclusion and exclusion criteria of the {{ contact.custom1 }} exercise program?

Section 5: Demographic Information

The fifth and last section will focus on demographic information (i.e., location of the program and characteristics of the primary instructor of the program). The primary instructor is the individual who may be in charge of planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc. Please check the best answer and specify if needed.

Please be advised that the information from the next two questions will not be used to identify programs.

35. In which province/territory is the {{ contact.custom1 }} exercise program located?

36. What are the first three digits of the postal code of the location of the {{ contact.custom1 }} exercise program? **If you teach the {{ contact.custom1 }} exercise program at multiple locations, please provide the first three digits of the postal code of each location.**

If you need help finding the postal code of your program, please right click here to open a postal code finder in a new tab.

Section 5: Demographic Information

The next section will ask about your characteristics as the primary instructor of the exercise program. Please check the best answer and specify if needed.

37. The {{ contact.custom1 }} exercise program is delivered by a:

- ☐ Certified fitness instructor (i.e., CSEP, CAN-FIT-PRO, etc.)
- ☐ Health professional (i.e., kinesiologist, physical therapist, etc.)
- ☐ Peer-leader
- ☐ Other, please specify:

38. How many years of experience have you had instructing the {{ contact.custom1 }} exercise program?

- ☐ 1 or fewer
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ○ 6 or more

39. What is your educational background/training? Check all that apply.

- [ ] Exercise Physiology/Kinesiology degree
- [ ] Physical therapy degree
- [ ] Nursing degree
- [ ] Fitness professional (i.e., Can-Fit Pro, CSEP)
- [ ] Other, please specify:

40. Have you received any specific training or education in falls prevention?

- ○ No
- ○ Yes

Section 5: Demographic Information

41. Please specify the name of the falls prevention course/ training program that you received:

42. Is there anything else you would like to tell us about your background?

End of Survey Question

43. Do you know of any other centres in your city/region that offer fall prevention/balance exercise programs for community dwelling older adults? If so, please provide the name of the centre below.

Permission to contact- Future Studies

Please indicate by right clicking on the link below to open a new tab and providing your contact information that we may contact you to invite you to take part in future research on fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada.

Clicking on the link below and providing your contact information does not imply that you consent to participate in subsequent research initiatives, it simply authorizes us to contact you.

Your name and contact information will be stored in a different database separate from your survey responses on a locked computer in a locked office in order to maintain the confidentiality of the questionnaire information you provide. After providing your contact information, please return to this page to complete the survey.

Please right click on the provided link to open a new tab if we may contact you to invite you to take part in future research: Permission to contact

Summary of the Findings

Please indicate by right clicking on the link below to open a new tab and providing your contact information if you would like to receive a summary of the findings of this study. Your name and contact information will be stored in a different database separate from your survey responses on a locked computer in a locked office in order to maintain the confidentiality of the questionnaire information you provide. After providing your contact information, please return to this page to complete the survey.

Please click on the provided link if you would like to receive a summary of the findings of this study: Summary of Findings

End of Survey

Based on your answers from the eligibility page, your exercise program is not eligible for this study. Thank you for your participation and for the information you shared with us.

We would like to remind you that all information that you have provided us will be kept completely confidential.

If you have any questions, comments, or concerns we would be happy to speak with you. You may contact us at _____ (Alexie) or _____ (Dr. Sibley), or e-mailed at _____ (Alexie) or _____ (Dr. Sibley).

Thank you again for your time.

End of Survey

The survey is completed. Thank you for your participation and for the information you shared with us. What you shared will help us understand the fall prevention exercise programs available to older adults.

We would like to remind you that all information that you have provided us will be kept completely confidential.

If you have any questions, comments, or concerns we would be happy to speak with you. You may contact us at _____ (Alexie) or _____ (Dr. Sibley), or e-mailed at _____ (Alexie) or _____ (Dr. Sibley).

Thank you again for your time.

Appendix D: Pilot Phase

Procedure

The piloting phase participants were identified and recruited using a snowball sampling strategy through the research team contacts and networking (i.e., conferences, community presentations, workshops, etc.). Identified participants were asked about other relevant programs and instructors, who were then contacted by the student principal investigator through a modified Dillman approach (pilot e-mail invitations attached). The first contact consisted of an invitation message introducing the study. Specifically, this included a request to participate in the pilot study, why they were selected, the usefulness of the piloting phase, confidentiality, willingness to answer questions or concerns, a thank you, and a signature. Recipients were asked to reply if they were interested in receiving more information and/or participate in the study. A reminder/thank you message was sent weekly for two weeks if no response was received.

Upon a reply expressing interest in the study, eligibility was confirmed, and a time was scheduled to complete the questionnaire over the telephone with the student principal investigator. The consent disclosure form and the link to the questionnaire (attached) were distributed to participants prior to the scheduled date and time.

Piloting the questionnaire was an iterative process in which each participant received an updated version of the questionnaire based on previous participant feedback. In this manner, the first five participants were instructed to focus solely on the content of the questionnaire (received a PDF version) and completed the questionnaire while on the phone with the student principal investigator. Participants were told that their responses to the questions would not be analyzed, and they were asked to think out loud and comment on their thought processes while answering the questions in order to record clarity, readability, and appropriateness of individual questions. Changes were made to the questionnaire (with approval/feedback from the advisor), and the next pilot participant would be scheduled with the newest version of the questionnaire. Following content focused pilot questionnaires, nine participants were sent the SurveyMonkey questionnaire link to the online questionnaire and were instructed to complete the questionnaire under real questionnaire conditions in order to ensure the appropriate procedures. Participants would either complete the questionnaire while on the phone with the student principal investigator (who wrote notes on thought processes, clarity, readability, and appropriateness of individual questions, as well as record problems or issues with the online questionnaire tool), or would complete the questionnaire on their own and would call the student principal investigator

immediately after in order to discuss overall questionnaire clarity, readability, appropriateness, ease of administration, and whether there is any missing information. The French translated questionnaire was also piloted for clarity, appropriate translation, and procedure.

All changes from the pilot phase were discussed with the research committee. Following discussion with the research committee, one question regarding number of sessions/classes taught was added to the questionnaire after returning to seven participants to ask if the addition of the question would help address previous comments. A final version was drafted taking into account the edits from the research team and piloting phase and sent as an amendment to the ethics board. Pilot data were not included in the final analysis.

Recruitment

A total of n=14 participants were included in the piloting phase. Initial responses were limited to Saskatchewan (n=1), Manitoba (n=3), and Ontario (n=7). Given that the study aimed to collect responses from all provinces, targeted recruitment was done to programs in British Columbia (n=3), Alberta (n=4), Nova Scotia (n=1), and Quebec (n=1). Following this targeted recruitment, three additional participants were included in the piloting phase for a total of n=14 [BC (n=2), SK (n=1), MB (n=3), ON (n=7), QC (n=1)].

Changes Based on Pilot Feedback

Online questionnaire platform. In the original proposal, REDCap was specified as the online questionnaire platform to be used for the piloting and data collection phases. However, while attempting to create the questionnaire for the piloting phase, it became clear that REDCap did not allow for programming custom variables to personalize questionnaires. SurveyMonkey was therefore chosen instead of REDCap since it allowed for programming custom variables, is secure and user-friendly.

Eligibility criteria. Eligibility criteria was expanded during the piloting phase in order to include fall prevention or balance training community exercise programs for older adults taught by peer-leaders or volunteers. In the original proposal, only programs that were led by a certified fitness instructor (i.e., CSEP, CAN-FIT-PRO, etc.) or a health professional (i.e., kinesiologist, physical therapist, etc.) were to be included. However, the decision to exclude peer-led programs was not supported in the literature. Furthermore, expanding the eligibility criteria allowed for the inclusion of additional relevant programs across Canada, as well as allow for a fuller understanding of the current state of fall prevention and balance training community exercise programs for older adults across Canada.

Questionnaire changes. Based on feedback from pilot participants, questionnaire changes included combining the supported and unsupported exercise tables into one table and changed the question. In the original questionnaire, the question read: “In a typical class, do you prescribe any supported (i.e., where the client can use their arms for support) standing balance exercises to any of your clients?- yes or no. If yes, please check the exercises that you conduct from the following list" and a table with exercises was presented with the options "No; Yes- prescribed to the majority (>= 50%) of clients; and Yes-, prescribed to a minority (<50%) of clients". However, many pilot participants mentioned that this was difficult to answer because they would prescribe the exercises and instruct participants to not use arm support if possible, but any clients required the arm support, depending on ability level. Furthermore, it was noted that in many programs/classes, arm support is always made available (i.e., each client has a chair in which they can choose to hold on to or not), but the arm support is not always used, again depending on the ability of the client. This insight led to the original question being changed to the following: "In a typical class, which of the following standing balance exercises do the majority (>=50%) of your clients perform?" with response options: "No, Yes- and the majority perform with arm support; and Yes- and the majority perform without arm support". This was also done for the walking exercise content.

Given participant feedback during the piloting phase, the strength exercise content section was also modified. The original question was the same as the other types of exercises above and contained a table with a list of exercises for each of the muscle groups (chest, arms, legs, shoulders, core). During piloting, there were many comments about form and equipment. Therefore, to make this question more simple and straightforward, the question was changed to: "In a typical class, which of the following strength training exercises (i.e., using free weights and/or resistance bands and/or bodyweight only) do the majority (>=50%) of your clients perform?" and collapsed the table content to include just the 5 main muscle groups with a few examples in brackets. The answer options also changed to: "No; Yes- and the majority perform while sitting; and Yes- and the majority perform while standing".

Further instructions were added at the beginning of every section to ask instructors to think of the classes they teach as a whole when answering the questions, as this was a concern for many pilot participants who taught multiple sessions/classes. In order to “measure” whether participant responses were based on one single session/class, or multiple sessions/classes, two additional questions were added to the program design section. The first questions asked, “How

many sessions/groups of the exercise program do you teach?" with response options "1, 2, 3 or more". If participants responded that they teach more than one session, the following question was asked, "Are there significant differences in the fitness/ functional level of participants in the different sessions/ groups of the {{ contact.custom1 }} program that you teach (i.e., session/group A consists of older adults with lower functional level and session/group B consists of older adults with higher functional level)?" with "yes" or "no" as response options.

Given the wide variety of provincial and program contexts, a question was added to the end of each main section in the questionnaire asking if there is anything else participants would like to share about that section of their exercise program. Last, minor changes to vocabulary (simplified language, French translation, etc.), formatting/organization, and response options were done according to pilot participant feedback.

Recruitment contingencies. Throughout the piloting phase, it was made clear that the original recruitment plan for data collection (i.e., one e-mail template intended to the instructors), would not be an efficient method to reach participants. Many initial contacts within the piloting phase were with program coordinators of the programs, who then agreed to pass on the information to their instructors. For this reason, and given the results from the search strategies, three separate recruitment e-mail templates were created (one for the instructors, one of the program coordinator, and one for the community centre/location where the program takes place), with one telephone recruitment template (for the community centre/program coordinator if no e-mail is publicly available through the online searches). The contingency plan is described in further detail in the methods for data collection.

Appendix E: Data Collection Phase E-mail and Telephone Recruitment Templates

Data Collection E-mail Invitations **for Instructor's E-mail**

First Contact- Prenotice E-mail**- Sent from the PI's e-mail**

Hello _____ (name of contact person),

I hope this message finds you well. I'm writing with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. I am contacting you because you were identified from publicly-available web sources as a primary instructor of fall prevention or balance training exercise classes for community-dwelling older adults.

This e-mail is intended for the primary instructor of _____(name of program). The primary instructor is the individual who may be in charge of planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc. If you are not the primary instructor of this program, please forward the content of this e-mail to the primary instructor of _____(name of program) or respond to this e-mail with the contact information of the primary instructor of _____ (name of program). Thank you.

A few days from now you will receive a request via SurveyMonkey to complete a brief questionnaire for our new research study. This study will describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada. The study aims to understand these characteristics because effective exercise programs for fall prevention are crucial for reducing the devastating physical, psychological, and economic consequences associated with falls in older adults. I am writing in advance because we've found that many people like to know ahead of time that they will be contacted. If you do not receive the survey link in your inbox next week, please check your junk folder.

This study has been approved by the University of Manitoba Health Research Ethics Board.

Thank you for your time and consideration. It's only with the generous help of people like you that our research can be successful.

Sincerely,
Alexie Touchette,
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Second Contact- Cover Letter and Questionnaire**- Sent via SurveyMonkey**

Dear _____ (name of contact person),

I hope this message finds you well. I'm writing with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. I am contacting you because **you were** identified from publicly-available web sources as **a primary instructor of** fall prevention or balance training **exercise** classes for community-dwelling older adults.

This e-mail and request for help is intended for the primary instructor of _____(name of program). The primary instructor is the individual who may be in charge of planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc. If you are not the primary instructor of this program, please forward the content of this e-mail to the primary instructor of _____(name of program) or respond to this e-mail with the contact information of the primary instructor of _____ (name of program). Thank you.

I am writing to ask you to complete a short questionnaire which asks about the _____ (name of program). The questionnaire will take **approximately between 15-25 minutes** to complete and is comprised of **5 sections**. The questions will focus on information relating to program design, exercise content, target population, and demographic information about the program and your background. It's my understanding that you are the primary instructor of _____(name of program) and could provide us with meaningful information.

Please read the instructions below every section header before answering the following questions. If at any point you would like to end the survey, you are free to do so. You may refuse to answer any question that you do not wish to answer.

The information we receive from you will give us valuable insight on the resources available for community dwelling older adults interested in fall prevention exercise programs. Information from this study will be used to understand current practices in older adult fall prevention and balance training community exercise programs.

Information from this study may be published and/or presented in public forums, however your name and the name of your associated exercise program will not be used or revealed. All participating programs and participants will be assigned a unique study ID. No names or identifying information will be collected. All information provided will be kept confidential and will only be used for research purposes. All information will be kept for 5 years after completion of the study in case further analysis is needed. After 5 years, physical information will be destroyed via shredding and digital information will be deleted from hard drives.

If you have any questions, comments, or concerns we would be happy to speak with you. You may contact us at _____ (Alexie) or _____ (Dr. Sibley), or e-mailed at _____ (Alexie) or _____ (Dr. Sibley). Thank you very much for your time and consideration.

This study has been approved by the University of Manitoba Health Research Ethics Board.

Please click on the **"Begin Survey" button below to begin the survey. The first section will consist of consent information. To access the French version of the survey, open the survey by clicking on the "Begin Survey" button and click on the "French" option at the top right hand corner of the screen.**

Sincerely,
Alexie Touchette
MSc Student

Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Third Contact- Thank you/Reminder- **Sent via SurveyMonkey**

Dear _____ (name of contact person),

This e-mail and request for help is intended for the primary instructor of _____(name of program). If you are not the primary instructor of this program, please forward the content of this e-mail to the primary instructor of _____(name of program) or respond to this e-mail with the contact information of the primary instructor of _____ (name of program). Thank you.

Last week a questionnaire seeking to describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada was sent to you.

If you have already completed and returned the questionnaire, please accept our sincere thanks. If not, please do so today. We are especially grateful for your help because it is only by asking people like you to provide us with valuable insight that we can understand current practices in older adult fall prevention and balance training community exercise programs.

This study has been approved by the University of Manitoba Health Research Ethics Board.

Please click on the **"Begin Survey" button below to begin the survey. The first section will consist of consent information. To access the French version of the survey, open the survey by clicking on the "Begin Survey" button and click on the "French" option at the top right hand corner of the screen.**

Sincerely,

Alexie Touchette
MSc Student

Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Fourth Contact- Last Reminder- **Sent via SurveyMonkey**

Dear _____ (name of contact person),

This e-mail and request for help is intended for the primary instructor of _____(name of program). If you are not the primary instructor of this program, please forward the content of this e-mail to the primary instructor of _____(name of program) or respond to this e-mail with the contact information of the primary instructor of _____ (name of program). Thank you.

During the last month we have sent you several e-mails about an important research study we are conducting at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. The purpose of the study is to describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada in order to understand current practices in older adult fall prevention and balance training community exercise programs.

The study is drawing to a close, and this is the last contact that will be made. Hearing from every participating program helps assure that the survey results are as accurate as possible.

We also want to assure you that your response to this study is voluntary, and if you prefer not to respond that's fine. A reminder that if you decide to participate, information from this study may be published and/or presented in public forums, however your name and the name of your associated exercise program will not be used or revealed. All participating programs and participants will be assigned a unique study ID. No names or identifying information will be collected.

Finally, we appreciate your willingness to consider our request as we conclude this effort to better understand current practices in older adult fall prevention and balance training community exercise programs. Thank you very much.

This study has been approved by the University of Manitoba Health Research Ethics Board.

Please click on the **"Begin Survey" button below to begin the survey. The first section will consist of consent information. To access the French version of the survey, open the survey by clicking on the "Begin Survey" button and click on the "French" option at the top right hand corner of the screen.**

Sincerely,
Alexie Touchette
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Data Collection E-mail Invitations Program Coordinator E-mail

First Contact- E-mail invitation- Sent from the PI's e-mail

Hello _____ (name of contact person),

I hope this message finds you well. I'm writing with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. I am contacting you because you were identified from publicly-available web sources as the program coordinator for the _____ (name of program) offered in _____ (province).

The study aims to describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada. The goal of the study is to understand these characteristics because effective exercise programs for fall prevention are crucial for reducing the devastating physical, psychological, and economic consequences associated with falls in older adults.

I am writing to ask your help in identifying potential instructors of the _____ (name of program) who would be interested in participating in this study by completing an online questionnaire. The questionnaire will take approximately between 15-25 minutes to complete and is comprised of 5 sections. The questions focus on information relating to program design, exercise content, target population, and demographic information about the program and the instructor's background.

Would you be willing to share the contact information (preferably e-mail) of the primary instructors of the _____ (name of program) exercise program OR forward the content below to the primary instructors of _____(name of program) so they can call/e-mail me for more information on the study?

This study has been approved by the University of Manitoba Health Research Ethics Board.

Thank you for your time and consideration. It's only with the generous help of people like you that our research can be successful.

Sincerely,

Alexie Touchette,
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Message to be forwarded to the primary instructors of _____ (name of program):

I hope this message finds you well. I'm writing with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. This study will describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada. I am contacting you because you were identified as a primary instructor of the _____ (name of program).

I am writing to ask you to complete a short questionnaire which asks about the _____ (name of program). The questionnaire will take approximately between 15-25 minutes to complete and is comprised of 5 sections. The questions will focus on information relating to program design, exercise content, target population, and demographic information about the program and your background. It's my understanding that you are the primary instructor of _____(name of program) and could provide us with meaningful information.

The information we receive from you will give us valuable insight on the resources available for community dwelling older adults interested in fall prevention exercise programs. Information from this study will be used to understand current practices in older adult fall prevention and balance training community exercise programs.

Information from this study may be published and/or presented in public forums, however your name and the name of your associated exercise program will not be used or revealed. All participating programs and participants will be assigned a unique study ID. No names or identifying information will be collected. All information provided will be kept confidential and will only be used for research purposes. All information will be kept for 5 years after completion of the study in case further analysis is needed. After 5 years, physical information will be destroyed via shredding and digital information will be deleted from hard drives.

If you are interested in participating in this study, have any questions, comments, or concerns we would be happy to speak with you. You may contact us at _____ (Alexie) or _____ (Dr. Sibley), or e-mailed at _____ (Alexie) or _____ (Dr. Sibley).

This study has been approved by the University of Manitoba Health Research Ethics Board. Thank you for your time and consideration.

Sincerely,
Alexie Touchette,
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Second Contact- First Reminder- Sent from the PI's e-mail

Dear _____ (name of contact person),

I hope this message finds you well. I'm writing with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. I am contacting you because you were identified from publicly-available web sources as the program coordinator for the _____ (name of program) offered in _____ (province).

Last week a request for help to identify potential instructors of the _____ (name of program) who would be interested in participating in this study by completing an online questionnaire seeking to describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada was sent to you.

This study invitation is intended for the primary instructors of _____(name of program). The primary instructor is the individual who may be in charge of planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc. Please forward the content of this e-mail to the primary instructors of _____(name of program) or respond to this e-mail with the contact information of the primary instructors of _____ (name of program). Thank you.

This study has been approved by the University of Manitoba Health Research Ethics Board.

Sincerely,
Alexie Touchette
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Message to be forwarded to the primary instructors of _____ (name of program):

I hope this message finds you well. I'm writing with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. I am contacting you because you were identified as a primary instructor of the _____ (name of program).

Last week a request to participate in a survey study seeking to describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada was sent to you.

If you have already contacted the principal investigator and completed the survey, please accept our sincere thanks. If not, please do so today. If you are interested in participating in this study, have any questions, comments, or concerns we would be happy to speak with you. You may contact us at _____ (Alexie) or _____ (Dr. Sibley), or e-mailed at _____ (Alexie) or _____ (Dr. Sibley).

We are especially grateful for your help because it is only by asking people like you to provide us with valuable insight that we can understand current practices in older adult fall prevention and balance training community exercise programs.

This study has been approved by the University of Manitoba Health Research Ethics Board.

Sincerely,
Alexie Touchette
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Third Contact- Last Reminder- Sent from the PI's e-mail

Dear _____ (name of contact person),

During the last month we have sent you several e-mails about an important research study we are conducting at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. The purpose of the study is to describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada in order to understand current practices in older adult fall prevention and balance training community exercise programs.

This study invitation is intended for the primary instructors of _____(name of program). The primary instructor is the individual who may be in charge of planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc. Please forward the content of this e-mail to the primary instructors of _____(name of program) or respond to this e-mail with the contact information of the primary instructors of _____ (name of program). Thank you.

This study has been approved by the University of Manitoba Health Research Ethics Board.

Sincerely,
Alexie Touchette
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Message to be forwarded to the primary instructors of _____ (name of program):

During the last month we have sent you several e-mails about an important research study we are conducting at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. The purpose of the study is to describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada in order to understand current practices in older adult fall prevention and balance training community exercise programs.

The study is drawing to a close, and this is the last contact that will be made. Hearing from every participating program helps assure that the survey results are as accurate as possible.

We also want to assure you that your response to this study is voluntary, and if you prefer not to respond that's fine. A reminder that if you decide to participate, information from this study may be published and/or presented in public forums, however your name and the name of your associated exercise program will not be used or revealed. All participating programs and

participants will be assigned a unique study ID. No names or identifying information will be collected.

Finally, we appreciate your willingness to consider our request as we conclude this effort to better understand current practices in older adult fall prevention and balance training community exercise programs.

If you are interested in participating in this study, have any questions, comments, or concerns we would be happy to speak with you. You may contact us at _____ (Alexie) or _____ (Dr. Sibley), or e-mailed at _____ (Alexie) or _____ (Dr. Sibley).

This study has been approved by the University of Manitoba Health Research Ethics Board.

Thank you very much.

Sincerely,
Alexie Touchette
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Data Collection E-mail Invitations for Centre's E-mail

First Contact- E-mail invitation- Sent from the PI's e-mail

Hello,

I'm writing with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. I am contacting this centre because your organization was identified from publicly-available web sources as providing fall prevention or balance training exercise classes for community-dwelling older adults.

This study invitation is intended for the primary instructor of _____(name of program). The primary instructor is the individual who may be in charge of planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc. Please forward the content of this e-mail to the primary instructor of _____(name of program) or respond to this e-mail with the contact information of the primary instructor of _____ (name of program). Thank you.

Message to be forwarded to the primary instructor of _____ (name of program):

I hope this message finds you well. I'm writing with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. This study will describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada. I am contacting you because you were identified by the _____ (name of centre) as a primary instructor of the _____ (name of program).

I am writing to ask you to complete a short questionnaire which asks about the _____ (name of program). The questionnaire will take approximately between 15-25 minutes to complete and is comprised of 5 sections. The questions will focus on information relating to program design, exercise content, target population, and demographic information about the program and your background. It's my understanding that you are the primary instructor of _____(name of program) and could provide us with meaningful information.

The information we receive from you will give us valuable insight on the resources available for community dwelling older adults interested in fall prevention exercise programs. Information from this study will be used to understand current practices in older adult fall prevention and balance training community exercise programs.

Information from this study may be published and/or presented in public forums, however your name and the name of your associated exercise program will not be used or revealed. All

participating programs and participants will be assigned a unique study ID. No names or identifying information will be collected. All information provided will be kept confidential and will only be used for research purposes. All information will be kept for 5 years after completion of the study in case further analysis is needed. After 5 years, physical information will be destroyed via shredding and digital information will be deleted from hard drives.

If you are interested in participating in this study, have any questions, comments, or concerns we would be happy to speak with you. You may contact us at _____ (Alexie) or _____ (Dr. Sibley), or e-mailed at _____ (Alexie) or _____ (Dr. Sibley).

This study has been approved by the University of Manitoba Health Research Ethics Board.

Thank you for your time and consideration. It's only with the generous help of people like you that our research can be successful.

Sincerely,

Alexie Touchette,
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Second Contact- First Reminder- Sent from the PI's e-mail

Hello,

I'm writing with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. I am contacting this centre because your organization was identified from publicly-available web sources as providing fall prevention or balance training exercise classes for community-dwelling older adults.

Last week a request to forward the study invitation to the primary instructor of _____(name of program) or to respond to this e-mail with the contact information of the primary instructor of _____ (name of program) was sent to _____ (name of centre).

This study invitation is intended for the primary instructor of _____(name of program). The primary instructor is the individual who may be in charge of planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc. Please forward the content of this e-mail to the primary instructor of _____(name of program) or respond to this e-mail with the contact information of the primary instructor of _____ (name of program). Thank you.

Message to be forwarded to the primary instructor of _____ (name of program):

I hope this message finds you well. I'm writing with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. I am contacting you because you were identified by the _____ (name of centre) as a primary instructor of the _____ (name of program).

Last week a request to participate in a survey study seeking to describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada was sent to you.

If you have already contacted the principal investigator and completed the survey, please accept our sincere thanks. If not, please do so today. If you are interested in participating in this study, have any questions, comments, or concerns we would be happy to speak with you. You may contact us at _____ (Alexie) or _____ (Dr. Sibley), or e-mailed at _____ (Alexie) or _____ (Dr. Sibley).

We are especially grateful for your help because it is only by asking people like you to provide us with valuable insight that we can understand current practices in older adult fall prevention and balance training community exercise programs.

This study has been approved by the University of Manitoba Health Research Ethics Board.

Sincerely,
Alexie Touchette
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Third Contact- Last Reminder- Sent from the PI's e-mail

Hello,

During the last month we have sent _____ (name of centre) several e-mails about an important research study we are conducting at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program.

This study invitation is intended for the primary instructor of _____(name of program). The primary instructor is the individual who may be in charge of planning, coordinating and developing class content, teaching the majority of classes while monitoring individual progress and offering support and assistance, etc. Please forward the content of this e-mail to the primary instructor of _____(name of program) or respond to this e-mail with the contact information of the primary instructor of _____ (name of program). Thank you.

Message to be forwarded to the primary instructor of _____ (name of program):

During the last month we have sent you several e-mails about an important research study we are conducting at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program. The purpose of the study is to describe characteristics of fall prevention and balance training community-based exercise programs for adults aged 50 years and older in Canada in order to understand current practices in older adult fall prevention and balance training community exercise programs.

The study is drawing to a close, and this is the last contact that will be made. Hearing from every participating program helps assure that the survey results are as accurate as possible.

We also want to assure you that your response to this study is voluntary, and if you prefer not to respond that's fine. A reminder that if you decide to participate, information from this study may be published and/or presented in public forums, however your name and the name of your associated exercise program will not be used or revealed. All participating programs and participants will be assigned a unique study ID. No names or identifying information will be collected.

Finally, we appreciate your willingness to consider our request as we conclude this effort to better understand current practices in older adult fall prevention and balance training community exercise programs.

If you are interested in participating in this study, have any questions, comments, or concerns we would be happy to speak with you. You may contact us at _____ (Alexie) or _____ (Dr. Sibley), or e-mailed at _____ (Alexie) or _____ (Dr. Sibley).

This study has been approved by the University of Manitoba Health Research Ethics Board.

Thank you very much.

Sincerely,
Alexie Touchette
MSc Student
Kathryn Sibley, PhD
Assistant professor, University of Manitoba

Telephone Recruitment for Community Centres

Please note that this is a template/guide and that conversations may vary.

Hello,

May I speak with the _____ (name of the centre) information desk please?

Hello. My name is Alexie Touchette and I'm phoning with regards to a new research study being conducted at the University of Manitoba in Winnipeg in partial fulfillment of a Master of Science graduate training program, under the supervision of Dr. Kathryn Sibley. The study aims to survey primary instructors of fall prevention and balance training community exercise programs for older adults in Canada.

I am contacting you because your organization was identified from publicly-available web sources as providing the _____ (name of program) exercise program for community-dwelling older adults.

Does the _____ (name of centre) still offer the _____ (name of program) exercise program?

If yes: Would you be willing to share the contact information (*preferably e-mail)* of the primary instructor of the _____ (name of program) exercise program or pass on my contact information to the primary instructor of the _____ (name of program) so they can call me for more information on the study?

If no: Thank you for your time. Have a great day.

(Wait for response. If yes, get contact information/ pass on your contact information.)

Thank you for your time and consideration. Have a great day!