SOCIAL CAPITAL AND THE INCIDENCE OF FALLS

by

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ABSTRACT

Falls are a serious concern among the elderly as they often have pre-existing comorbidities that increase their risk of injury as a result of a fall. Previous studies have found links between biological, behavioural and environmental risk factors and falls among the elderly.

The current study focused on the effect of social capital on falls among Guelph seniors aged 75 and over whom were approached using non-probability convenience sampling. Each of the 25 participants was interviewed and data was collected on the following measures: basic demographics, Fear of Falling and social capital. Total falls were tracked over a period of three months.

Men (9.34 ± 1.15) had higher balance confidence scores than women (7.86 ± 2.23). A significant positive correlation was found between social capital and education ($r=.488$, $p=.013$). A high degree of social capital was associated with an increase in balance confidence scores ($\beta=.455$; $p=.046$) adjusting for covariates (model $R^2=.548$). Low level of housing, for example, rental and subsidized was associated with a higher incidence of falls ($\beta=.444$; $p=.056$), even when controlling for the following independent variables: age, gender, risk factors, education, social capital, income and balance confidence (model $R^2=.471$).

Falls are predictable and preventable. The current study highlights some areas for public health intervention: housing, education and social capital.

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Chapter I

Falling is a concern for any population as the potential for injury is so great. However, falling among seniors is particularly worrisome as their health is often compromised. The consequences of falls that are experienced by the individual, as well as the economic implications of falls provide the impetus for further research in the area of falls prevention.

It is estimated that one in three individuals (an incidence of 33 percent) over the age of 65 falls at least once each year (Blake et al., 1988; Campbell, Borrie, & Spears, 1989; Cesari et al., 2002; Fletcher & Hirdes, 2002; Howland et al., 1993; Northridge, Nevitt, Kelsey, & Link, 1995; Prudham & Evans, 1981; Sorock & Shimkin, 1988). Some studies have noted much higher rates ranging from 40-60 percent (Berg, Alessio, Mills, & Tong, 1997; Cumming, Salkeld, Thomas, & Szonyi, 2000; Myers et al., 1996; Nevitt, Cummings, Kidd, & Black, 1989; Nevitt, Cummings, & Hudes, 1991; M. E. Tinetti, Doucette, Claus, & Marottoli, 1995; M. E. Tinetti & Williams, 1998; B. J. Vellas, Wayne, Garry, & Baumgartner, 1998). Many studies have reported that seniors who experience a fall are more likely to fall again (Fletcher & Hirdes, 2002; Howland et al., 1993; M. E. Tinetti & Williams, 1998). In some instances among those who fell, as many as half were recurrent fallers (Lehtola, Koistinen, & Luukinen, 2006; Nevitt et al., 1989; Prudham & Evans, 1981). Furthermore, the risk of falls tends to increase with age: approximately 40 percent of community-dwelling elderly over the age of 80 falls each year (Campbell, Reinken, Allan, & Martinez, 1981;

Prudham & Evans, 1981) and this group is two to three times more likely to report an injurious fall than their younger counterparts (B. J. Vellas et al., 1998).

In Ontario, injuries due to falls account for 86 percent of all hospital injury admissions among seniors (Canadian Institute for Health Information, 1999/2000). More than half of all falls result in some form of injury (Howland et al., 1993; Lehtola et al., 2006; Nevitt et al., 1991; Wild, Nayak, & Isaacs, 1981). While many studies have reported that 5-15 percent of falls result in serious injuries such as fractures, head trauma or joint dislocation requiring hospitalization (Lehtola et al., 2006; Nevitt et al., 1991; Wild et al., 1981), several others have reported hospitalization rates for injurious falls between 15-25 percent (Howland et al., 1993; B. J. Vellas et al., 1998). More specifically, seniors who have experienced a single non-injurious fall are five times more likely to be admitted to a nursing home; this risk increases to eight and a half with multiple injurious falls and 20 for those with one fall causing serious injury(M. E. Tinetti & Williams, 1997).

While the physical consequences of falling are evident, frequent falling can lead to a rapid deterioration in health and function which is often more than physical trauma. Fallers can experience social withdrawal, psychological trauma, and increased dependence. Further, falls decrease self-confidence and can cause people to isolate themselves and restrict both physical and social activity (Howland et al., 1998; S. L. Murphy, Dubin, & Gill, 2003; Myers et al., 1996; Nevitt et al., 1989; M. E. Tinetti & Williams, 1998; B. Vellas, Cayla, Bocquet, de Pemille, & Albarede, 1987). Although this fear-related activity restriction has

been noted among people experiencing non-injurious falls (Howland et al., 1993) the effect is especially pronounced in those sustaining a fall-related injury (Nevitt et al., 1991). Specifically, men who sustained a fall-related injury experienced a decrease in cognitive status, and women experienced a decrease in both physical mobility and cognitive status (B. J. Vellas et al., 1998).

Perhaps the most alarming consequence of falls is that they are the sixth leading cause of premature death among seniors in Ontario (Smartrisk, 1999). In a three year prospective study, mortality rates were 12 percent among nonfallers, 14 percent among persons with one non-injurious falls and 21 percent among persons with at least two non-injurious falls (M. E. Tinetti & Williams, 1998). In another study, one-quarter of patients died within one year after sustaining a fall (Wild et al., 1981).

Falls also contribute to a significant economic burden in Canada. Ninety percent of the 25,000 hip fractures sustained annually by Canadian seniors are attributed to falling (Sattin, 1992). The average single year cost of a hip fracture per person in Canada is estimated to be around $26,527; $21,385 for those patients who returned to the community, $44,156 for those who were transferred and $33,729 for those readmitted to long-term care facilities (Wiktorowicz, Goeree, Papaioannou, Adachi, & Papadimitropoulos, 2001). In 1996 the cost of falls in older Canadians was estimated to be $2.8 billion annually, with roughly $1 billion going to direct health costs (Smartrisk, 1999). Reducing the number of falls among older Canadians by 25 percent annually is suggested to result in 7,500 fewer permanently disabled people over the age of 65 in any given year.

Consequently, as a result of lowering the incidence of falls, Canadians could see a net savings to the health care system of approximately $138 million annually (Smartrisk, 1999).

Much of the existing literature outlines a multitude of risk factors for falls. However, the area of particular interest in this research, and one that has previously been neglected is social capital. Social capital refers to the degree of connectedness and both the quality and quantity of social integration in a population, and includes a structural component which covers individual perceptions of support, reciprocity, sharing and trust (Harpham, Grant, & Thomas, 2002). However, social capital is dependent upon a society's social structure and is therefore a characteristic of place, as opposed to an individual (Kawachi & Kennedy, 1997). Normally, social capital is measured on an individual basis and then aggregated to the community, state, or country level (Lochner, Kawachi, & Kennedy, 1999). However, for the purpose of this research, the individual's perception of social capital will be the focus.

Because social integration has been found to influence the number of and impact of falls (Faulkner, Cauley, Zmuda, Griffin, & Nevitt, 2003) and is an individual component of social capital, it is hypothesized that social capital, will have an impact on the likelihood that an individual will incur a fall. For example, people with a high level of social capital will be more connected in their community and with their family; therefore they will have more opportunities to maintain their activity levels, thus reducing their likelihood of falling. Further evidence to support a potential relationship between social capital and falling

comes from previous exploration of the relationship between social capital and population health. In an ecologic analysis based on state-level mortality rates Kawachi et al., 1997 found that indicators of social capital were correlated with mortality rates, coronary heart disease, malignant neoplasms, stroke, infant mortality and unintentional injury. Similarly, components of social capital, such as civic mistrust and lack of reciprocity were associated with poor self-rated health among elderly in both Germany and the United States and depression and functional limitations in America (Pollack & von dem Knesebeck, O., 2004).

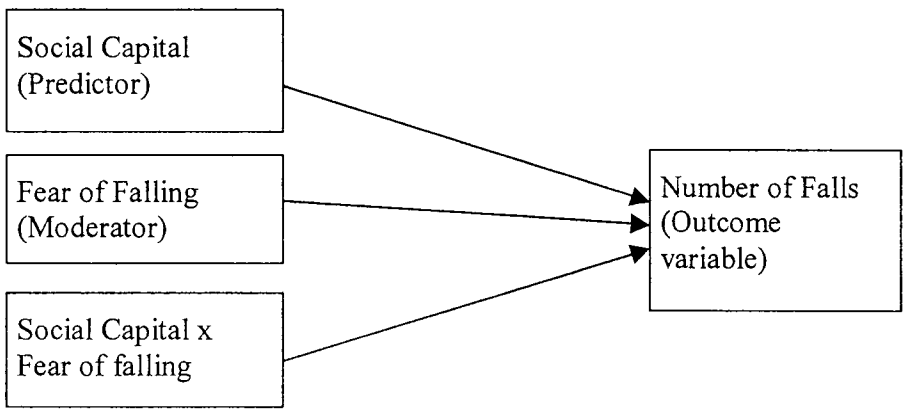
However, one cannot ignore the impact of fear of falling on this relationship. Between one-quarter and one-half of seniors who experience a fall become anxious about the possibility of a recurring fall and as many as one in four seniors who experience a fall report deliberately restricting activities as a result of their fear of falling (Howland et al., 1993; S. L. Murphy et al., 2003; Myers et al., 1996; M. E. Tinetti, Richman, & Powell, 1990) Furthermore, many seniors that have yet to experience a fall, express a fear of falling (Bruce, Devine, & Prince, 2002; Cumming et al., 2000; Howland et al., 1993; Lach, 2005; S. L. Murphy et al., 2003; Myers et al., 1996).

Based on the original hypothesis related to the influence of fear of falling on a person's activity levels, it is possible that social capital affects falls outcomes, and may be moderated by the effects of fear of falling. Specifically, if a person perceives themselves to have a high level of social capital, but they are very fearful of falling, they may restrict their activities, despite the many opportunities they may have for social engagement. Fear of falling is recognized

as a moderating variable because it is expected to identify on whom and under what circumstances the independent variable (social capital) will have effects (Kraemer, Wilson, Fairburn, & Agras, 2002). Furthermore, fear of falling is expected to affect the direction and strength or both, of the relations between the predictor variable (social capital) and the criterion variable (falls outcome) (Baron & Kenny, 1986).

A suggested model underlying the proposed research is described as follows: there will be three causal paths that feed into the outcome variable (number of and consequences of falls):

- the impact of social capital as the predictor
- the impact of fear of falling as the moderator
- the interaction or the product of these two.



The moderator hypothesis will be supported if the interaction path is found to be significant (Baron & Kenny, 1986). Therefore, the null hypothesis is as follows: a person's level of social capital will have no impact on falls outcomes, fear of

falling will have no effect on their falls status and the interaction between social capital and fear of falling will not have a significant effect on falls.

Falling and its consequences are serious public health concerns, as they are both prevalent and preventable (Berg et al., 1997). However, in order to ensure a successful approach to falls prevention among a growing population of seniors, comprehensive policies need to be put in place from all levels of government. Social capital and its impact on health is a relatively new area of research, but has many implications in the area of population health as it may enhance social support which may mitigate the effects of traumatic events in one's life, such as a fall. It is therefore important to further examine social capital and health outcomes as ecologic analysis may be needed in order to change political agendas.

Glossary of Terms

FOF- Fear of falling

ADL- Activities of Daily Living

IADL- Instrumental Activities of Daily Living (cleaning, grocery shopping, transportation, etc.)

TUG- The timed up-and-go test

SDAT- Senile Dementia of the Alzheimer's Type

FES- Falls Efficacy Scale

MFES-Modified Falls Efficacy Scale

ABC- Activities-specific Balance Confidence Scale

SAFE- Survey of Activities and Fear of Falling in the Elderly

A-SCAT- Adapted Social Capital Assessment Tool

SC-IQ- Integrated Questionnaire for the Measurement of Social Capital

Chapter II: Review of Related Literature

The review of literature highlights nearly three decades of research published on the epidemiology of falls, the phenomenon of fear of falling, and a relatively new area of research; social capital. The review consists of selected sources of literature in relation to the epidemiology of falls, social capital and fear of falling, and therefore is not exhaustive in nature. Strategies for reviewing information included: computer, interlibrary, and manual searches in the University of Guelph and University of Waterloo Libraries. Databases searched include: Proquest, EBSCO, PubMed, PsychLine, and OVID; all of which resulted in a review spanning the health disciplines of medicine, psychiatry, behavioural and social sciences, epidemiology, public health, and physiotherapy.

Circumstances of Falls

The majority of falls research cites that more than half of all falls occurred in the person's home (Nevitt et al., 1989; Nevitt et al., 1991; Prudham & Evans, 1981; M. E. Tinetti, Speechley, & Ginter, 1988; Waller, 1978). However, some studies reported that more than half of people fell outdoors (Blake et al., 1988; Pajala et al., 2006); a finding supported by other research which reports public places and outdoors in close proximity to the home as common fall locations (Waller, 1978). Another study found that while women mostly fell at home, men most often fell outside in a public place (B. J. Vellas et al., 1998). Furthermore, seniors younger than 75 years were more likely to fall outdoors than those who were older than 75 years (Bath & Morgan, 1999). It was also found that indoor falls were associated with frailty, while outdoor falls were associated with

compromised health status in healthier people. Multiple fallers and indoor fallers experienced the greatest risk of mortality as they often have comorbidities that put them at increase risk for both falls and fall-related injuries (Bath & Morgan, 1999).

Few studies have been able to come to a consensus on what time of day falls are most likely to happen, for example, during the daytime (Pajala et al., 2006; B. J. Vellas et al., 1998). However, a two year prospective study, found a pattern, among women who were less than 90; the probability of injury from a fall was highest in the morning and in the evening (Lehtola et al., 2006). As for a seasonal difference in falls patterns, men fell most often during the winter, while there was no significant seasonal difference in falls for women (Berg et al., 1997).

Environmental factors were noted as the cause of falls in many cases (Cesari et al., 2002; Fletcher & Hirdes, 2002; Nevitt et al., 1989; Nevitt et al., 1991; Speechley & Tinetti, 1991; M. E. Tinetti et al., 1988; Waller, 1978). However, the impact of acute or chronic health problems on falls status, is also well documented (Waller, 1978). For example, dizziness was reported as the cause among 13 percent (M. E. Tinetti et al., 1988), eight percent (Blake et al., 1988) and 6.4 percent (Prudham & Evans, 1981) of elderly fallers. Other conditions associated with falls include: tripping (Berg et al., 1997; Blake et al., 1988; Prudham & Evans, 1981), blackouts (Blake et al., 1988) and legs giving way (Prudham & Evans, 1981). Many falls occur while seniors are involved in activities of daily living (ADLs) (Lehtola et al., 2006; Speechley & Tinetti, 1991) or engaged in an activity such as walking (Nevitt et al., 1991; Speechley &

Tinetti, 1991; B. J. Vellas et al., 1998), going up and down stairs, transferring (ie. getting in or out of bed or chair), stooping or bending, turning around to reach for something (Nevitt et al., 1991) or traveling over icy or wet surfaces (Waller, 1978). Conversely, some researchers did not find falls to be strongly associated with the presence of home hazards, however, when compared with vigorous older persons living with fewer environmental hazards, vigorous persons with more home hazards were more likely to fall. (Northridge et al., 1995). In other studies comparing frail and vigorous seniors, those who were considered frail were, on average, twice as likely to fall as their vigorous counterparts. (Northridge et al., 1995; Speechley & Tinetti, 1991).

Risk Factors for Falls

One factor that increases the risk of falling for older adults is the presence of certain physical disabilities (Campbell et al., 1981; M. E. Tinetti et al., 1988; Wickham, Cooper, Margetts, & Barker, 1989). Many studies demonstrate the increased risk specifically for those with foot problems (Blake et al., 1988; Koski, Luukinen, Laippala, & Kivela, 1996; M. E. Tinetti et al., 1988); hip weakness (Robbins et al., 1989) or muscle weakness, including decreased hand grip and knee strength (Blake et al., 1988; Campbell et al., 1989; Nevitt et al., 1989; M. E. Tinetti, Williams, & Mayewski, 1986; Wickham et al., 1989). Similarly, poor flexibility and endurance (M. E. Tinetti et al., 1986), and impaired reaction time (Koski et al., 1996; Nevitt et al., 1991) have been found to contribute to falls outcomes. Functional disability has also been reported as a predictive risk factor for falls, especially ADL and IADL limitations (Biderman, Cwikel, Fried, &

Galinsky, 2002; Prudham & Evans, 1981), such as: difficulty getting up from a chair (Nevitt et al., 1989). Furthermore, both arthritis (Blake et al., 1988; Campbell et al., 1989; Nevitt et al., 1989) and being less healthy in general (Bath & Morgan, 1999) have been found to significantly affect fall status.

Many studies have found evidence that abnormalities of balance and gait are a significant contributor to falls (Campbell et al., 1981; Campbell et al., 1989; Cesari et al., 2002; Fletcher & Hirdes, 2002; Nevitt et al., 1989; Prudham & Evans, 1981; M. E. Tinetti et al., 1986; M. E. Tinetti et al., 1988; B. J. Vellas et al., 1998; Wickham et al., 1989; Wild et al., 1981; Landi 2005); especially for injurious falls (Koski et al., 1996; M. E. Tinetti et al., 1995). Further mobility concerns that have been found to increase one's risk of falls are: slow walking speed (Bath & Morgan, 1999), wandering (Cesari et al., 2002), and the use of walking aids (Campbell et al., 1981). Balance and gait disturbances are particularly important as they have been found to be the most predictive of falls (Robbins et al., 1989) and are specifically associated with recurrent fallers (Campbell et al., 1981) and mortality (Wild et al., 1981).

There are also several psychological factors which have been found to increase a person's falls risk. Cognitive impairment has been associated with falls (Campbell et al., 1981; Fletcher & Hirdes, 2002; Prudham & Evans, 1981; Robbins et al., 1989; M. E. Tinetti et al., 1986; M. E. Tinetti et al., 1988; Wild et al., 1981); especially those resulting in major injury (Nevitt et al., 1991; M. E. Tinetti et al., 1995). Similarly, several studies have found that those individuals suffering from depression are at an increased risk for falls (Biderman et al., 2002;

Cesari et al., 2002; Landi et al., 2005), as are those who have a fear of falling (Cumming et al., 2000; Landi et al., 2005), and poor self-rated health status (Biderman et al., 2002; Fletcher & Hirdes, 2002). In a one year prospective study, Type A behaviour pattern was independently associated with falling in males, but not in females, which may indicate that risk-taking behaviour increases the risk of falling (Zhang, Ishikawa-Takata, Yamazaki, & Ohta, 2004). Furthermore, in a case control study people with mild Senile Dementia of the Alzheimer's Type (SDAT) experienced falls three times as often as controls (Morris, Rubin, Morris, & Mandel, 1987).

Several studies have indicated that medication influences the risk of falls. Some researchers reported that a higher number of prescribed drugs is the significant risk factor (Bath & Morgan, 1999; Biderman et al., 2002; Blake et al., 1988; Campbell et al., 1989; B. J. Vellas et al., 1998; Landi 2005); noting that three or more (Biderman et al., 2002) or four or more medications (Campbell et al., 1989) are likely to increase falls risk. Other researchers provide evidence that the type of medication, and not just the number are important, for example: psyhotropics (Blake et al., 1988; Campbell et al., 1989; Prudham & Evans, 1981; M. E. Tinetti et al., 1988; M. E. Tinetti et al., 1995; Wickham et al., 1989), antidepressants (Blake et al., 1988; Sorock & Shimkin, 1988), benzodiazepines (Landi, 2005; Sorock & Shimkin, 1988), narcotic analgesics, insulin (Prudham & Evans, 1981), centrally active antihypertensive agents (Prudham & Evans, 1981), antipsychotic drugs (Landi 2005), and drugs that cause postural hypotension (Campbell et al., 1989; Prudham & Evans, 1981). However, one study found that

people taking antidepressants did not demonstrate an increased risk of falls (Landi 2005). Drugs found specifically to increase the risk of injurious falls include: psychotropics (M. E. Tinetti et al., 1995), digitalis glycosides, calcium blockers, and benzodiazepines (Koski et al., 1996).

Several impairments have been reported to increase the risk of falls, for example: impairments of hearing (Biderman et al., 2002; M. E. Tinetti et al., 1986) and vision (Campbell et al., 1981; Nevitt et al., 1991; Prudham & Evans, 1981; M. E. Tinetti et al., 1986). Postural hypotension has also been associated with an increased risk of falls (Campbell et al., 1981; Campbell et al., 1989; Robbins et al., 1989; M. E. Tinetti et al., 1986). Further conditions that have been linked to falls outcomes include: stroke (Campbell et al., 1981; Prudham & Evans, 1981), reported giddiness (Blake et al., 1988), heart disease and non rotary vertigo (Prudham & Evans, 1981), and Parkinson's (Fletcher & Hirdes, 2002; Nevitt et al., 1989). Prudham et al. 1981 found that fallers tended to suffer more frequently from faints, blackouts, weakness and numbness, while Nevitt et al. 1991 found that falls associated with a loss in consciousness were more likely to result in major injury. Lastly, recent weight loss (Wickham et al., 1989), and incontinence (Wild et al., 1981) have both been associated with falls risk. Low Body Mass Index (BMI) has been noted as a risk factor for sustaining injury during a fall (M. E. Tinetti et al., 1995). Some studies have found that the more diseases a person has, the more at risk they are for falls (Biderman et al., 2002) or to sustain an injury from a fall (M. E. Tinetti et al., 1995).

There have been several other factors, found to increase the risk of falls. For example, many studies have found that females tend to fall more often than males (Biderman et al., 2002; Prudham & Evans, 1981; M. E. Tinetti et al., 1995; B. J. Vellas et al., 1998); in some cases as many as two to three times more often (Blake et al., 1988; Wickham et al., 1989). Furthermore, they are more likely to suffer injuries as a result of a fall (Gryfe, Amies, & Ashley, 1977; B. J. Vellas et al., 1998), which is likely a result of lower bone density (M. E. Tinetti et al., 1995). However, most of these researchers found that the disparity in falls frequency between males and females decreases with age (Blake et al., 1988; Gryfe et al., 1977; Prudham & Evans, 1981). Conversely, in a study of seniors using community-based home care services, men were more likely to fall, and to be recurrent fallers (Fletcher & Hirdes, 2002). Several studies have reported that as people age, their risk of falling increases (Nevitt et al., 1989; B. J. Vellas et al., 1998; Wickham et al., 1989) until approximately the age of 80, at which point falls risk tends to decline steadily (Blake et al., 1988). There is also evidence to suggest that falls status is influenced by number of previous falls (Biderman et al., 2002; Nevitt et al., 1989; B. J. Vellas et al., 1998; Wild et al., 1981), decreased physical activity (Campbell et al., 1989; B. Vellas et al., 1987), and even genetic endowments, such as familial factors (Pajala et al., 2006) and race; with Caucasians having the greatest risk for falls (Nevitt et al., 1989; Nevitt et al., 1991). Social support has also been found to be associated with falls, as people who are unmarried (Biderman et al., 2002) or living alone (Wickham et al., 1989) fall more often than those who cohabitate. Furthermore, in a three year

prospective study, stronger family networks were associated with a decreased falls risk, whereas weaker friendship networks showed a tendency for decreased falls risk. Therefore it was thought that while both networks lead to an increase in activity, family networks may provide supports that are relevant to reducing falls (Faulkner et al., 2003).

The accumulation of risk factors also seems to be an important factor in determining who is at risk for falls. In one study, the risk of falling increased linearly with the number of risk factors; from eight percent with none to 78 percent with four or more risk factors (M. E. Tinetti et al., 1988). In another prospective study, nine risk factors were included in a falls risk index: the proportion of recurrent fallers increased from zero percent (0-3 risk factors) to 31 percent (4-6 risk factors) to 100 percent (seven or more risk factors) (M. E. Tinetti et al., 1986). Similarly, Nevitt et al., 1989 found that those with none or one of the seven risk factors the proportion of falling was 0.10, this increased to 0.69 for those with 4 or more risk factors.

Fear of Falling: Demographics

Fear of falling has been found to affect anywhere from one-quarter (Howland et al., 1993; S. L. Murphy, Williams, & Gill, 2002) to one-half (Howland et al., 1993; Howland et al., 1998) of adults over the age of 65; and is influenced by whether or not the person has fallen, or sustained an injury from a fall (Howland et al., 1993). Fear of falling has also been found to change over time: in two prospective studies approximately one quarter of those who did not express FOF at baseline, developed this fear one year later (Lach, 2005; S. L.

Murphy et al., 2003). Similar to falls, FOF tends to increase with age (Lach, 2005) and is more prevalent in women than in men (Lach, 2005; Myers et al., 1996; Suzuki, Ohyama, Yamada, & Kanamori, 2002).

Risk Factors for Developing FOF

Several risk factors have been found to be associated with FOF. Some are common to both falls, and fear of falling, such as; assistance with ADLs (Howland et al., 1993; Suzuki et al., 2002), visual impairments (S. L. Murphy et al., 2003; Suzuki et al., 2002), female gender (Friedman, Munoz, West, Rubin, & Fried, 2002; Howland et al., 1998; Suzuki et al., 2002), advancing age (Friedman et al., 2002; S. L. Murphy et al., 2003), and previous falls (Friedman et al., 2002; Howland et al., 1993; Lach, 2005; S. L. Murphy et al., 2003; Suzuki et al., 2002). However, certain factors that have not been documented as falls risk factors were found to affect the development of FOF, these include: knowing someone who has fallen (Howland et al., 1993; Myers et al., 1996), fewer social contacts (Howland et al., 1998), lack of emotional support (S. L. Murphy et al., 2003), and feeling unsteady (Lach, 2005).

Consequences

There are many severe consequences of FOF, the most noted being restriction or curtailing of normal activities (Howland et al., 1998; S. L. Murphy et al., 2002). The characteristics associated with activity restriction are: history of injurious fall, slow timed physical performance, two or more chronic conditions, depression (S. L. Murphy et al., 2002), not communicating about falls, less social

support, and knowing someone who has fallen (Howland et al., 1998). FOF may also cause people to adopt a high risk gait, which predisposes them to falls (Maki, 1997). Furthermore, people who report being fearful tend to be less physically and socially active (Bruce et al., 2002) and to have a decreased quality of life; often with symptoms of depression (Arfken, Lach, Birge, & Miller, 1994). Another study found evidence to suggest that fear of falling increases the risk of admission to an aged care institution, especially among nonfallers (Cumming et al., 2000).

Measuring FOF

Falls Efficacy Scale (FES). In this scale, FOF is operationalized as falls efficacy in order to determine the extent to which fear of falling is related to functional decline among the elderly (M. E. Tinetti et al., 1990). This tool consists of 10 nonhazardous activities of daily living (ie. getting dressed, toileting, bathing, preparing meals, etc.) and is designed to assess the degree of perceived efficacy at avoiding a fall (M. E. Tinetti et al., 1990). Each activity is assessed on a 10 point continuum; 1 (completely confident that the task can be performed without falling) to 10 (not at all confident) with a higher score representing lower confidence or self-efficacy. The person's score is the sum of the scores on each 10 point continuum, with scores ranging from 10-100 (M. E. Tinetti et al., 1990). The FES was found to be both reliable and valid, and was able to discriminate between those who restrict activities and those who do not (M. E. Tinetti et al., 1990). However, the scores were not significantly different for fallers versus nonfallers and results tended to cluster at the high end of the scale (Powell & Myers, 1995). Due to this "ceiling effect" and because it exclusively measures

indoor activities, the FES is thought to be more suitable for older adults who are homebound and have low mobility (Legters, 2002).

Modified Falls Efficacy Scale (MFES). Because the FES tended to have a ceiling effect with higher functioning seniors, the MFES was developed which added four new activities to the original. The scale was also modified to go from 0 (not at all confident the task can be performed without falling) to 10 (completely confident) (Hill, Schwarz, Kalogeropoulos, & Gibson, 1996). The new tool assessed confidence on more difficult (outdoor) activities such as; using public transport, crossing roads, gardening and traveling up and down steps (Hill et al., 1996). It was also found to be both reliable and valid, and had lower skew values than the FES (Hill et al., 1996).

The Activities-specific Balance Confidence (ABC) Scale. The researchers that developed this scale had two main concerns about the FES: some of the items in the FES were too vague and could lead to inconsistent interpretation, and it was not sensitive enough to detect loss of balance confidence in high functioning seniors (ADLs and IADLs) (Myers et al., 1996; Powell & Myers, 1995). Therefore, items included in this scale were more specific and encompassed a broader range of difficulty. The response continuum ranges from 0-100 percent, and the question asked is: "how confident are you that you will not lose your balance or become unsteady while..." (Powell & Myers, 1995). The ABC was found to have high test-retest reliability, internal consistency (Myers, Fletcher, Myers, & Sherk, 1998; Powell & Myers, 1995) and construct validity (Powell & Myers, 1995). It was able to discriminate between subjects who reportedly

avoided activity because of FOF and those who did not (Myers et al., 1996) and was a better discriminator of high versus low mobility subjects; meaning that the range of scores among subjects of different mobility levels was greater than the FES scores (Powell & Myers, 1995). The best predictors of balance confidence were perceived health and current level of physical activity; while age, education, and gender were significant predictors (Myers et al., 1998). One concern with the ABC was addressed in a pilot test by Li et al., 2005. The researchers found that some participants had difficulty rating the scale based on the percentage rating, therefore they used a scale ranging from 0 to 10 with a high score indicating greater falls efficacy (Cronbach's alpha 0.87-0.92) (Li, Fisher, Harmer, & McAuley, 2005).

The Survey of Activities and FOF in the Elderly (SAFFE). The SAFFE was created, to address the previously noted difficulties with the FES and ABC scales, as well as concerns that the FES does not determine the reasons behind and individual's lack of participation, and neither the FES nor ABC contain items that focus on exercise or social activity (Lachman et al., 1998). Furthermore, the researchers wished to examine the relationship of FOF to activity restriction and quality of life. The tool contains 22 activities representing both ADLs and IADLs; for each activity, several questions were asked: "do you do the activity?", "if you do, are you worried you might fall?", "if you don't, is it because you are worried you might fall?", "are there other reasons?", "compared to 5 years ago would you say you do it less, the same, or more?". This measure was also found to have a high degree of construct validity.

Social Capital

Social Capital has been characterized in two distinct ways. The first refers to the resources (capital) that people have access to through their relationships with others. These resources include information, ideas and support and are social in that they are only accessible through one's established relationships and cannot be generated by individuals alone. The structure of a network (who is interacting and how often) affects the flow of resources, which is why those who have ties that span many networks are said to have the most capital as they have access to more and better resources. (Burt 2000 as cited in Grootaert et al. 2004)

Putnam refers to the nature and extent of one's involvement in various informal networks and formal civic organizations. In this context, social capital refers to the ways in which members of a community choose to interact with one another (Putnam 2000 as cited in Grootaert 2004). The more connections a person has, the more social capital they are considered to have. Along these lines, social capital consists of aspects of social organization, such as: networks of secondary associations, levels of interpersonal trust, and norms of mutual aid and reciprocity. These are resources that are available to individuals, but facilitate collective action. Social capital is therefore an ecologic characteristic, meaning that it is a feature of the social structure, not of the individual operating within that structure (Lochner et al., 1999).

One model suggests there are two components to social capital, the structural component, which covers the extent and intensity of associational links or activity; what people do. The cognitive component includes: perceptions of

support, reciprocity, sharing and trust and represents how people feel (Bain and Hicks 1998 as cited in Harpham et al. 2002).

Recently, two additional components have been examined. Bonding refers to within-community relationships (Harpham et al., 2002): ties to people who are similar in terms of demographic characteristics, such as family members, neighbours, close friends, and coworkers (Grootaert, Narayan, Nyhan Jones, & Woolcock, 2004). Bridging social capital refers to extra, or outside community relations (Harpham et al., 2002), including ties to people who do not share similar characteristics (Grootaert et al., 2004).

Impact on health. Several studies have found evidence to suggest a relationship between social capital and many health outcomes. In one study high levels of social mistrust were related to an increase in total mortality and higher rates of most major causes of death, including unintentional injury. Likewise, group membership was strongly inversely related with total mortality, and was a predictor of coronary heart disease, malignant neoplasms, and infant mortality (Kawachi & Kennedy, 1997). A second study compared six heart disease interventions and found that support services were as effective in preventing deaths from heart disease as were medical care, and rescue (ie. bypass surgery) (Lomas, 1998). Deaths from coronary heart disease, accidents, and suicide were significantly increased among less socially connected men. Moreover, an increase in social networks over time was associated with a 29 percent decrease in risk of death (Eng, Rimm, Fitzmaurice, & Kawachi, 2002). Lastly, among people who had ischemic heart disease, cancer and stroke, social network measures were

strong predictors of both cause-specific and total mortality (Vogt, Mullooly, Ernst, Pope, & Hollis, 1992).

Measuring social capital. Social capital is measured by indicators such as membership in associations, trust and reciprocity, which are gathered through individual's perceptions. Numerous tools have been utilized, each with its own advantages and disadvantages. The Social Capital Community Benchmark Survey, developed at the Saguaro Seminar, was developed to measure civic engagement in America and covers 11 different facets of social capital. While it is comprehensive, the length (over 100 questions) is inappropriate for the intended population, as are many of the questions.

The Adapted Social Capital Assessment Tool (A-SCAT) captures an individual's perceptions and experience of social capital, rather than measuring social capital at the community level. No validity or reliability measures are currently available. This measure is also lengthy and includes many questions that address the same construct and are not appropriate to the target population.

The Integrated Questionnaire for the Measurement of Social Capital (SC-IQ) developed by The World Bank was intended to map the distribution of social capital across areas or socio-economic groups, or relate social capital to poverty and access to services (Grootaert et al., 2004). In pilot tests conducted in Albania and Nigeria interview times ranged from 30-120 minutes. The questionnaire is lengthy and difficult to code, and has yet to be used in any western countries (Grootaert et al., 2004).

The Social Capital Questionnaire, developed by Bullen and Onyx, contains 36 questions that capture structural, cognitive, bonding and bridging components of social capital. The questionnaire was administered to over 1200 citizens, between the ages of 18-65, in various areas in Australia, and demonstrated good construct validity (Onyx & Bullen, 2000b).

Regardless of which measurement tool one employs, when measuring social capital it is important to measure possible confounders such as; socioeconomic status which may affect quality of housing, education, length of residence in the community, gender, and number of people per household (Harpham et al., 2002).

Chapter III: Methods

Participants

As it is important for this research that the participants represent various levels of social capital, older adults (ages 75+) will be approached through a non-probability convenience sampling method, rather than random sampling. Potential participants were approached only after ethics approval was granted from the ethics review board at Lakehead University. All participants who meet the eligibility criteria, and are willing to participate will be included in the study. There will be no fewer than 15 participants selected from a population of approximately 750 seniors from a variety of locations throughout the city of Guelph. This will help ensure a heterogeneous sample which consists of participants of varying degrees of socioeconomic status, education, income, and social capital. The points of contact will include, seniors living independently in the community, as well as seniors residing in retirement communities, who are considered to function independently.

Selection Criteria

Participants will be selected based on the following criteria: they must be 75 years or older, independently living in the community, able to understand and follow instructions, proficient in English, willing to participate, which means they must be available for the period of study and agree to fill out the falls calendar for the full three months, and they must be ambulatory, with or without assistance.

Access to Sample

Four locations were selected as potential contact points for the current study. The Evergreen Seniors Centre is a community centre that offers various classes ranging from yoga to crafts and computers. The Royal on Gordon is a retirement residence with 98 older adults considered to function independently. Parkside Christian Village is a federally funded, non-profit housing development for older adults and includes 50 apartments, of which, several units are geared to income. Lastly, the Village by the Arboretum is an adult lifestyle community consisting of 488 single family town homes located in Guelph's south end. The majority of the residents are 55 years and older, and own their homes. The administrator or manager of each facility was contacted by the researcher in order to determine if they would support the proposed study. For each of the locations, the permission of this person was required before any potential participants were approached. Once the necessary approval was given by each corresponding manager, a meeting was set up, and the researcher delivered the essential materials to each of the three locations. The materials consisted of an introductory letter, which was distributed to each potential participant, and contained a summary of the proposed study and the researcher's contact information. The activities coordinator from the Royal on Gordon requested that the researcher provide a presentation on falls prevention for the residents. The researcher used this opportunity to inform residents about the study, screen those who were interested in volunteering and enter eligible participants into the database. The Village by the Arboretum is a community and not contained within a single

building, therefore, the administrator placed a notice on their website as well as in their newsletter; interested candidates contacted the researcher directly. During the initial contact, each potential participant was screened in order to ensure they met the selection criteria; as well, some basic demographic information, such as, gender and age was collected. Participants' names, phone numbers and addresses were also entered into the database at this point, and were used for contact purposes only. Also, a date and time that was convenient for both participant and researcher was selected for the first interview (T1).

Apparatus

In order to be efficient in data collection and analysis a database was created, specifically for this study (Thomas, Bernard, & Chan, 2005). The database will function as a data collection and storage tool, as well as aid in the analysis. Data were collected on site using a standard paper and pencil method. Participant responses were then input directly into the database after the face-to-face interview. This approach was intended to save time, and decrease response transcription errors. The database was written for Microsoft Access and stored all participant information including, demographics, fear of falling measure, social capital measure, and confounding variables, such as number of risk factors and socioeconomic status, for later analysis with SPSS. The researcher updated the database each month based on the participant's falls status reported in their falls diaries.

Procedure

Once the sample was determined, all eligible participants agreeing to participate in the study were contacted to arrange convenient interview times. The researcher visited each participant according to a pre-planned schedule and conducted a face-to-face interview. Each participant was presented with a letter of consent (Appendix 2) which he or she read and was then asked to sign. Information obtained from each participant was immediately recorded on the participant questionnaire. However, the information was not associated with the participants' name, as each participant was assigned a project code number that was used in the analysis. The data collected from each participant included the following measures: fear of falling, social capital and general demographic information that will be discussed in detail in a later section. The average duration of each interview was approximately one hour. Once the session was complete, each participant was given three calendars, one for each month they were involved in the study (November-January). They were expected to use the calendars to record their number of falls. The researcher explained at length, the definition of a fall as well as how to complete the calendars and that they were to be mailed monthly. Once all interviews were completed, the data from the questionnaires was entered in to the database and scanned to ensure that all participant records were complete and had been entered correctly. A preliminary analysis was conducted in order to assess the average scores for FOF and social capital, which helped in choosing an appropriate demarcation point. At the conclusion of the study, all participants were offered a falls prevention package

that was compiled by the researcher in collaboration with a nurse from the Wellington-Dufferin Guelph Health Unit. The package included: information on home hazards, risk factors for falls, how to get up from a fall, a medication diary and a list of services that are available for older adults in the city of Guelph.

Fear of Falling. Fear of falling was measured using the Activities-specific Balance Confidence Scale (Powell & Myers, 1995)(Appendix 4). In this scale, fear of falling is operationalized by an individual's self confidence while performing a variety of daily activities. There are 16 activities and for each, the researcher asked the participant how confident they were that they could maintain their balance and remain steady while performing the activity. The potential response can range from 0% (No confidence) and continues in increments of 10 until 100% (Completely confident). However, as noted in the review of related literature, Li et al. 2005, found that many older adults found it difficult to use the 0-100% scale. Based on the aforementioned recommendations, the current study utilized a scale ranging from 0 (no confidence) to 10 (completely confident). If the participant stated that they did not engage in a certain activity, they were asked to imagine how confident they would be if they had to do the activity. In order to obtain a score for each participant, the total rating (ranging from 0-160) was divided by 16, or the number of items completed. For the purpose of this study, the moderating variable (FOF) must be dichotomized; meaning that an appropriate cut-off-point is determined to separate those with fear and those without. In previous work by Myers et al., 1998, a "cut-point" of 80 (or 8 with the modified scale) served to separate a relatively tight cluster of subjects at the high-

confidence end of the scale, from the remaining subjects, whose scores were spread over a wider range. Furthermore, in a longitudinal study of patients undergoing hip and knee replacements, the "cut-point" of 80 was again utilized (Myers et al., 1996). Therefore, in the present study those with a score of 8 or higher were said to have no fear and those with a score of less than eight were categorized as having fear (Myers et al., 1998).

Social capital. The measure of social capital that was used in the proposed study is the Social Capital Questionnaire, which was developed in Australia by Bullen & Onyx (1998) (Appendix 5). The questionnaire is designed to collect information on a person's perceptions of their social capital, and includes questions about their social activities, levels of trust in others, and the types of resources people have available to them; a higher score indicates a higher level of social capital (Onyx & Bullen, 2000a). With permission from one of the researchers (Bullen), the questionnaire was modified to be more appropriate for the target population. Since the tool had only been used on participants aged 18-65 some of the wording was changed in order to ensure it was easily understood by those over 75 years of age. Furthermore, as it was developed in Australia, some of the words were not appropriate for use in Canada.

Demographic information and risk factors. In order to determine if social capital did in fact have an effect on falls outcomes, various confounding variables needed to be controlled. The first were the variables that affect falls outcomes. Information was collected on the following risk factors for falls: number of medications, use of assistive device, hearing or vision impairments, previous falls,

balance and gait problems, hypotension, number of environmental hazards, alcohol use, foot problems, Parkinson's and arthritis. All risk factors were assessed by participant accounts with the exception of environmental hazards, which was determined by a scan of the residence by the researcher and balance and gait difficulties, which were measured using the Timed Up and Go Test (TUG) (Appendix 6&7). In past research, participants who took longer than 10 seconds to complete the TUG were considered to have some level of impairment in gait and/or balance (Podsiadlo & Richardson, 1991). Based on this evidence, participants who took longer than 10 seconds to complete the TUG were considered to have balance or gait difficulties. Participants were then classified as having four or more or less than four of the above mentioned risk factors. The second factor that would affect the relationship between social capital and falls is socioeconomic status, which includes; level of education, income, and housing. This information was gathered by questions taken from the social capital questionnaire.

Falls calendars. Each participant was given three calendars. One for each month they were involved in the study. Standard calendars were printed from a computer with an increased font size to ensure readability. After the first interview each participant was given his or her calendar along with three self-addressed stamped envelopes. Each participant was given detailed instructions regarding where they were to keep their calendar, and how they were to complete them. Whenever they had a fall they were to place a check mark, or an "X" on the day the fall occurred. The following definition of a fall, in appropriate language,

was utilized: "unintentionally coming to rest on the ground, floor or other lower level (eg. chair) for reasons other than sudden onset of acute illness or overwhelming external force" (Kellogg Work Group). The last day of every month included a written notice to each participant: "please send calendar in today". Participants who forgot to send in their calendar at the end of the month were given a reminder phone call after 10 days, at which point they gave the researcher a promised date that they would mail the calendar. Participants who lost their calendar were asked to verbally report any falls to the researcher over the phone. Participants' falls information was entered into the database as the calendars were received with the number of falls in each month being recorded.

Proposed Analysis

In order to prove the hypothesized relationship between social capital and falls, three causal paths that feed into the outcome variable (number of falls) must be examined: the predictor variable, level of social capital, the moderating variable, fear of falling, and the interaction, or product of the two. In order to look at the impact of the first two variables on falls outcomes, social capital will be correlated with number of falls, controlling for number of risk factors (which was dichotomized into 4+ or <4), gender, and age; as well as the various socioeconomic indicators (education, income and housing). The research will correlate the participant's score on the measure of fear of falling index and the number of falls, similarly controlling for the aforementioned confounding variables. In order to examine the third path, fear of falling will be dichotomized into no fear, and fear, as mentioned earlier. Social capital will then be compared

with falls separately for each fear of falling category using unstandardized regression coefficients. The difference between the two will be examined. Only after this test is performed, will social capital be correlated with falls separately for each fear of falling category. This is due to two deficiencies that have been noted with correlational methods. First, it assumes that the predictor variable has equal variance at each level of the moderator. Second, if the amount of measurement error in falls varies as a function of fear of falling then social capital may appear in some instances to be related to falls, when in fact, a relationship does not exist (Baron & Kenny, 1986). If social capital is significantly related to falls, and the difference between the two correlations, fear of falling and social capital, are significant, then it can be said that fear of falling has a moderating effect on the relationship between social capital and falls.

Chapter IV: Results

The results of the current study are organized in the following manner: demographic variables, descriptive statistics for important dependent measures, correlations, and finally multiple logistic regressions (linear).

Results of the study are based on 25 participants from Guelph. Data collection was limited to the following five sources: 44 percent of the participants were from the Evergreen Seniors Centre, 20 percent were from Royal on Gordon, 16 percent from Village by the Arboretum, 16 percent were approached through social contacts and one participant (four percent) was from Parkside Christian village. The distribution of various sociodemographic characteristics of the samples is shown in Table 1. Female participants (60 percent) outnumbered males (40 percent) and the same ratio was true for participants 80 years and older (60 percent) and less than 80 years old (40 percent). Participants were categorized as having less than four of the 11 risk factors for falls (52 percent), or having four or more risk factors (48 percent). The majority of the participants sampled did not fall at all during the course of the study (72 percent). However 12 percent and 4 percent of participants experienced at least one and two falls respectively, while 12 percent fell three times or more. With respect to education 36 percent had completed high school, 28 percent went to or completed university, 24 percent had less than a high school education and 12 percent had completed some post graduate education. Twenty-eight percent of participants reported that their annual household income was less than $25,000, while 36 percent earned between $25-

50,000 and 32 percent made more than $50,000. Sixty-four percent of participants resided in a privately owned dwelling, while 28 percent rented and 8 percent lived in subsidized housing.

Table 1.
Study Participants and their Sociodemographic Characteristics

Variable	Percentage (Frequency)
Age	
<80	40 (10)
80+	60 (15)
Location	
Village by the Arboretum	16 (4)
Evergreen Seniors Centre	44 (11)
The Royal on Gordon	20 (5)
Parkside Christian Village	4 (1)
Social Contacts	16 (4)
Gender	
Female	60 (15)
Male	40 (10)
Total Falls	
0	72 (18)
1	12 (3)
2	4 (1)
3+	12 (3)
Risk Factors	
<4	52 (13)
4+	48 (12)
Education	
Less than high school	24 (6)
Completed high school	36 (9)
University	28 (7)
Post Graduate	12 (3)
Annual household income	
Did not answer	4 (1)
< $25,000	28 (7)
$25-50,000	36 (9)
$50,000	32 (8)
Housing	
Private	64 (16)
Rental	28 (7)
Subsidized	8 (2)

The mean values for various descriptors are presented in Table 2. The mean age of the participants in this study was 80.64 years with a standard deviation of ±4.26. Males were slightly younger (79 ±3.3) than females (81.73 ±4.57). The mean ABC score was 8.45 with a standard deviation of ±1.99, with males scoring considerably higher (9.34 ±1.15) than their female counterparts (7.86 ±2.23). This pattern was also noted in the social capitals scores; males (93.9 ±11.29) and females (89.6 ±11.82). The mean number of falls was 0.68 with a standard deviation of ±1.44, with men, falling less 0.40 (±0.966) than the female participants 0.87 (±1.685).

T-tests were run to see if the reported differences between male and female participants were significant. In comparing the means of social capital scores, no significant difference was found between males (M=93.90, SD=11.289) and females (F=89.60, SD=11.82), therefore equal variances was assumed t(23)=-.907, p=.371. Similarly, no significant difference was found in the number of falls between males (M=.40, SD=0.97) and females (F=0.87, SD=1.69), t(23)=.790, p=.437. However, when the mean ABC scores were compared, equal variance was assumed: males (M=9.34, SD=1.15) had higher scores than females (M=7.86, SD=2.23), and the difference approached significance, t(23)=-1.92, p=.067.

Table 2.
Mean Scores by Total, Male and Female Participants

Variable	Total (n=25) M ± SD CI (95%)	Males (n=10) M ± SD CI (95%)	Females (n=15) M ± SD CI (95%)
Age	80.64 ± 4.26 (78.97,82.31)	79 ± 3.3 (76.96,81.04)	81.73 ± 4.57 (79.42,84.04)
ABC Score[a]	8.45 ± 1.99 (7.67,9.23)	9.34 ± 1.15 (8.63,10.04)	7.86 ± 2.23 (6.73,8.99)
Social Capital Score[b]	91.32 ± 11.57 (86.78,95.86)	93.9 ± 11.29 (86.90,100.897)	89.6 ± 11.82 (83.62,95.58)
Total Falls[c] *(November-February)*	0.68 ± 1.44 (0.12,1.24)	0.40 ± 0.97 (-0.20, 1.00)	0.87 ± 1.69 (0.02,1.72)

[a]ABC Score is out of a highest possible score of 10
[b]Social Capital Score is out of a highest possible score of 120
[c]Total Falls was collected over three months where each person recorded every fall they experienced

The Activities-specific Balance Confidence Scale (ABC) score distribution was determined by grouping the number of males and females that had scores from 0-0.99, 1-1.99, 2-2.99 and so on, up to a perfect score of 10. These frequencies were plotted on a bar graph (presented in Figure 1 and 2) in order to understand why what seemed to be a large difference between male and female scores, only approached significance. In doing so, it became clear that the female scores had one major outlier who scored 1.63 out of a possible 10, while the rest of the scores clustered between five and nine. On the other hand, the male

participants had no scores below six and 30 percent scored a perfect 10 out of 10. The difference in means could then be attributed to these outliers.

Figure 1.
ABC Score distribution (Females)

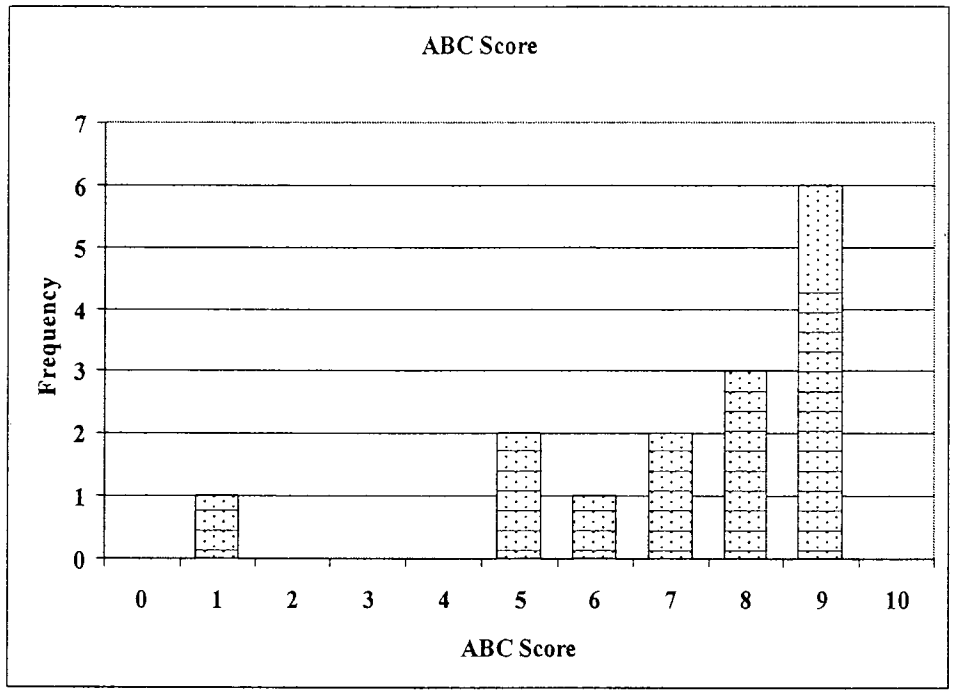
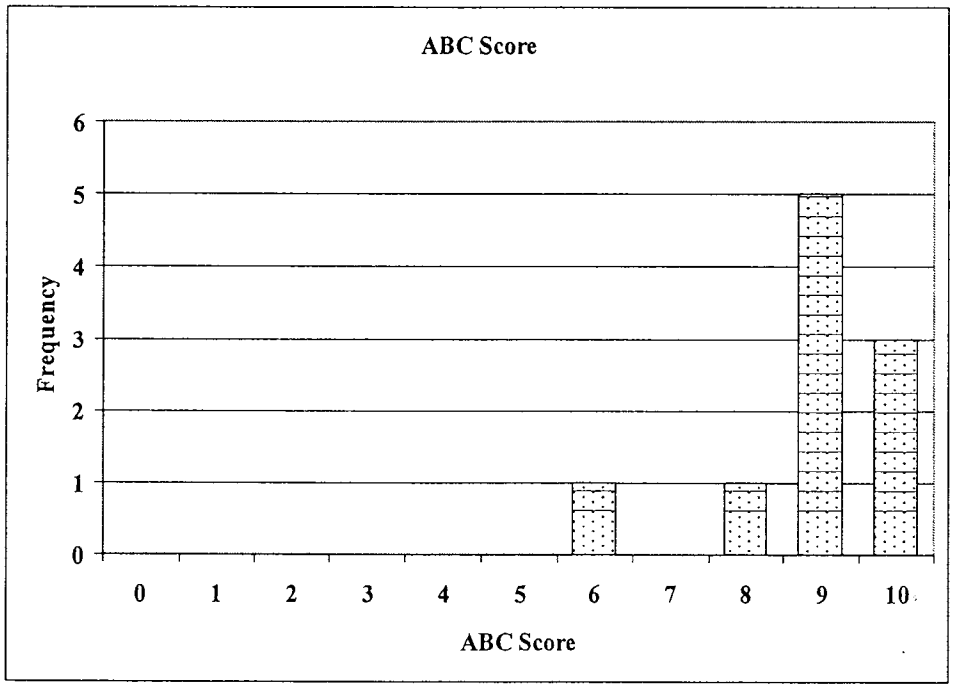


Figure 2.
ABC Score Distribution (Males)



Pearson correlations were run on several variables; the significant results are presented in Table 3. ABC score was negatively correlated with risk factors (r=-.492). This means that participants who had more than four risk factors scored significantly lower on the ABC scale. Similarly, risk factors were positively associated with total number of falls; however, this relationship only approached significance (p=.054). Unsurprisingly, we found that a higher level of income was significantly associated with owning one's home (r=-.473), as opposed to living in a rental or subsidized residence. Furthermore housing influenced the total number of falls. As housing increased in the following fashion (private, rental, subsidized), total falls increased (β=.444; p=.056). An increase in number of risk factors was also associated with an increase in falls (β=.437; p=.058). These relationships remained even when controlling for the following variables: risk factors, education, age, gender, social capital score, housing, income and ABC score: R^2=.471, F(8,16)=1.1778, p=.156. There were significant positive correlations between social capital and both education (r=.488) and ABC scores (r=.485). Social capital made a significant unique contribution to ABC score (β=.455; p=.046) when a multiple regression was run with ABC as the dependent variable and the following predictors: total falls, education, age, gender, risk factors, income, social capital score, and housing. The R square was (.548) F(8,16)=2.424, p=0.063.

Table 3.
Significant Correlations for Selected Variables

	Housing	ABC Score	Social Capital Score	Total Falls
Risk Factors		.492* .013 25		
Education			.488* .013 25	
Income	-.473* .017 25			
Housing				.469* .018 25
ABC Score			.485* .014 25	

* $p<0.05$, two-tailed test.

Chapter V: Discussion

The main purpose of this study was to determine if a person's social capital would influence their likelihood of falling. However, due to financial and time constraints the sample size was comprised of 25 participants and therefore the initial hypotheses could not be accurately tested. The following discussion will highlight the results of this study that support previous findings in related literature, as well as emerging patterns that are of interest.

In terms of characteristics of the sample, although it was small, it was quite diverse in all respects. Education and income were equally represented as well as the number of risk factors for each participant. The participants were gathered from different locations across the city of Guelph which greatly contributed to the diversity of the sample. Those who volunteered for the study were extremely interested in the research and very helpful, in that they went above and beyond what was required of them. Participants did, however, have a few similarities of note: the majority of those who volunteered for the study had 1) participated in some type of research before, 2) recently experienced a fall, 3) completed some type of post graduate work and were therefore familiar with the principles of research and 4) grandchildren who were in University and therefore empathized with the plight of the researcher. Potential participants, who were approached, were, in general, leery of the motives of the researcher and the aforementioned qualities of those who volunteered for the study made them more likely to trust the researcher and feel comfortable participating.

The incidence of falls among the current sample is consistent with the falls frequency cited in much of the literature. For example, Cesari et al., 2002 reported that every year one in three seniors will experience a fall. However, the results of the current study were taken over a period of three months, which is less than the standard 12 months used in the literature. Although it was not tested, this suggests that the falls frequency for this sample may have been higher if they had been followed for a longer period of time. However, it is equally probable that the same people would have experienced more falls.

Many studies have reported a causal relationship between certain risk factors and falls, namely; hearing and vision impairments (Biderman et al., 2002), gait abnormalities (Cesari et al., 2002; Fletcher & Hirdes, 2002), number of medications (Campbell et al., 1989), foot problems (Koski, Luukinen, Laippala, & Kivela, 1996) and home hazards (Cesari et al., 2002; Fletcher & Hirdes, 2002). Furthermore, previous research has also shown that it is not the specific types of risk factor that determines whether or not someone will fall, rather it is the accumulation of risk factors that substantially increases their risk (M. E. Tinetti et al., 1988; Nevitt et al., 1989). The aforementioned risk factors were used in the current study to categorize participants as having less than four or four or more risk factors; these groupings were then used in subsequent analyses. While there was no significant relationship found, the current pattern supports previous literature; as those participants with four or more risk factors were more likely to fall than those with less than four risk factors.

It has also been previously noted that many of the risk factors that contribute to falling similarly contribute to the development of fear of falling (Suzuki et al., 2002; S. L. Murphy et al., 2003; Friedman, Munoz, West, Rubin, & Fried, 2002). The current study supports these findings, as those who had four or more risk factors had significantly lower balance confidence scores. It could be however, that because these participants had more risk factors, they had likely fallen more often in the past than someone with fewer risk factors, which would also contribute to their decreased confidence.

The results of the present study indicate that men tend to score higher on the Activities-specific Balance Confidence scale than women (although this only approached significance). Similar relationships have been found in previous research by Friedman et al., 2002 and Suzuki et al., 2002. One possible explanation for this pattern is that men tended to overestimate their level of confidence so as not to seem weak and afraid. Many men in the current study did not even wait until the activity in question was read before they answered that they were completely confident; or rated themselves a 10 out of 10. On the other hand women tended to underestimate their confidence so as not to seem overly self-assured and therefore appear more modest. It is conceivable that balance confidence is indicative of general confidence and male participants wanted to appear to be more confident then they actually are.

An interesting result from the current study was the strong positive correlation between education and social capital. There are several possible explanations for this significant relationship. Firstly, social capital refers to the

resources people have available to them through their relationship with others, for example: information, support and ideas (Burt 2000 as cited in Grootaert et al. 2004). It is plausible then that someone with a high level of education has friends with similar educational backgrounds and therefore they have a more diverse pool of information from which to draw. For example, a doctor may have a lawyer and a financial advisor as friends whom they could turn to for sound advice in specific situations. Furthermore, these supports would likely be able to offer monetary assistance.

The reporting habits of individuals with a higher level of education indicated that they appeared to have more trust in others; this is a noteworthy difference. These participants tended to be more involved in their communities and hold the general belief that things will work out for the best. A higher level of education often translates into more available opportunities, which leads to more positive life experiences. When one has had positive outcomes in the past, one believes that positive events will occur in the future (belief that things will work out for the best), has a positive view of others (have more trust in others) and also feels a sense of duty to help those who have not been as fortunate (increased community involvement).

The current research was not able to support the hypothesized relationship between social capital and falls, however, two correlations that emerged are worth reporting. The first being the strong positive relationship between social capital score and ABC score. A similar relationship has been noted in past research, where it was found that participants with fewer social contacts and a lack of

emotional support were more likely to report a fear of falling (Howland et al., 1998; S. L. Murphy et al., 2003). However, these constructs represent only part of social capital, which is a much broader measurement that takes into account norms of reciprocity and trust as well as involvement in civic organizations. It is clear from the research that a relationship does exist between social capital and ABC score; however, it is unclear as to the direction of this relationship. It could be that as fear of falling develops it leads to a restriction in activities and social engagements; isolating the person from social contacts. However, an equally likely deduction is that someone with a low level of social capital would lack appropriate resources, that is, someone to call in case of an emergency, and would therefore have less confidence while performing daily activities.

Data emerged from this study; however, that suggest a cyclical, as opposed to a causal relationship. Although this potential cycle is not tested in this thesis it is thought that that those who experience fear may curtail their activities, thereby restricting their opportunities to socialize, which leads to isolation, which may invoke a fear of falling, causing the person to further inhibit their participation in activities. This association highlights the importance of social relationships in determining health and suggests that seniors programs be made readily available to seniors who cannot afford them and that isolated groups especially, are targeted for interventions and given opportunities to voice their concerns. Regardless, more research in the area is needed to validate the relationship that was found in this small sample of participants and to test the abovementioned relationship.

Individuals who either lived in a rental or subsidized apartment were more likely to fall that those who owned their own home. This relationship remained, independently of the following variables: education, risk factors, age, gender, social capital score, income, and ABC score. There are two proposed explanations for this relationship. The first is that the conditions in rental or subsidized residences would present hazards that would increase someone's risk of falling. For example, apartments often have poorly lit hallways and stairwells or cracks in the sidewalk that have been neglected. Furthermore, these units may be much smaller than private dwellings and as such there is less room to maneuver safely around furniture and small objects. The second explanation is that housing is a proxy for income, which can be a proxy for education. Therefore those participants who are more educated would seek out the means to learn about the risk factors for falls and take measures to prevent them, such as making lifestyle changes and talking to their doctor. These results have serious public health implications, such as the importance of targeting education campaigns towards those most at risk; individuals who are isolated and do not have the means to remove potential environmental hazards. Interventions would be especially effective and efficient if delivered in social housing complexes, where many of the at-risk individuals could be reached at once. Furthermore, landlords of buildings with a high population of seniors need to be informed as to the environmental risk factors for incurring a fall, as well as some cost-effective safety measures.

While it is recognized that the data are limited and the original hypothesized relationship could not be accurately tested, there were many interesting associations that became evident during the course of this study. However, some of the limitations warrant further discussion; the first concerning the length of time that participants were followed. Most of the previous literature regarding the epidemiology of falls tracks participants for at least 12 months (Biderman et al., 2002). However, due to financial and time constraints the current study followed participants for a period of three months. It is difficult, in this short amount of time, to get an accurate measurement of a person's likelihood of falling. The researcher chose not to rely on retrospective falls data collection as there are many inherent disadvantages, including limited participant recall. The second limitation that must be noted is the relatively small sample size. There are approximately 6000 seniors over the age of 75 living in Guelph. The researcher narrowed the scope by targeting areas where the population density of seniors was high. Many seniors were approached, however, the majority was very weary about being interviewed and assumed the researcher had ulterior motives. Those seniors who did agree to participate exhibited the qualities that were mentioned earlier. Based on these limitations it is recommended that the relationship between social capital and falls be investigated further with a larger sample and that participant falls be tracked for at least one year.

Conclusion

The current research intended to evaluate three causal pathways leading to the outcome variable (falls): social capital, fear of falling, and the interaction between these two variables. However, due to the small sample of 25 participants, no significant relationship could be found between the abovementioned measures. This did, however, lead to some interesting findings. Men were found to have higher scores on the Activities-specific Balance Confidence Scale than women. This finding has implications for the validity of Fear of Falling measures and deserves further investigation to determine the reasons for these differences.

It is also interesting that social capital was significantly related to education, but not other socioeconomic variables, such as income and housing. Social capital has been linked to many serious disease outcomes, but is often difficult to measure as it involves large scale ecologic analysis. If education is determined to be a predictor for social capital it would be much easier to measure and to implement social programs directed at a single variable.

Although the current research did not find a relationship between social capital and falls, social capital was significantly related to ABC score. Since, past research has found fear of falling to be a risk factor for falls (Landi, 2005); it is plausible that with a larger sample a relationship between social capital and falls would emerge. Finally, the relationship between housing and falls warrants the greatest attention as this was the only variable that was found to make a unique contribution to falling among the sample.

Recommendations

Falls and their sequelae are experienced by the entire spectrum of elderly persons. However, this research has reported some patterns which highlight the characteristics that can increase an individual's risk of falling. Preventive strategies, therefore, need to be tailored to the individuals who are most at-risk and delivered within the social structure in which they live. This research emphasizes the importance of several variables that were either directly or indirectly related to falling. These include education, social capital and housing.

Education affects many aspects of quality of life as it relates to access to resources, opportunities and services. This research further highlights the importance of educating an already vulnerable population. As the population and life expectancy of seniors in Canada continues to increase, it becomes ever more important to find ways to reduce health disparities. Community education campaigns must be targeted to the most isolated, frail and at-risk seniors to ensure that they have access to information that could potentially improve their quality of life and mitigate disease and injury outcomes.

Social Capital is a construct with many dimensions that can be addressed through community mobilization efforts. Social agencies must continue to strive to increase access to services for seniors, for example; health services, social programs and affordable housing. Connecting seniors to their community will serve to build capacity for these groups, which will allow them to feel like contributing and empowered residents.

Housing is a tangible risk factor that can be addressed at all levels of government through policy changes and advocacy. This research suggests that seniors living in rental or subsidized housing be targeted for campaigns that build awareness of the many environmental risk factors that put one at risk to fall. These include poorly lit hallways and stairwells, clutter, scatter rugs, power cords, ice and snow covered sidewalks and so forth. Furthermore, landlords must be educated as to potential risk factors for falls and policies should be put in place that offer incentives to landlords who comply with certain safety regulations specific to seniors.

The factors that have been noted in the current study warrant further research, however, other socioeconomic factors that could potentially contribute to falls and fall-related injuries must be examined in order to reduce the disparity between fallers and non-fallers and ensure that strategies are delivered in the population health context.

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Appendices

Introductory Letter

Melissa Kwiatkowski
Master's of Public Health, Lakehead University

Dear Potential Participant:

My Name is Melissa Kwiatkowski and I am a student in the Master's of Public Health program at Lakehead University. I am conducting a study of the impact of social networks and community involvement on falling among older adults. This research is being carried out in order to gain an understanding of the factors that put people at risk for falls.

In order to conduct my research, I am looking for participants, over the age of 75, who would be willing to be interviewed once, in mid-October for approximately 60 minutes and then again 3 months later. The only task I would ask you to complete during the 3 months is to use a calendar that I will provide and check off any day that you experience a fall. In the interviews I will need to collect general demographic data, as well as information on some of the risk factors you may have for falling. Some of the questions will pertain to how comfortable you feel doing certain daily activities and some will ask you questions about your level of involvement in the community as well as your social activities. There are no incorrect responses to the questionnaire and all answers will be accepted. It is also important you know that if you feel uncomfortable with any question you may leave it unanswered, and you may withdraw from the study at any time.

Your answers will be kept completely confidential. Your name and personal information will only be used so that I may contact you to set up an interview time, and will not be associated with any of the answers you provide. When the research is completed, I will be developing a report based on the results, which will be available to the public. Information you have provided will be presented along with responses from residents of other retirement communities in the Guelph Area. You can request access to the results directly through myself, the researcher, any time after June 2007. All data collected will be securely stored at Lakehead University for seven years.

If you are interested in participating in my study, please contact me at (519) 824-9920. If you have further questions you can contact my supervisor, Dr. William Montelpare at 807-343-8481. Thank you for your consideration to volunteer for this study.

Sincerely,

Melissa Kwiatkowski.
Master of Public Health.

Informed Consent

I _____ have read the cover letter pertaining to the study: **Social Capital and the Incidence of Falls.** I understand the purpose of the study and that I will be required to volunteer approximately 60 minutes of my time in order to complete two interviews, 3 months apart, and that I will be required to keep track of my falls during the three months with a falls calendar given to me by the researcher. I am also aware that I have the right to refuse to answer any question and/or to stop my participation in this study at any time. I know that all my answers are confidential, that Lakehead University will store any data collected for seven years, and the final report will be available to the public. I am also aware that I can request a copy of the results directly from the Melissa Kwiatkowski anytime after June 2007.

In signing below I agree to participate in the study.

_____ _____

Signature of Participant Date

Demographic Information

Contact Information

Name:	
ID #:	
Phone:	
Address:	
Gender:	
Age:	

Risk Factors

Risk Factor	Yes	No	Risk Factor	Yes	No
4+ medications			Alcohol use		
Assistive Device			Foot problems		
Hearing or vision problems			Parkinson's		
Balance or gait problems			Arthritis		
Hypotension			Falls in the past 12 months, if yes, how many:		
1+ environmental hazards					

4+ risk factors		<4 risk factors	

Education

Less than high school	
Completed high school	
University	
Post Graduate	

Income

Below $25,000	
$25,000-$50,000	
More than $50,000	

Housing

Private	
Rental	
Subsidized	

Pearson Product Correlation for All Variables

		Age	Risk Factors	Education	Income	Housing	ABC Score	Social Capital Score	Total Falls
Age	r	1	.121	-.234	-.378	.150	-.339	-.169	.178
	p		.564	.260	.062	.475	.097	.419	.395
	N	25	25	25	25	25	25	25	25
Risk Factors	r	.121	1	-.113	.044	-.035	.492*	-.359	.389
	p	.564		.589	.834	.867	.013	.078	.054
	N	25	25	25	25	25	25	25	25
Education	r	.234	-.113	1	.205	-.071	.046	.488*	.037
	p	.260	.589		.326	.737	.826	.013	.862
	N	25	25	25	25	25	25	25	25
Income	r	.378	.044	.205	1	-.473*	.037	.094	-.337
	p	.062	.834	.326		.017	.860	.653	.099
	N	25	25	25	25	25	25	25	25
Housing	r	.150	-.035	-.071	-.473*	1	.141	.097	.469*
	p	.475	.867	.737	.017		.503	.646	.018
	N	25	25	25	25	25	25	25	25
ABC Score	r	.339	-.492*	.046	.037	.141	1	.485*	-.141
	p	.097	.013	.826	.860	.503		.014	.502
	N	25	25	25	25	25	25	25	25
Social Capital Score	r	.169	-.359	.488*	.094	.097	.485*	1	-.119
	p	.419	.078	.013	.653	.646	.014		.571
	N	25	25	25	25	25	25	25	25
Total Falls	r	.178	.389	.037	-.337	.469*	-.141	-.119	1
	p	.395	.054	.862	.099	.018	.502	.571	
	N	25	25	25	25	25	25	25	25

* $p<0.05$, two-tailed test.

The Activities-specific Balance Confidence (ABC) Scale
For each of the following activities, please indicate your level of self-confidence by choosing a corresponding number from the following rating scale:

0	1	2	3	4	5	6	7	8	9	10
No Confidence										**Completely Confident**

"How confident are you that you can maintain your balance and remain steady when you....

1. walk around the house? _____

2. walk up or down stairs?_____

3. bend over and pick up a slipper from the front of a closet floor? _____

4. reach for a small can off a shelf at eye level? _____

5. stand on your tip toes and reach for something above your head? _____

6. stand on a chair and reach for something?_____

7. sweep the floor?_____

8. walk outside the house to a car parked in the driveway?_____

9. get into or out of a car?_____

10. walk across a parking lot to the mall?_____

11. walk up or down a ramp?_____

12. walk in a crowded mall where people rapidly walk past you?_____

13. are bumped into by people as you walk through the mall?_____

14. step onto or off of an escalator while holding onto a railing?____

15. step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing?_____

16. walk outside on icy sidewalks?_____

Administration

The ABC can be self-administered, via personal or telephone interview. Larger typeset should be used for self-administration, while an enlarged version of the rating scale on an index card will facilitate interviews. Each respondent should be queried concerning their understanding of the instructions, and probed regarding difficulty answering any specific items.

Instructions to Respondents

"For each of the following, please indicate your level of confidence in doing the activity without losing your balance or becoming unsteady by choosing one of the percentage points on the scale from 0% to 100%. If you **do not currently do** the activity in question, try and imagine how confident you would be if you had to do the activity. If you **normally** use a walking aid to do the activity or hold onto someone, rate your confidence as if you were using these supports. If you have any questions about answering any of the items, please ask the administrator."

Instructions for Scoring

Total the ratings (possible range = 0 to 1600) and divide by 16 (or the number of items completed) to get each person's ABC score. If a person qualifies his/her response to items #2, #9, #11, #14, or #15 (different ratings for "up" vs "down" or "onto" vs "off"), solicit separate ratings and use the **lowest** confidence rating of the two (as this will limit the entire activity, e.g, likelihood of using stairs). Total scores can be computed if at least 12 of the items are answered. Note: internal confidence (alpha) does not decrease appreciably with the deletion of item # 16--icy sidewalks--for administration in warmer climates (Myers et al.'98).

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Social Capital Questionnaire

For the following questions **please circle the most appropriate response**

1. Do you feel valued by society?

No, not much			*Yes, very much*
1	2	3	4

2. Looking back, are you satisfied with what your life has meant?

No, not much			*Yes, very much*
1	2	3	4

3. Have you ever picked up other people's garbage in a public place?

No, never			*Yes, frequently*
1	2	3	4

4. Some say that by helping others you help yourself in the long run. Do you agree?

No, not much			*Yes, very much*
1	2	3	4

5. Do you help out a local group as a volunteer?

No, not at all			*Yes, often (at least once a week)*
1	2	3	4

6. Do you feel safe walking down your street after dark?

No, not much			*Yes, very much*
1	2	3	4

7. Do you agree that most people can be trusted?

No, not much			*Yes, very much*
1	2	3	4

8. If someone came to your door for help would you invite them into your home to use the phone?

No, not at all			*Yes, definitely*
1	2	3	4

9. Can you get help from friends when you need it?

No, not at all			*Yes, definitely*
1	2	3	4

10. Does your area have a reputation for being a safe place?

No, not at all			*Yes*
1	2	3	4

11. If you were caring for a pet and needed to go away for a while, would you ask a neighbour for help? OR If you were leaving town would you feel comfortable asking a neighbour to watch your home and take in your mail?

No, not at all			*Yes, definitely*
1	2	3	4

12. Have you visited a neighbour in the past week?

No, not at all			*Yes, frequently*
1	2	3	4

13. Have you attended a local community event in the past 6 months (eg, church event, school concert, craft exhibition)?

No, not at all			*Yes, several (at least 3)*
1	2	3	4

14. Are you an active member of a local organization or club (eg, sport, craft, social club)?

No, not at all			*Yes, very active*
1	2	3	4

15. Does your local community feel like home?

No, not at all			*Yes, definitely*
1	2	3	4

16. In the past week, how many phone conversations have you had with friends?

None			*Many (at least 6)*
1	2	3	4

17. How many people did you talk to yesterday?

None at all			*Many (at least 10)*
1	2	3	4

18. Do you have lunch/dinner with other people outside your household?

No, not much			*Yes, nearly always*
1	2	3	4

19. Do you go outside your local community to visit your family?

No, not much			*Yes, nearly always*
1	2	3	4

20. When you go shopping in your local area are you likely to run into friends and acquaintances?

No, not much			*Yes, nearly always*
1	2	3	4

21. If you need information to make a life decision, do you know where to find that information?

No, not at all			*Yes, definitely*
1	2	3	4

22. In the past 6 months, have you done a favour for a sick or ill neighbour/friend?

No, not at all			*Yes, frequently (at least 5 times)*
1	2	3	4

23. Are you on a management committee or organizing committee for any local group or organization?

No, not at all			*Yes, several (at least 3)*
1	2	3	4

24. In the past 3 years have you ever taken part in a local community project or working bee?

No, not at all			*Yes, very much*
1	2	3	4

25. Have you ever been part of a project to organize a new service in your area (eg, youth club, scout hall, child care, recreation for disabled)?

No, not at all			*Yes, several times (at least 3)*
1	2	3	4

26. If you disagree with what everyone else agreed on, would you feel free to speak out?

No, not at all			*Yes, definitely*
1	2	3	4

27. If you have a dispute with your neighbours are you willing to negotiate in order to solve the problem?

No, not at all			*Yes, definitely*
1	2	3	4

28. Do you think that multiculturalism makes life in your area better?

No, not at all			*Yes, definitely*
1	2	3	4

29. Do you enjoy living among people of different life styles?

No, not at all			*Yes, definitely*
I	2	3	4

30. If a stranger, someone different, moves into your street, would they be accepted by the neighbours?

No, not easily			*Yes, definitely*
1	2	3	4

Timed Up-and-Go (TUG) Test

Described below is a simple field assessment which can be easily used in physical activity programs for older adults. It is simple to deliver, safe, sensitive to change with activity, and can provide a "snap shot" description of an older adult's function.

Start position: In everyday footwear, the individual sits in a standard arm chair (seat height 46 cm, arm height approximately 65 cm) with back against the chair, and arms resting on the chair's arms. Use a walking aid during the test if the individual normally uses one.

Instructions: On the word "go", get up and walk at a comfortable and safe pace to the line on the floor 3 meters away, turn, return to chair and sit down again.

Record: Time in seconds required to complete the task; one practice walk allowed before being timed; note difficulties in getting out of the chair, walking, turning and/or sitting down.

Timed Up-and-Go (TUG) Test Scoring

≤10 sec INDEPENDENT

- Person is at a high level of function. A re-test at this level is not necessary; choose instead a Self-Paced Walking field test.

11-19 sec SEMI-INDEPENDENT

- Person may use an aid but is still able to enjoy a moderate level of function.
- Following an effective exercise program this measurement should show improvement

≥20 sec DEPENDENT

- Person has a low level of function and his/her mobility is compromised.
- Following an effective exercise program this measure should show improvement.

Timed Up-and-Go (TUG) Test Score Sheet

Name _____ Date Completed

_____

ID# _____ Name of Tester

_____

TIME (SECONDS)

GAIT AID? YES ☐ NO ☐

IF YES, SPECIFY:

☐ cane ☐ wheeled walker (4 wheels)

☐ two canes ☐ walker (two wheels, two solid feet)

☐ solid walker (no wheels)

Note any DIFFICULTIES OBSERVED: (standing, turning, sitting down etc.)
