

Changes in Physical Activity, Physical Function
and Cognitive Function
with Transition to Retirement Living

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Physical activity is associated with slower physical and cognitive decline with aging. However, there are many barriers to physical activity among community-dwelling older adults. Retirement living may facilitate physical activity by reducing health, social, and environmental barriers for seniors. The purpose of this thesis was to: (1) quantify changes in physical activity and physical function over the transition to retirement living; (2) examine the relationship between participant characteristics and physical activity in retirement living; and (3) describe the relationship between change in physical activity and change in physical and cognitive function. Older adults on the wait-lists for or living in retirement living were recruited. Physical activity was assessed with the Actigraph activity monitor and the CHAMPS activity questionnaire. Physical function was measured with the Senior Fitness Test. Cognitive function was assessed with a 45-minute test battery that assessed a variety of cognitive domains. In this study, objectively measured physical activity decreased with the transition to retirement living; however, it appeared that intentional exercise increased while activities of daily living (ADLs) decreased. Additionally, endurance, agility, and strength improved after the transition. In retirement living, physical activity was positively associated with endurance, agility, and strength, as well as balance confidence, memory and executive function. However, change in physical activity over the transition to retirement living was not positively correlated with changes in physical or cognitive function. The results from this study, the first to prospectively follow older adults over the transition to retirement living, indicate that physical activity decreases due to a large drop in ADLs with the transition, though physical function appeared to improve. Future studies should expand the timeline used in this thesis to better understand

change in physical activity and function. In addition, strategies to overcome the decrease in physical activity due to a drop in ADLs should be developed.

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Dedication

I would like to dedicate the thesis to my late Nana, Jane Regan, whose battle with dementia and transitioning to retirement living on her own inspired my ambition to focus my research endeavours on easing the decline in cognitive impairment among our aging population. I have always been interested in physical activity and its associated benefits throughout the life course, but it was after experiencing the effects of dementia first hand that I wanted to focus my efforts on determining ways to promote physical activity among older adults in such a way as to optimize physical and cognitive functioning. Nana, this study is just the beginning for me and I look forward to researching and implementing new ways to encourage physical activity among the aging population in an effort to preserve physical and cognitive function.

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List of Abbreviations

ADLs – Activities of Daily Living

CCRC – Continuing Care Retirement Community

CESD – Center for Epidemiologic Studies Depression Scale

HVLT – Hopkins Verbal Learning Test

MCI – Mild Cognitive Impairment

MoCA – Montreal Cognitive Assessment

NPI-Q – Neuropsychiatric Inventory Questionnaire

1.0 INTRODUCTION AND OVERVIEW

In 2010, seniors aged 65 and older accounted for 14% of the Canadian population (Statistics Canada, 2011). This population is expected to increase at an accelerated rate in the upcoming years, as more baby boomers reach the age of 65 years. Projections predict that in 2026, seniors will account for greater than 20% of the Canadian population and 25% by 2056 (Statistics Canada, 2011). Increased age is often accompanied by a decrease in health and well-being, which is associated with increased demand on the health care system and support services (Strathokostas et al., 2004, Sternberg et al., 2011). People often experience decline in both cognitive and physical function with aging (Hollenberg et al., 2006, Stathokostas et al., 2004, Albert et al., 2011, Masur et al., 1994, Goh et al., 2011). The decline in both cognitive and physical function can vary greatly from individual to individual and is dependent on various factors, one being involvement in regular physical activity, which seems to decrease the rate of decline (Pate et al., 1995, Bijnen et al., 1999, Yaffe et al., 2001, Colcombe & Kramer, 2003, Brawley et al., 2006). However, there are many barriers to physical activity among older adults. It was hypothesized that residing in retirement living may alleviate some of these barriers. As a result, the purpose of this thesis was to examine change in physical activity patterns and associated cognitive and physical function over the transition from community living to retirement living.

The literature review will first provide background about the physical and cognitive changes associated with aging and the benefits of physical activity to both cognitive and physical function. The barriers to physical activity among older adults will then be reviewed as well as factors that motivate them to remain or become physically active. The potential of retirement living communities as a facilitator to overcome barriers to physical activity will then be

introduced. Lastly, research regarding the difference in physical activity levels in community living versus retirement living will be assessed and gaps in knowledge regarding this transition from community to retirement living will be identified.

2.0 LITERATURE REVIEW

2.1 Functional Decline with Aging:

Biological aging typically results in a decline in function. This functional decline makes activities of daily living (ADLs) more challenging and often leads to the need for long-term care (Luppa et al., 2010).

2.1a Physical Decline with Aging:

Many aspects of physical fitness and function decline with age. Aerobic endurance declines on average with aging (Hollenberg et al., 2006, Stathokostas et al., 2004). Longitudinal data reveals that average aerobic capacity decreases by approximately 10% in both men and women per decade (Hollenberg et al., 2006). Individuals that experience a greater decrease in aerobic capacity are more likely to develop mobility issues, as activities such as walking become more exhaustive (Strathokostas et al., 2004). Decreased mobility then makes ADLs more difficult, decreasing one's functional independence (Strathokostas et al., 2004).

Muscle mass begins to decline in mid to late life. This decline accelerates in later life such that by age 80, 40% of muscle mass is typically lost (Lexell et al., 1988, Saini et al., 2009). On average 5 to 13% of people aged 60 to 70 and 11 to 50% of people older than 80 years suffer from sarcopenia, a combination of decreased muscle mass and strength that impairs their ability to perform everyday tasks (Baumgartner et al., 1998, Frisoli et al., 2011, Janssen, 2006, Janssen et al., 2002, Lauretani et al., 2003, Rolland et al., 2003).

Frailty and disability can occur from a combination of decline in respiratory and muscular health (Heuberger, 2011). Frailty is often defined as a combination of at least three of the following; weight loss, muscle loss, exhaustion, strength decline, and decreased physical

activity (Fried et al., 2001). With frailty comes increased risk for broken bones, muscle aches and pains, and functional dependence (Sternberg et al., 2011).

2.1b Cognitive Decline with Aging:

Cognitive function also declines on average with increasing age. Executive function and memory are the two cognitive domains that exhibit the greatest decline with aging (Goh et al., 2011). Executive function encompasses many cognitive processes including retrieval, inhibition, manipulation, maintenance, and inhibition of incoming information, as well as forming strategies and switching concepts in order to reach a specified goal (Goh et al., 2011). Memory can be defined as the ability to store and retrieve information. It can further be broken down into short-term (recall between one-ten minute delay) and long-term (recall after twenty minutes or greater delay). Older adults generally find it much more challenging to retrieve words and sentences when formulating thoughts, switch between different goals, inhibit and manipulate incoming visual information, and recall information after a long delay (Goh et al., 2011).

Age-related cognitive decline may also progress to clinical states, including mild cognitive impairment (MCI) and dementia, both of which become more common with increasing age (Albert et al., 2011, Masur et al., 1994). Those who are diagnosed with MCI show a significantly steeper longitudinal cognitive decline with aging than their healthy counterparts (Goh et al., 2011). Individuals with MCI may experience depression, irritability, and difficulty sleeping, which can impede their social interaction with others on a daily basis (Lyketsos et al., 2002). People with MCI also experience greater memory loss than their healthy counterparts, but they do not meet the cognitive deficit criteria to be diagnosed with dementia and their ADLs are not impaired (Albert et al., 2011).

MCI is thought to be a precursor to dementia, at least in some instances (Albert et al., 2011). Individuals with dementia experience impaired judgement and reasoning, which affects their ability to make safe and reasonable decisions (Rising Tide, 2009). The magnitude of short and long term memory loss impedes their ability to carry out daily tasks such as getting ready in the morning, cooking a meal, or going shopping (Rising Tide, 2009). This disease affects approximately half a million Canadians today, and that number is expected to more than double in the next thirty years unless an identifiable treatment or preventative measure is established (Rising Tide, 2009). Therefore, it is important to identify ways to slow down or prevent cognitive decline.

2.2 Benefits of Physical Activity

Physical activity can be defined as any bodily movement by skeletal muscles that results in energy expenditure (Nieman, 2003). Physical activity reduces the risk of a number of diseases and is associated with lower overall morbidity and mortality (Pate et al., 1995, Bijnen et al., 1999). The Public Health Agency of Canada recommends that adults 65 years and older take part in a least 2.5 hours of moderate to vigorous intensity aerobic exercise per week in sessions of 10 minutes or more (Public Health Agency of Canada, 2012). It also recommends muscle and bone strengthening activities twice a week to help with balance and posture (Public Health Agency of Canada, 2012)

Aerobic exercise is associated with reduced risk of heart disease, stroke, osteoporosis, type 2 diabetes, and some cancers (Pate et al., 1995). It is associated with improved cardiovascular health and capacity and decreased blood pressure (Rowe & Kahn, 1998). It is also associated with improved coordination and motor control, increased functional ability, safety, and independence with ADLs (Pate et al., 1995).

Regular physical activity is also associated with better cognitive outcomes with aging (Middleton et al., 2010). In a study of older women, those who reported habitual physical activity at baseline were at less risk of experiencing cognitive decline within 6 to 8 years of follow up than those who reported regular sedentary behaviour (Yaffe et al., 2001). Those who are physically active in late life also have 28% less risk of developing dementia compared to those who remain inactive (Hamer & Chida, 2009). Clinical trials show that physical activity can improve cognitive function in late life (Colcombe & Kramer, 2003). Older adults who engage in aerobic training can improve cognitive function over 3 to 12 months (Colcombe & Kramer, 2003). Additionally, senior women who engaged in resistance training twice a week for one year improved cognitive function, as measured by inhibition (Liu-Ambrose et al., 2012). A combination of both strength and aerobic exercise for 1 to 6 months may have even greater impact on cognitive functions, including executive function, attention, and visuospatial processes (Colcombe & Kramer, 2003).

Physical activity is an important behaviour that contributes to healthy aging, such that it is associated with later onset and reduced severity of several chronic diseases as well as improved well-being in late life (Colcombe and Kramer, 2003, Cress et al., 1999, Landi et al., 2010).

2.3 Barriers and Motivators for Physical Activity

Despite the many benefits of physical activity on health, cognitive function, and physical function, many older adults do not take part in regular physical activity. According to Statistics Canada, in 2012, only 51% of males and 41% of females over the age of 65 were regularly physically active (Statistics Canada, 2013). Additionally, prior research indicated that half of

older adults who are sedentary report no intention of becoming physically active (Dishman, 1994). These very low levels of physical activity among older adults in Canada will potentially become a major health concern as the number of people over the age of 65 increases.

Nearly 90% of elderly individuals claim there are one or more significant barriers that prevent them from being physically active (O'Neill & Reid, 1991). In order to increase physical activity levels, it is important to reduce barriers among older adults. There are also distinct motivators that encourage physically active elderly to remain active and provoke sedentary elderly to begin an exercise regime. The barriers and motivators for physical activity in the elderly are discussed below.

Health

Older adults claim that poor health, mobility impairment, and pain are the greatest barriers to physical activity (Cohen-Mansfield et al., 2003, Booth et al., 2000, Pereira et al., 1998). People who are already experiencing these issues fear that physical activity may exacerbate the conditions (Cohen-Mansfield et al., 2003, Booth et al., 2000). As a result, some older adults believe that they are incapable of physical activity (Schutzer & Graves, 2004). Some older adults claim that the exertion from exercise is too great a strain on their heart, lungs, and bones (Schutzer & Graves, 2004). Older adults may see exercise as a trigger for pain onset and fear perpetuating illness due to the strain placed on the body (Booth et al., 2000, Cohen-Mansfield et al., 2003).

Conversely, elderly individuals report that they feel motivated to stay physically active or become physically active as a result of the associated health benefits of physical activity (Belza et al., 2004, Dishman, 1994). Those who have access to and stay involved and up to date with

health research are more aware of the benefits of physical activity and do not want to experience the negative health risks that are associated with a sedentary lifestyle (Dishman, 1994).

Environment

Geographic proximity and travel distance to exercise endeavours also influence physical activity levels, as the time required for exercising also includes the travel time (Chao et al., 2000). Elderly individuals report that it is specifically the travel time that prevents them from taking part (Chao et al., 2000). This burden of travel is greater for older adults than for younger adults, as some older individuals do not drive so they must rely on others or take public transit, which can take a long time or be inconvenient (Chao et al., 2000). Elderly individuals living in more remote locations find it particularly challenging to access recreation centers, pools, parks, or walking paths (Sallis et al., 1997). Perceived safety in the environment is another reported barrier to physical activity. Fear for safety, which can arise from traffic, other people, or animals in the neighbourhood, decreases likelihood of walking for exercise (Eyler et al., 1998).

Conversely, local walking paths may motivate elderly individuals to stay active (Sallis et al., 1997). Those living in urban areas report that greater access to exercise programs and community centers for seniors motivates them to become physically active (Sallis et al., 1997). Conversely, older adults living farther from exercise facilities explained that if they could access exercise facilities nearby, without relying on public transit, they would be more inclined to attend (Cohen-Mansfield et al., 2003).

Education and Role of the Physician

Almost all older adults visit their family physician at least once a year and many visit more often (Balde et al., 2003). However, elderly patients indicate that they receive minimal counselling regarding regular exercise from their physician (Balde et al., 2003, Hage, 1983,

Calfas et al., 1996). Physicians may instruct their patients to be more physically active but do not offer specific recommendations (Chao et al., 2000). As a result, many elderly individuals do not understand how to become more active (Chao et al., 2000). When health care professionals give unclear recommendations about the amount and type of recommended physical activity, older adults may be more likely to view exercise as recreation rather than necessary medical therapy (Chao et al., 2000). Patients noted that there is not enough time during their regular visit for their physician to explain the requirements of exercise, which leaves them unsure about the exercise prescription (Calfas et al., 1996). This may be compounded in people with poor concentration and memory deficits (Chao et al., 2000).

Some older adults report that they take a physician recommendation in high regard (Hage, 1983), so when the health risks of remaining sedentary are explained by their family physician, the importance of exercise appears more relevant and motivates them to begin an exercise program (Cohen-Mansfield et al., 2003). Recognition that deteriorating health may be caused by a sedentary lifestyle can prompt physicians to push the importance and necessity of physical activity (Cohen-Mansfield et al., 2003).

Self-Efficacy

Older adults with high exercise-related self-efficacy are more likely to choose to participate in physical activity (Hall & McAuley, 2011, Menec & Chipperfield, 1997). Self-efficacy can be defined as the belief in one's own ability to successfully perform a specific behaviour (Bandura, 1977), such as exercise. Experience, visual observation, verbal persuasion, and emotional wellness can improve one's likelihood to continue to exercise (Resnick, 2001, McAuley et al., 1993, Brassington et al., 2002), possibly because these factors are associated with higher exercise-related self-efficacy (Hall & McAuley, 2011). Social support also improves

exercise-related self-efficacy and adherence to physical activity programs, most notably in women (Litt et al., 2002). When people experience greater success with a specific behaviour (i.e., physical activity), they are more likely to enjoy the behaviour and continue it (Hall & McAuley, 2011). If achievable goals are set, and individuals continue to receive motivation from others, they are likely to improve and achieve goals, subsequently improving self-efficacy (Bandura, 1977). Hence, goal setting, monitoring of progress and motivation are also associated with improved ability to sustain an exercise program (Schutzer & Graves 2004).

In summary, health concerns, environment, education, and exercise-related self-efficacy all play major roles in the initiation and adherence to a physically active lifestyle. Facilitating the motivators and decreasing barriers in these categories will likely have a positive outcome on physical activity levels in older adults.

2.4 Opportunities in Retirement Living:

Research suggests that increasing physical activity among older adults will improve cognitive and physical function and will likely reduce the economic burden on the health care system (as summarized above). Retirement living options within a continuing care retirement community (CCRC) frequently offer a wide range of physical, social, and cognitive activities to residents and may facilitate physical activity by reducing some of the barriers, as described above.

Health

Poor physical health is a barrier to physical activity in the community (Cohen-Mansfield et al., 2003, Booth et al., 2000, Pereira et al., 1998). However, one study of 59 retirement living adults suggested that physical function (measured by comfortable and fast gait speeds and the 6 minute walk test) was not associated with physical activity levels (measured by ankle

accelerometers and the Physical Activity Scale for the Elderly) in retirement living (Zalewski et al., 2009). As a result, it appears physical health may not be a significant barrier to physical activity in retirement living, unlike in the community. Multiple factors may contribute to the reduction or elimination of physical health as a barrier to physical activity. Exercise centres in retirement living communities may offer exercise equipment designed for seniors, which accommodate a larger range of physical abilities. Some CCRCs such as the Schlegel Villages (the retirement communities used in this study) also have staff members in the retirement living community to help those with poor health and mobility concerns carry out physical activity endeavours.

Unfortunately, older adults with deteriorating health status or depression may be less likely to participate in the activities offered and, therefore, less likely to benefit from retirement living (Bjornsdottir et al., 2012, Krout et al., 2000, De Wit et al., 2010). As a result, it is important to examine whether residents with poor mental and physical function choose to take part in the services and amenities offered in retirement living.

Environment

The environment, due to safety concerns or distance from exercise facilities, may be a barrier to physical activity participation in the community (Sallis et al., 1997, Chao et al., 2000, Shah et al., 1996). Retirement living in CCRCs decreases environmental barriers by improving at least the perception of safety (due to staff supervision) and providing on-site exercise opportunities. CCRCs often have walking paths on the property and exercise facilities both for individual use and group classes. This reduces transportation time as a barrier to physical activity. When exercise facilities are available on site, there is no dependence on others or public transit. For activities off-site, transportation may be provided to residents. In addition, CCRCs

often have on-site staff at all times of day so residents can feel safe walking within and around the property.

Education and Role of the Physician

Some retirement homes have onsite physicians or physicians who provide services on-site on a regular basis. With better access to a physician, residents may be more likely to receive exercise advice from their physician, which is associated with higher likelihood of performing moderate to high physical activity on a weekly basis than those who do not (Balde et al., 2003). In addition, recreational or exercise staff may also provide further education and training regarding safe and effective exercise programs, which may encourage physical activity among residents who otherwise did not understand the benefits of physical activity.

Self-Efficacy

Self-efficacy is a motivator for physical activity. Goal setting and achievement can improve exercise-related self-efficacy. Recreational and exercise staff may be available in retirement living communities to educate and motivate residents with verbal support, and help them set achievable goals for regular improvement. This may improve exercise related self-efficacy among retirement living residents.

In addition, residents are surrounded with neighbours similar in age who may share similar interests. These people can provide social support for physical activity and residents/neighbours can work together to motivate one another to exercise. Greater practice and enjoyment in these activities consequently increases related self-efficacy in the activity (Bandura, 1977).

Older adults with high self-efficacy and high sociability upon entrance to retirement living may be more likely to participate in the physical activities offered and take advantage of

the amenities in retirement communities (Hall & McAuley, 2011, Menec & Chipperfield, 1997, Bjornsdottir et al., 2012). As a result, people with these traits may experience greater functional and health benefits from retirement living.

2.5 Preliminary Evidence Regarding Physical Activity in Community & Retirement Living:

As discussed above, due to the various opportunities available in retirement living communities, several barriers to physical activity may be alleviated and motivators may be established. Thus, it seems likely that at least some residents will increase their engagement in physical activity upon moving into retirement living communities. However, few studies have examined changes in physical activity levels when people move from the community to retirement living.

I identified only two studies that compared community living to retirement living. Both were cross-sectional studies. One study found that people in retirement living had lower physical activity levels than those living in the community (Henry et al., 2001). This study recruited 90 elderly adults in retirement living (59% female) and 78 elderly adults living in the community (51% female) in Thailand. Of note, the participants living in the community were significantly younger (mean 69 years for males and 72 years for females) than those in retirement living (75 years for males and females). The second study reported that people in retirement living had poorer agility, balance, and mobility compared to community-dwellers (Kang et al., 2004). This study analyzed 169 older adults (79% female) living in the community and 172 older adults (78% female) living in retirement living in the US. Again, participants in retirement living were significantly older (mean 77 years) than those living in the community (mean 84 years). In contrast to these results suggesting that older adults in retirement living are less active and less

physically fit, a study of 59 older adults living in independent or assisted living apartments in retirement living in the greater Milwaukee area reported that participants had sufficiently high physical activity levels to suggest that retirement living residents may be more active than their community-dwelling peers (Zalewski et al., 2009). There were major weaknesses to these studies, however, in that they only characterized retirement living or compared community living to retirement living in a cross-sectional manner. There are likely many differences between community and retirement living population samples that may confound the findings regarding differences in physical activity, including differences in age evident in both cross-sectional studies discussed. Furthermore, people who are in retirement living are likely to have worse health and functional abilities than those in the community, even if matched for age, sex, and common illnesses. As a result, longitudinal studies are needed to capture the change in physical activity over the transition from community living to retirement living.

Not previously examined, changes in physical activity may also be associated with changes in cognitive and physical function. If physical activity levels increase, this change may consequently improve cognitive and physical function and, thereby, decrease the need for care and increase functional independence and quality of life. However, it is acknowledged that any positive effect to cognitive or physical function may be difficult to capture in the context of aging, particularly without a comparable control group that continues to live in the community.

3.0 STUDY BACKGROUND

Older adults who experience cognitive or physical impairment are more likely to need hospitalization or long term care (Aminzadeh & Dalziel 2002, Luppá et al., 2010). Therefore, it is important to develop effective strategies to delay or prevent the decline in cognitive and physical function in order to reduce the demand on the health care system, particularly as the number of older adults grows. Physical activity is one strategy to delay functional decline (Pate et al., 1995, Bijnen et al., 1999, Rowe & Kahn, 1998). However, many community-dwelling older adults are physically inactive due to a combination of barriers (Nicholson, 2009, Schutzer & Graves, 2004), as discussed above. CCRCs offer physical and social activities. These and other characteristics of CCRCs may help residents overcome barriers to physical inactivity. This study examined whether physical activity levels changed upon transition from community to retirement living in CCRC's, and the characteristics associated with physical activity in retirement living. This study also examined whether change in physical activity over the transition to retirement living was associated with positive change in physical and cognitive function.

3.1 Operational Definitions of Retirement Living

CCRC: A retirement community that offers a variety of levels of care within a single community. This can range from entirely independent living to long term care, which provides medical, physical, and functional support to residents. In this study, the CCRCs evaluated were all from the Schlegel Villages. Five different individual communities within the Schlegel Villages were analyzed.

Retirement living in CCRCs: A living option in a CCRC where the residents live in either a room or apartment and can have meals, laundry or housekeeping services provided, but do not receive significant assistance with ADL's or medical support.

Description of Schlegel Villages

The Schlegel Villages offer CCRC's in several locations throughout southern Ontario. Levels of care range from independent living to long term care. For this study, only participants living in or moving into retirement apartments or condos (operationally defined as retirement living) were considered. These units are available for both single adults and couples and are available with a range of sizes and amenities. Meal plans, laundry and housecleaning services are offered to all residents but not all residents use these services. All villages, even the two newly opened facilities included in this study, also have fitness centers and an on-site kinesiologist, a main street with a library, shops, and a community center, as well as landscaped grounds with paved walkways. Retirement residents at all villages also have access to various recreational and entertainment events offered inside and outside the village (with bus transportation). A sample of the July Retirement Living calendar from the Village of Arbour Trails is found in **Appendix A**.

3.2 Overall Aim and Approach

The overall aim of this research project was to understand how physical and social activity changes with transition from community living to retirement living, and how this is associated with cognitive function, physical function, and mood. This thesis specifically focused on physical activity.

4.0 CURRENT STUDY

The current study examined change in physical activity upon the transition from community living to retirement living. Within the overall project, there were two separate study designs: 1) a longitudinal repeated measures design that assessed participants' physical activity, physical function, and cognitive function while they lived in the community and after they moved into retirement living; and 2) a cross-sectional design that had current residents report current physical activity in retirement living and retrospectively report their community physical activity levels prior to transition to retirement living, and (in some cases) assessed current residents' cognitive and physical function in retirement living. Participants completed a series of physical activity questionnaires, activity monitoring, and assessments of physical and cognitive function.

4.1 Study Rationale

Physical and cognitive function decline with age (Hollenberg et al., 2006, Stathokostas et al., 2004, Heuberger, 2011, Goh et al., 2011). Physical activity preserves functional ability and independence, decreases risk for heart disease, diabetes, stroke, and improves cognitive function (Pate et al., 1995, Rowe & Kahn, 1998, Brawley et al., 2006, Schuit et al., 2001). Despite the many benefits of physical activity on health, cognitive function, and physical function, 49% of males and 59% of females over the age of 65 do not regularly take part in physical activity (Statistics Canada, 2013). This physical inactivity is due at least partially to the fact that older adults are faced with several barriers to physical activity, previously mentioned in section 2.3 (O'Neill & Reid, 1991). It is hypothesized that retirement living may alleviate many of these

barriers. Therefore, the transition to retirement living may increase the physical activity of older adults and consequently improve cognitive and physical function.

To date, few studies have characterized the difference in physical activity between community living adults and those in retirement living and the studies that exist were cross-sectional. To date no study has examined the transition from community living to retirement living longitudinally.

4.2 Objectives and hypotheses

1. To determine whether physical activity and physical function change as older adults transition from community living to retirement living.
 - Hypothesis 1a: Involvement in intentional exercise will increase with the transition (example: walking for the purpose of exercise, attending exercise classes, etc.)
 - Hypothesis 1b: ADLs will decrease with the transition to retirement living. (example: time spent doing household chores)
 - Hypothesis 1c: The percentage of time spent being physically active will increase with the transition.
 - Hypothesis 1d: Physical function will improve following the transition.
2. To determine whether physical activity levels in retirement living varies by participant subgroups (eg. sex, education, cognitive function, physical function, balance confidence, etc.)
 - Hypothesis 2a: People who are male, have higher education, and are married will have higher physical activity levels in retirement living.

- Hypothesis 2b: People who report greater balance confidence or who have better physical fitness and cognitive function will have higher physical activity levels in retirement living.
3. To determine whether changes in physical activity with the transition to retirement living are associated with changes in cognitive and/or physical function.
- Hypothesis 3a: Change in physical activity will be positively correlated with change in cognitive function.
 - Hypothesis 3b: Change in physical activity will be positively correlated with change in physical function.

4.3 Sample Recruitment

This section outlines eligibility criteria for the participants and recruitment procedures that were used for the future and current residents.

4.3a Eligibility Criteria

Transitional residents were recruited from the wait-lists of two Schlegel Villages (Tansley Woods and Arbour Trails). To be eligible for this study, individuals were required to:

- Currently be living independently in the community without assistance in basic ADLs.
- Be on the wait-list for one of the two denoted retirement communities, with a proposed move in date of 1-3 months.
- Not report any acute disruptions to mental or physical health, including delirium or unstable cardiovascular, recent stroke, or hospitalization.
- Not have a current diagnosis of cognitive impairment that would make self-reports unreliable.

Current residents were recruited from five Schlegel Villages (Tansley Woods, Arbour Trails, Taunton Mills, Riverside Glen, and Winston Park). To be eligible for this study, individuals were required to:

- Currently be living in the retirement living section of the village, without any assistance from staff with ADLs.
- Not report any acute disruptions to mental or physical health including delirium or unstable cardiovascular, recent stroke, or hospitalization.
- Not have a current diagnosis of cognitive impairment that would make self-reports unreliable.

4.3b Recruitment Strategies Used

For Transitional Residents:

Schlegel-University of Waterloo Research Institute for Aging (RIA) Research Coordinator (SB) and Assistant Research Coordinator (KP), Schlegel Villages' marketing coordinators (who met directly with prospective residents), principal investigator (LM), student investigator (KR) and research assistants recruited participants according to a standardized procedure. SB and KP provided the marketing coordinators with project packages containing: a cover-letter written on behalf of the marketing coordinators, initial study brochures with a brief overview of the study's purpose and involvement, information and consent letter providing an in-depth overview of the study purpose and involvement, and a return envelope. All recruitment materials are shown in **Appendix B**. Once these transitional residents were given a move in date, the marketing coordinators provided them with the project packages when they came to the village to sign their lease. This package provided instructions for interested residents to return their name and

contact information to KP via email, phone or mail. KP then passed on any interested future residents' contact information to KR and/or the associated research assistant.

The author of this thesis, KR then contacted each potential participant by phone to review procedures and asked potential participants if they were still interested in participating in the study. Potential participants could ask any questions and take as long as they needed to decide on participation, contingent that the first assessment had to take place at least 1 month prior to their move-in date. KR also provided any additional information regarding the study, answered questions, and determined the timeline of testing with regard to move in date. The first assessment was scheduled between 1 and 3 months prior to move in date. KR also phoned each participant 24 hours before their scheduled appointment as a reminder. Telephone scripts for these phone calls can also be found in **Appendix B**.

For Current Residents:

Information brochures (**Appendix B**) were distributed to current residents via mail or in person by KP to all five of the villages recruited from for this study (Arbour Trails, Tansley Woods, Taunton Mills, Riverside Glen, and Winston Park). Additionally either LM or KR, along with SB or KP visited each village. In the case of the Villages of Arbour Trails, and Tansley Woods, an information booth was also set up to advertise the study where KR answered any questions residents had about participation.

4.3c Study Sample

The pilot work for this study recruited 13 current residents (5 from Taunton Mills, 2 from Riverside Glen, and 6 from Winston Park). Following this, 14 participants were recruited from the retirement living wait-lists, 12 of whom completed the assessment following the transition to retirement living (Pre and Post Assessments) (8 participants from Tansley Woods, and 4

participants from Arbour Trails). To supplement recruitment, an additional 8 current residents were recruited, with 4 participants from each of Arbour Trails and Tansley Woods.

4.4 Ethics Approval and Consent

Ethics approval was obtained from the University of Waterloo's Office of Research Ethics. Written consent was obtained from residents prior to testing. The study information letter and consent form can be found in **Appendix B**. Although names were used for initial contact between researcher and participant and for communication at each testing session, only those directly involved in the recruitment process (Research Institute for Aging research coordinator and assistant, Schlegel Village marketing coordinators, primary investigator, student investigator, and research assistant) had access to these names. Contact information was stored electronically with password protection in a separate location from collected data. All collected data was entered and analyzed using identification codes and stored electronically in an encrypted folder. Only the student investigator has access to the list connecting names with study identification codes. Hard copies of questionnaires or recorded results are stored in a locked cabinet in the research lab. To protect confidentiality, no names are used in this thesis document or any resulting reports or publications.

5.0 STUDY PROTOCOL

Transitional Residents:

Transitional residents completed two assessments, a “Pre-Transition” assessment and “Post-Transition” assessment, each taking place over two sessions approximately a week apart. The Pre-Transition assessment was 1 to 3 months prior to the resident’s move in date and the Post-Transition assessment was scheduled 2 to 3 months after they had moved in (**Figure 5.1**). The Pre-Transition and Post-Transition protocols were identical. Each assessment included measures of physical activity, physical function, and cognitive function performed over two sessions as well as activity monitoring performed between sessions, as outlined in **Figure 5.2**.

The information letter and consent form (**Appendix B**) were given to the participants prior to the first testing session. They were free to ask as many questions as they liked and take as much time as needed to give informed consent to the researchers. They were also free to withdraw their consent at any point during the study. After consent was obtained, the researcher administered a brief participant information form and medical questionnaire (**Appendix C**) to capture demographic and educational information and ensure there were no medical issues that may have conflicted with study eligibility. At the first session of each assessment, participant's height, weight, waist circumference, resting heart rate and blood pressure were measured. They also completed a series of questionnaires that assessed their physical and social activity as well as their balance confidence. A Senior Fitness Test was also administered to measure physical function. After completion of the first session, they were sent home with an activity monitor to track their physical activity for seven days. After a week, participants met with the researchers again for the second session in each assessment. In the second session, the participants completed a cognitive assessment consisting of a series of tasks that assessed memory, planning,

and attention. At the end of the last assessment with each participant, they received a letter of appreciation from the researcher, stating the value and appreciation for their time and input to this study (**Appendix D**).

Further detail of each part of the overall assessment including the corresponding measures associated is described in section 6.0.

Figure 5.1 Protocol Timeline

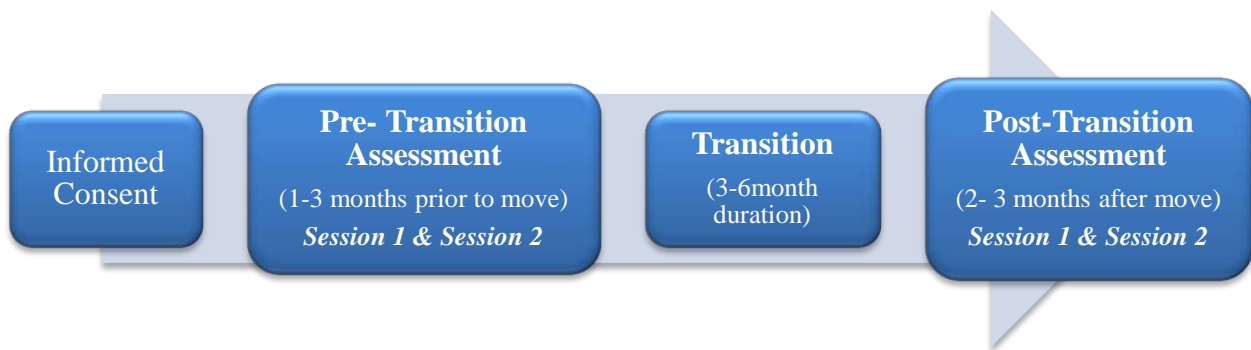
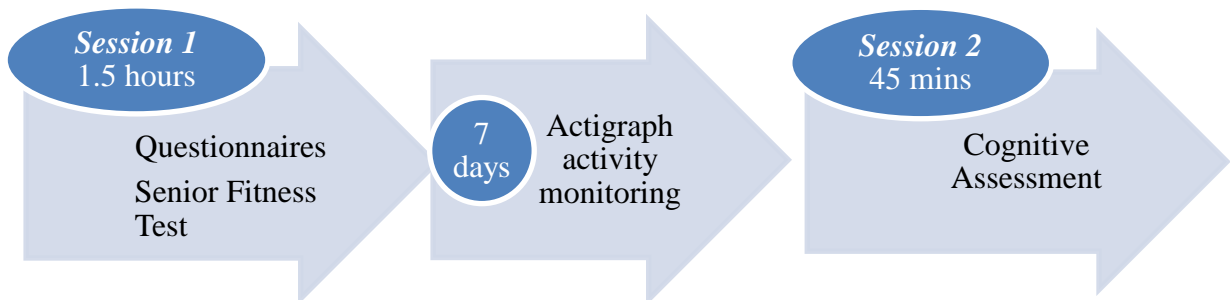


Figure 5.2 Assessment Design



Current Residents:

There were two groups of current residents, referred to as current residents (full protocol) and current residents (pilot). The protocol for the current residents (full protocol) was identical to that of the transitional residents except that data was only collected while living in the retirement living community. (That is, the Pre-Transition assessment was not performed.) In addition, they retrospectively reported physical and social activity via questionnaires to capture their past-activity prior to their transition to retirement living. The protocol for the current residents (pilot) was slightly different as these initial 13 current residents were from the pilot phase. For this group, only a single session was completed where they reported current physical and social activity and retrospectively reported physical and social activity in the community via questionnaires. They also completed 7 days of activity monitoring but physical and cognitive function was not assessed.

6.0 DATA COLLECTION PROCEDURES AND MEASURES

This section provides a description of the procedures used for data collection and the specific measures used to assess physical activity, physical function, and cognitive function. Each assessment was separated into two sessions and one take home component, as described above. Specific measures are described in the order of administration. It is important to note that the data collection procedures and all measures were the same in both the Pre-Transition and Post-Transition assessments for the transitional residents.

6.1 Participant Demographics and Current Medical Status

The first session in each assessment began with questions regarding participant characteristics such as date of birth, years of education, sex, as well as measures of height, weight, blood pressure, heart rate, and waist circumference. Participants also reported any medical or mobility concerns and any recent falls in the past two months. A copy of this form can be found in **Appendix C**.

6.2 Modified CHAMPS Activity Questionnaire for Older Adults

A modified Community Healthy Activities Model Program for Seniors Activities Questionnaire for Older Adults (CHAMPS) was administered to assess the participants' self-reported physical and leisure activity. The researcher asked the participant to respond to each of the questions as accurately as possible and encouraged them to ask questions for clarification whenever necessary. The CHAMPS was validated as an accurate account of planned activities and ADL (Colbert et al., 2011, Giles & Marshall, 2009, Kaleth et al., 2010, Moore et al., 2008, Resnicow et al., 2003), and includes both physical and non-physical activity components. The

CHAMPS questionnaire has a test-retest reliability estimate of 0.56- 0.70 in older adults, but may be susceptible to over-reporting of some items (for example, walking and housework) (Heckler et al., 2012). The CHAMPS was the physical activity questionnaire that was most strongly associated with total daily activity energy expenditure compared to several measures among older adults (Colbert et al., 2011), which made it appropriate for our purpose. The weakness of this questionnaire, however, was that it was developed for a Southern California community where outdoor activities are possible all year round. In order to account for seasonal activities in Southern Ontario, which precludes participation in many outdoor activities year-round, we also asked about the months per year of participation for seasonal activities including golf, tennis, gardening, cycling, swimming, and walking outdoors. Analyses were adjusted to weight for seasonal participation. Participants that answered yes to a question regarding a seasonal activity were asked to report times per week and hours per week of activity for the times of year when they do participate. Before analysing, the weekly frequency and duration were multiplied by the number of months of participation and divided by 12 months. The CHAMPS questionnaire was otherwise scored according to the instructions given by the developer (Stewart et al., 2000). This included scores developed to assess both frequency and duration of physical activity. Questions were also divided into intentional exercise (questions 7, 9, 10, 14, 15, 16, 24, 25, 26, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, and 41) and ADL (questions 19, 20, 21, 22, 23, and 27) to compare individual involvement in each. A copy of the modified CHAMPS is found in **Appendix C**.

6.3 Activities-Specific Balance Confidence (ABC) Scale

Studies have shown that physical activity is lower among people with worse balance confidence for ADLs (Myers et al., 2005, Webber et al., 2010). The 16-item ABC scale is a reliable and valid measure of balance confidence among older adults living in the community (Jordstad et al., 2005, Myers et al., 1998, Myers et al., 1996, Powell & Myers, 1995). In this study, a revised ABC was used to better capture activities relevant to retirement living in CCRCs. An adapted version of the ABC scale (with 21 items, checklist format, and 5 point response scale) was administered to six transitional residents at the pre-assessment (Crizzle, 2011), but was not analyzed for the purpose of this thesis. This scale was changed to a 28-item ABC questionnaire for the remaining participants and assessments. Although a recent 20-point ABC scale was adapted for residents of retirement living (Gooderham, 2014), our study used a slightly different questionnaire (**Appendix C**) and the validity and reliability of this particular version is unknown. For the purpose of this thesis, the ABC score was examined as a predictor of physical activity levels in retirement living. The ABC was examined using three different scoring systems: 1) the original 16-point ABC (a subcomponent of our scale) (Myers, et al., 1998); 2) a 27-point ABC (question 15 removed from ABC scale found in **Appendix C**); and 3) a 20-point ABC that was similar in content to the ABC that was adapted for residents of retirement living (Gooderham, 2014) (questions 1, 2, 4, 7, 14, 15, 17, and 19 were removed from the 28-point scale).

6.4 Luben Social Network Scale

Social support was assessed with the Luben Social Network Scale (**Appendix C**), which captures frequency and quality of social connections (Luben, 1988). This measure was not used for the purpose of this thesis.

6.5 Social Connectedness Scale

A Social Connectedness Scale (**Appendix D**) was administered to participants when living in retirement living. This scale addressed how connected the resident's felt with others in the retirement community. This measure was not used for the purpose of this thesis.

6.6 Senior Fitness Test of Physical Function

The Senior Fitness Test was used to assess physical function. It characterizes physical function across a number of domains and has established norms from over 7000 men and women aged 60-94 years (Rickli, 1999). The Senior Fitness Test includes assessments of upper and lower body strength and flexibility, agility, and aerobic endurance. The assessor provided instructions and a short demonstration prior to each task. The participant was encouraged to ask questions for clarification during the instruction and demonstration to ensure that they fully understood how to perform the required activity. They were asked to report any pain, discomfort or shortness of breath to the researcher immediately. A brief overview of the protocol for each item in the Senior Fitness Test is described below (Jones & Rikli, 2002). These measures were scored according to the validated instructions from the developers.

6 Minute Walk

The 6 minute walk test was used as a measure of aerobic endurance. Participants performed the walk test in a 25m long corridor. The participants were instructed to walk as quickly as possible for 6 minutes, while the researcher measured the total distance covered. Mobility aids were permitted to be used if necessary.

Arm Curls

The arm curl test was used as a measure of upper body strength. Participants performed as many arm curls as possible in 30 seconds. Males used an 8lb weight and females used a 5lb weight. The test was conducted with their dominant (stronger) arm. They were required to sit on a chair (without armrests) with the weight held in their hand using a suitcase grip (palm facing toward body). Their arm was in a fully extended position at their side for the start position of this exercise. They were also instructed to brace their arm against their body to ensure that only the lower portion of the arm moved during the bicep curls. For some participants, the researcher assisted in stabilization of the upper arm to ensure it remained stable and did not swing. To begin the motion, they curled the arm up through a full range of motion, gradually supinating the hand. Once in full flexion, they gradually returned the arm to full vertical extension with a straight elbow with hand back facing toward the body. This action was repeated as many times as possible within 30 seconds. The number of fully completed arm curls was recorded by the researcher.

Chair Stands

The chair stand test was used as a measure of lower body strength. Participants performed as many chair stands as possible in 30 seconds. A standard straight back chair without arm rests was placed against a wall. The participants began by sitting in the middle of

the chair with their feet flat on the floor, shoulder width apart. Their arms were crossed and placed against their chest. To begin the test, they moved from a seated position to full standing position, then back to a seated position. Complete chair stands started and ended in the seated position. If the use of the arms for safety or stability was required, they were permitted to do so; however these trials were not counted as completed chair stands.

Timed Up and Go (TUG)

The timed up and go (TUG) test was used as a measure of motor agility. Participants began sitting in the middle of the chair, placed against a wall for safety. Their feet were on the ground, shoulder width apart and arms were crossed across the chest. A pylon marker was placed 8 feet away from the chair. On the command “Go”, the timer was started and the participant rose from the seated position, walked as quickly as possible to and around the pylon, and returned to the chair in the starting seated position. The timer was stopped as soon as the participant was back in the seated position. Mobility aids were permitted to be used if necessary; this information was recorded by the researcher.

Back Scratch

The back scratch test was used to measure upper body flexibility by assessing shoulder range of motion. Participants performed this test in a standing position. They were instructed to place their preferred hand over the same shoulder with palm facing down. Their other arm reached behind and up their lower back, palm facing out, in an attempt to reach middle fingers to or across one another, in the middle of the back. They were given an opportunity to try both hands. The most flexible side was recorded, with the side recorded to ensure the same hand was used during the follow up assessment. The researcher directed the participant to ensure that finger tips were aligned as best to their ability and then measured the vertical distance in

centimeters between both middle fingers. If the fingertips touched, a score of zero was recorded. If they did not touch, a negative score of the distance between fingertips was recorded. Conversely, if they overlapped a positive score of the distance of overlap was recorded.

Chair Sit and Reach

The chair sit and reach test was used to measure lower body flexibility. For this test, participants sat at the edge of a chair, which was placed against a wall for safety. One foot remained flat on the floor directly below the chair edge. They were asked to extend the other leg forward with the knee straight, heel on the floor, with the ankle in 90 degree dorsiflexion. Choice of leg was up to the participant and they were given the opportunity to try both. Leg choice was recorded to ensure consistency across assessments. One hand was placed on top of the other with middle fingers even. The participant was instructed to inhale first then exhale while reaching finger tips as close as possible to their toes. They were reminded to bend at the hip, and to keep their back straight and head up. They were required to hold this position for 2 seconds. The researcher measured the distance from middle fingertip to top of toe in centimeters. If the finger tips reached the toes a score of zero was recorded. If they did not touch, the distance between was measured with a negative score. If they overlapped, a positive measure of the distance of overlap was recorded. They performed 2 practice sessions, followed by 2 test sessions, where the better of the 2 scores was recorded. Participants were reminded not to bounce, but to make slow gradual movements, and never to reach to the point of pain.

2 Minute Step in Place

The 2 minute step in place test was used as an additional aerobic endurance test. This test is less impaired by mobility devices or walking difficulties than the 6-minute walk test. We performed both tests (where possible) on all participants. For this test, the participant stood

straight next to a wall. The midway point between the patella (knee cap) and iliac crest (top of hip bone) was marked with a piece of tape on the wall. The participant was then instructed to march in place for 2 minutes. In doing so, they were required to lift each knee to the height of the tape on the wall. The researcher recorded the number of times the right knee reached the tape level in the 2 minute interval. The participants were permitted to rest at any point during this time and could also use the wall, a chair, or a mobility aid for support to ensure stability and safety if necessary.

Descriptions and images for each section of the Senior Fitness Test are shown in **Appendix C**. Researchers recorded participant performance on each section and commented on any issues that may have affected or altered their performance, such as mobility aids or required rest breaks. The researcher scoring and comment sheet for the Senior Fitness test can be found in **Appendix C**.

6.7 Physical Activity Monitoring

The tri-axial activity monitors (Actigraph GT3X+) were used to objectively capture the daily physical activity of the participants over the next 7 days. Participants' also reported their daily activity using daily diaries (**Appendix C**). Prior to departure from the first session, the researcher explained the use of both the activity monitor and the daily diaries. Any questions with regard to the Actigraph or daily diaries were answered at this time. Participants were also given a reminder sheet with a list of take home instructions for both the Actigraph and the daily diary. This package also contained the researchers' contact information, as well as the date and time for the cognitive assessment which was scheduled a minimum of 7 days later. The participants were verbally thanked for their time and participation in the study thus far.

Tri-Axial Actigraph Activity Monitor

The participants were instructed to wear the Actigraph (GT3X+) around the waist, with the monitor sitting comfortably on their right hip. The researcher adjusted the size of the waist band to fit the participant. The participants also practiced putting on the Actigraph appropriately and removing it. The researcher explained that the Actigraph should be worn at all times throughout the day, except when bathing or sleeping at night. The participants were also encouraged to perform their activities as usual over the next 7 days and not to alter their regular behaviour. Participants were instructed to begin wearing the Actigraph when they woke up on the following morning.

The Actigraph (GT3X+) measures the participant's activity using activity counts, which is based on oscillations in acceleration in 3 axes of movement. The Actigraph collected activity counts at 30Hz per second and analysed data was epoched in 10-second intervals. The 10-second epoch allowed us to capture not only purposeful long duration activities but also short ADLs. Wear time validation was performed using parameters set by Choi et al. (2011). This analysis defined the non-wear period as minimum length of 90 min with a spike tolerance of 2 minutes. Cut-off values to distinguish between sedentary, light, moderate, and vigorous activity based on all 3-axes have not yet been validated for older adults. Therefore, analysis procedures were based on the vertical axes only, which has previously validated cut-offs to distinguish between different activity levels (sedentary, light, moderate, vigorous) among older adults (Hall et al., 2012, Kozey-Keadle et al., 2011). For the purpose of analyses, we denoted sedentary activity as <150 counts per minute (cpm), light physical activity as 150-809 cpm, moderate physical activity at 810-3396 cpm, and vigorous physical activity as >3396 cpm. For consistency across

individuals, time spent in each physical activity level was divided by total wear time to obtain percentage of time spent sedentary, in light, and moderate/vigorous physical activity.

Daily Diaries

Participants were also asked to log their activities in a daily diary in order to assess the types of physical activities performed over the 7 day monitoring period. They were asked to provide brief descriptions of activities that they did throughout the day, for purposeful exercise, leisure, and ADLs. They were also asked to record the times when the monitor was put on and removed. Each participant received an example of how to fill out the diary with both activities and comments, which was explained in detail. They were encouraged to provide as many comments as possible to help with the interpretation of their data. Unfortunately, several participants did not complete or provide sufficient detail of activities on the daily diaries to use the information in a constructive manner so this tool was not used for the purpose of this thesis.

6.8 Cognitive Function Assessment

After 7 days of activity monitoring, the participant returned with the Actigraph and daily diary to complete the second session (the cognitive assessment). The cognitive assessment consisted of the Montreal Cognitive Assessment (MoCA) followed by a battery of cognitive tests based on the Vascular Cognitive Impairment Harmonization Standards, which assess cognitive domains including memory, executive function, and attention (Hachinski et al., 2006). This 30 minute test protocol included the Hopkins Verbal Learning Test (HVLT), digit symbol coding, semantic fluency, phonemic fluency, the Center for Epidemiologic Studies-Depression Scale (CES-D), and the Neuropsychiatric Inventory Questionnaire (NPI-Q), along with one

supplemental test, the Trail Making Test. A brief description of the administration of each cognitive test is provided below, with copies of each test included in **Appendix D**.

The Montreal Cognitive Assessment (MoCA)

Participants first completed the MoCA, which is a one page test administered in approximately 10 minutes that measures several domains of cognitive function (Nasreddine et al., 2005). The test is scored out of a total of 30 points. To assess short term memory, participants had 2 learning trials of 5 nouns and were asked to recall these 5 nouns after a 5 minute delay. To assess visuospatial abilities, participants were asked to draw a clock and to copy a drawing of a three-dimensional polygon. Executive function was assessed with three different tasks: 1) an alternation trail making task adapted from the Trail Making B task; 2) a phonemic fluency task; and 3) a two-item verbal abstraction task. Participants were also asked to perform a sustained attention task, which required them to detect a target using tapping, a serial subtraction task, and forward and backward digit span, which together evaluated attention, concentration and working memory respectively. Their language ability was assessed using a three-item confrontation naming task with animals of low-familiarity, a fluency task, and by repeating two syntactically complex sentences. Lastly, their orientation to time and place was evaluated. The researcher scored the participants' answers according to standardized criteria to create an overall score out of 30 points as well as sub-scores for each of the domains listed above. An overall score of greater than 26 was considered normal. One point was added to the score of those participants who reported less than 12 years of education. Two alternate versions of the test were used and randomized between the Pre- and Post-Assessment to control for learning effects.

Hopkins Verbal Learning Test (HVLТ)

The HVLТ is a test of short and long term memory (Brandt, 1991). The test required the researcher to read aloud a list of 12 words, which belonged to three different categories. The participant had three trials to remember as many of the words as possible by repeating them back to the researcher. The list of words was re-read after each trial. After at least 25 minutes delay (after the remainder of the other cognitive tests were completed), the participant was asked to list the words that they still remembered. Again, to control for practice effects between assessments, two different versions of the HVLТ were used and randomized between Pre- and Post-Assessments.

WAIS III Digit-Symbol Coding

Digit-symbol coding is a test of working memory (Wechsler, 1997). For this test participants were presented a set of digits with corresponding symbols. Below was a series of digits in random order. Participants were given 2 minutes to correctly write down the corresponding symbol to each digit.

Phonemic Fluency

Phonemic fluency is a test of controlled oral word association (Lezak, 1983). For this test participants were asked to name as many words as possible in 60 seconds that began with a given letter. There were three trials with three different letters. In addition, to control for practice effects, a different set of three letters were used for each assessment.

Semantic Fluency

Semantic fluency tests language function (Lezak, 1983). For this test, participants were given 60 seconds to name as many words as they could that belonged to a certain category. Again to control for practice effects, there were two different categories used (animal naming

and fruit/vegetable naming) and the category chosen was randomized between Pre- and Post-Assessments.

Trail Making Test

The Trail Making test is a two part executive function test (Reitan & Wolfson, 1985). Both components consist of 25 circles that are distributed over a sheet of paper. In Trails A, the circles are numbered 1 to 25 and the participant was asked to connect the numbers in ascending order. In Trails B, there are circles numbered 1 to 13 and circles with letters A to L. The participant was required to connect the circles in ascending and alphabetical order, alternating between numbers and letters (e.g. 1-A-2-B etc.) They were asked to perform both trails by connecting the circles with a pen on the paper as quickly as possible.

Center for Epidemiologic Studies- Depression Scale (CES-D)

Participants were also asked to self-report how they felt and behaved during the past week. The 20-item CES-D probes depressive symptoms and has good specificity (90%) and sensitivity (86%) (Radloff and Teri, 1986). A score of 16 or higher indicates respondents at risk for clinical depression. Participants responded to the questionnaire themselves but could ask the researcher for clarification if necessary.

Neuropsychiatric Inventory- Questionnaire (NPI-Q)

The NPI-Q was administered to briefly capture the psychological personality of the participant. This test asked a wide array of questions that probe some behavioural domains that are affected with cognitive impairment (Radloff and Teri, 1986). This questionnaire is filled out by a third party, typically a spouse or caregiver. For participants that were transitioning to retirement living with their spouse and both participated in this study, the NPI-Q was

administered for each spouse to report about the other. For participants who had lost their spouse or did not have a spouse participating in the study, the NPI-Q was not completed. The NPI-Q was not used for the purpose of this thesis.

7.0 DATA ANALYSIS

Participant characteristics were compared between groups using either Kruskal-Wallis H test (continuous measures) or Chi-Square test (categorical characteristics). Data analysis was completed using IBM SPSS Statistics version 22.

7.1 Objective 1: Change in Physical Activity and Physical Function

The primary physical activity outcomes were the CHAMPS questionnaire (frequency and duration of physical activity) and the Actigraph activity measures (percentage of time in sedentary activity, light physical activity, moderate/vigorous physical activity, and total physical activity). Measures of physical function were from the Senior Fitness Test. Change from pre- to post-transition was evaluated using the Wilcoxon signed-rank test, as physical activity and physical function data were not normally distributed.

7.2 Objective 2: Association between Participant Characteristics and Physical Activity

Associations between physical activity in retirement living and participant characteristics were evaluated with either the Spearman correlation (continuous measures) or Mann-Whitney U test (categorical measures) where appropriate. Participant characteristics included gender, marital status, age, years of education, balance confidence, depressive symptoms, physical function, and cognitive function.

7.3 Objective 3: Changes in Physical Activity Correlation with Changes in Physical and Cognitive Function

Change in physical activity, physical function and cognitive function was generated by subtracting pre-transition scores from post-transition scores. A spearman correlation analysis was used to determine whether change in physical activity was correlated with change in cognitive or change in physical function.

8.0 RESULTS

Participant Characteristics

Thirty-eight participants were recruited for this study. Four were excluded because they decided they no longer wanted to participate following or during the first assessment. One participant was excluded because of exclusion criteria (Parkinson's disease). As a result, thirty-three retirement living adults completed this study. Of these participants, 12 were transitional residents (recruited before they moved into retirement living, full test battery before and after transition), 8 were current retirement living residents (full protocol) which completed the full test battery in retirement living, and 13 were current retirement living residents (pilot) which completed a brief test battery that only included questionnaires and Actigraph measures. The current residents (pilot) were the first group of participants assessed from October 2012 to March 2013. Following this, transitional residents' pre-transition assessments were collected from May 2013 to August 2013 and post-transition assessments were collected from October 2013 to December 2013. The final group, current residents (full protocol), were assessed from January 2014 to February 2014.

Participant characteristics of each group are described in Table 8.0a. The transitional residents were more often married ($p=0.001$), significantly younger ($p=0.002$), and had more years of education ($p=0.05$) than the current resident groups. There were also different distributions of residents across Schlegel Village sites between groups.

Of the 33 participants, 20 participants were administered the full protocol and the other 13 participants only completed questionnaires and actigraph monitoring as part of pilot data collection. These 13 pilot participants are also missing some descriptive information including; balance confidence, falls experienced in the previous two months, and whether a mobility aid is

used on a regular basis. Of the 20 participants administered the full protocol, 15 had complete data. Of the 5 remaining participants, 2 current residents (full protocol) did not complete actigraph monitoring. In addition, 6 minute walk test results were removed for 2 transitional residents because one participant suffered a recent injury at the post-transition assessment and the other no longer used a walker, making results incomparable. Finally, one transitional resident was missing Trails B data as they performed very poorly and exhibited significant frustration with the task. Of note, daily diaries were not completed with sufficient detail or consistency to be considered for evaluation.

Physical Activity Levels

Most objective and self-reported measures of physical activity in retirement living were similar among the three resident groups; however, there were some exceptions. Using the CHAMPS questionnaire, current residents (pilot) reported that they spent significantly more time in ADLs in retirement living compared to current residents (full protocol) and transitional residents ($p=0.008$).

Retrospective reports from current residents (pilot) regarding duration of physical activity while living in the community was significantly greater than both retrospective reports by current residents (full protocol) and real-time reports of transitional residents ($p=0.02$). These differences were primarily due to higher reported frequency and duration of ADL from current residents (pilot) ($p\leq 0.006$). While frequency of intentional exercise was similar across groups, the duration of intentional exercise reported by the transitional residents while living in the community was significantly less than the retrospective reports from either current residents (full protocol) or current residents (pilot) ($p=0.008$). Detail regarding self-reports of physical activity is presented in Table 8.0b.

Objectively measured physical activity in retirement living was similar among all three groups ($p \geq 0.15$). Note that only transitional residents had objectively measured physical activity in the community, as presented in Table 8.0b.

Table 8.0a: Participant characteristics, median (interquartile range) or %(n).

Characteristic	Transitional Residents	Current Residents (full protocol)	Current Residents (pilot)	P-value*
Participants (n)	12	8	13	
Village of Arbour Trails	33.3% (4)	75% (6)	0	<0.001
Village of Tansley Woods	66.7% (8)	25% (2)	0	
Village of Taunton Mills	0	0	38.5% (5)	
Village of Riverside Glen	0	0	15.4% (2)	
Village of Winston Park	0	0	46.2% (6)	
Gender, female	41.7% (5)	50% (4)	61.5% (8)	0.61
Marital Status, married	100% (12)	50% (4)	30.8% (4)	0.001
Age	83.5 (81.5 - 85.3)	83.5 (82 - 85)	88 (86 - 90)	0.002
Years of Education	16 (14.5 - 18.3)	14 (11.8 - 15)	13.5 (10.8 - 15.3)	0.05
ABC 16	83.6 (54.4 - 94.5)	85.9 (78.9 - 91.8)	-	0.64
ABC 27	81.5 (51.2 - 90.5)	86.6 (78.7 - 92.8)	-	0.44
ABC 20	75 (49.3 - 88.1)	83.8 (72.8 - 90.3)	-	0.44
MoCA score	22.5 (20.8 - 25.3)	24.5 (23.3 - 25)	-	0.44
Trails B time	137.2 (126.5 - 184.6)	142.3 (105.6 - 160.4)	-	0.62
CESD	3 (1.5 - 6.5)	10 (6.3 - 13)	-	0.10
Falls	8.3% (1)	0% (0)	-	0.40
Mobility aid required	33.3% (4)	37.5% (3)	-	0.85
Arthritis	8.3% (1)	25% (2)	46.2% (6)	0.10
Lower limb injury/surgery	25% (3)	25% (2)	7.7% (1)	0.45
Time Living in Village (months)	3 (2.9 - 3)	4.5 (3.3 - 5.5)	36 (23 - 45)	<0.001
Time before Transition (months)	1.5 (1 - 1.8)	-	-	-

*Analyzed with the Kruskal Wallis H test or Chi Square.

Table 8.0b: Self-reported and objectively measured physical activity in community and retirement living, median (interquartile range).

	Transitional Residents	Current Residents (full protocol)	Current Residents (pilot)	P-Value*
<i>CHAMPS Questionnaire</i>				
<u>In Community (/wk)**</u>				
Physical Activity Frequency	15.8 (7.8 - 19.8)	12.3 (9.7 - 18.7)	29 (13 - 39.1)	0.12
Physical Activity Duration (hrs)	6.8 (5.1 - 9.1)	5.9 (4.4 - 10.3)	21 (10.5 - 35.9)	0.02
ADL Frequency	6.5 (3.8 - 8.8)	1 (0.4 - 2.5)	12 (6 - 20)	0.006
ADL Duration (hrs)	2.3 (1.2 - 8.9)	0.5 (0.4 - 0.8)	12.8 (4.3 - 24.8)	0.001
Intentional Exercise Frequency	6.3 (2.6 - 14.3)	10.1 (8.9 - 13.3)	11.1 (8 - 17)	0.31
Intentional Exercise Duration (hrs)	1.8 (0.8 - 4.9)	5.9 (3.7 - 8.2)	9.4 (2.8 - 11.8)	0.008
<u>In Retirement Living (/wk)</u>				
Physical Activity Frequency	11.5 (7.9 - 20.6)	20.8 (6.8 - 22.8)	16 (11.5 - 23)	0.76
Physical Activity Duration (hrs)	6.5 (2.8 - 10.4)	6.5 (4.7 - 8.6)	10.5 (7.5 - 13.5)	0.24
ADL Frequency	0.5 (0 - 4)	0 (0 - 6.3)	3 (1 - 4.5)	0.30
ADL Duration (hrs)	0.3 (0 - 0.6)	0 (0 - 1.8)	2.3 (0.5 - 3.8)	0.008
Intentional Exercise Frequency	10 (7.4 - 15.8)	13.8 (6.8 - 22.8)	11 (8.5 - 17.8)	0.90
Intentional Exercise Duration (hrs)	5.8 (2.8 - 9.9)	6.5 (3.6 - 8.3)	6.8 (5.8 - 9.5)	0.80
<i>Actigraph(% of daytime)</i>				
<u>In Community**</u>				
% Sedentary	86.9 (85.1 - 89.3)	-	-	-
% Total Physical Activity	13.1 (10.8 - 15)	-	-	-
% Light	8.6 (7.9 - 10.7)	-	-	-
% Moderate/Vigorous	3.1 (2.4 - 4.7)	-	-	-
<u>In Retirement Living</u>				
% Sedentary	89.6 (87.7 - 91.5)	-	-	0.16
% Total Physical Activity	10.4 (8.4 - 12.3)	-	-	0.31
% Light	7.4 (6.1 - 8.0)	-	-	0.31
% Moderate/Vigorous	2.4 (1.9 - 3.8)	-	-	0.15

*Analyzed with the Kruskal-Wallis H test.

**Current residents self-reported community physical activity retrospectively.

8.1: Change in Physical Activity with the Transition to Retirement Living.

Among transitional residents, total percentage of time spent being physically active (as objectively measured using the Actigraph) was lower in retirement living than in community living (p=0.02), attributable primarily to a decrease in light physical activity (p=0.006) (Table 8.1a).

Reports of physical activity indicated that total physical activity was similar in the community and retirement living among transitional residents and among current residents (full protocol) but was lower in duration in retirement living among current residents (pilot). When broken down by type of physical activity, transitional residents reported a significant increase in the frequency (p=0.03) and duration (p=0.003) of intentional exercise and a decrease in the frequency (p=0.01) and duration (p=0.004) of ADL. No significant changes in physical activity were reported by the current residents (full protocol). Current residents (pilot) also reported a decrease in the frequency (p=0.001) and duration (p=0.002) of ADL. A full description of self-reported physical activity in community living and in retirement living based on self-report CHAMPS questionnaire can be found in Table 8.1b.

Table 8.1a: Changes in physical activity among retirement living residents with transition to retirement living, median (interquartile range).

Actigraph (% of daytime)	Pre-transition	Post-transition	P-value*
Transitional Residents			
% Sedentary	86.7 (5.2)	89.7 (3.9)	0.02
% Total Physical Activity	13.3 (5.2)	10.2 (3.9)	0.02
% Light	9.4 (3.3)	7.1 (2.5)	0.006
% Moderate/Vigorous	3.9 (2.4)	3.1 (2.1)	0.20

* Analyzed with the Wilcoxon signed-rank test.

Table 8.1b: Change in physical activity with the transition to retirement living, median (interquartile range)

CHAMPS Questionnaire	Pre-transition	Post-transition	P-value*
Transitional Residents			
<i>Frequency(/week)</i>			
Total Physical Activity	15.8 (7.8 - 19.8)	11.5 (7.9 - 20.6)	0.80
Intentional Exercise	6.3 (2.6 - 14.3)	10 (7.4 - 15.8)	0.03
ADL	6.5 (3.8 - 8.8)	0.5 (0 - 4)	0.01
<i>Duration(hrs)</i>			
Total Physical Activity	6.8 (5.1 - 9.1)	6.5 (2.8 - 10.4)	0.78
Intentional Exercise	1.8 (0.8 - 4.9)	5.8 (2.8 - 9.9)	0.003
ADL	2.3 (1.2 - 8.9)	0.3 (0 - 0.6)	0.004
Current Residents (full protocol)**			
<i>Frequency(/week)</i>			
Total Physical Activity	12.3 (9.7 - 18.7)	20.8 (6.8 - 22.8)	0.90
Intentional Exercise	10.1 (8.9 - 13.3)	13.8 (6.8 - 22.8)	0.46
ADL	1 (0.4 - 2.5)	0 (0 - 6.3)	0.41
<i>Duration(hrs)</i>			
Total Physical Activity	5.9 (4.4 - 10.3)	6.5 (4.7 - 8.6)	0.48
Intentional Exercise	5.9 (3.7 - 8.2)	6.5 (3.6 - 8.3)	0.75
ADL	0.5 (0.4 - 0.8)	0 (0 - 1.8)	0.34
Current Residents (pilot)**			
<i>Frequency(/week)</i>			
Total Physical Activity	29 (13 - 39.1)	16 (11.5 - 23)	0.09
Intentional Exercise	11.1 (8 - 17)	11 (8.5 - 17.8)	0.92
ADL	12 (6 - 20)	3 (1 - 4.5)	0.001
<i>Duration(hrs)</i>			
Total Physical Activity	21 (10.5 - 35.9)	10.5 (7.5 - 13.5)	0.01
Intentional Exercise	9.4 (2.8 - 11.8)	6.8 (5.8 - 9.5)	0.97
ADL	12.8 (4.3 - 24.8)	2.3 (0.5 - 3.8)	0.002

*Analyzed with the Wilcoxon signed-rank test.

**Pre-transition physical activity among current residents was reported retrospectively.

8.2: Change in Physical Function with the Transition to Retirement Living.

Table 8.2 depicts the change in physical function among transitional residents from community living to retirement living. As measured with the Senior Fitness Test, transitional residents significantly improved their physical function after transitioning into retirement living in measures of endurance, agility, and strength ($p \leq 0.05$). Only measures of flexibility were

similar from before to after the transition ($p \geq 0.48$). Note that only 10 of 12 participants' data were included in the 6 min walk. Two participants were excluded at the post-assessment, one person because they used a walker during the pre-transition assessment but no longer needed the walker at the post-transition assessment, making scores not comparable, and another because they had a recent surgery at the time of the post-transition assessment and did not want to complete the 6 minute walk.

Table 8.2: Changes in physical function among transitional participants with transition to retirement living, median (interquartile range).

Physical Function Measures	Pre-transition	Post-transition	P-value*
Transitional Residents			
<i>Endurance</i>			
6min Walk (m)	370.5 (273.6 - 397.9)	362 (230.6 - 413.8)	0.05
2min Steps in place (#)	49.5 (35.8 - 63.5)	60 (39.8 - 88.8)	0.02
<i>Agility</i>			
8ft Timed up and go (s)	10.5 (8.2 - 14.8)	10 (8.0 - 12.3)	0.04
<i>Strength</i>			
Arm Curls (no. in 30 sec)	11 (8.5 - 12.3)	11.5 (10.8-13.1)	0.04
Chair Stands (no. in 30 sec)	7 (3.8 - 9.5)	8 (4.5-10.8)	0.01
<i>Flexibility</i>			
Back Scratch distance (cm)	-14.5 (-22.6 - -10.2)	-16 (-26 - -5.7)	0.48
Sit & Reach distance (cm)	0 (-9.2 - 1.6)	-2.8 (-14.6 - 2.5)	0.66

*Analyzed with the Spearman Correlation.

8.3: Association between Participant Characteristics and Physical Activity in Retirement Living.

Contrary to hypotheses, gender, marital status, and age were not associated with physical activity levels. Depressive symptoms were generally not associated with physical activity levels either. Although time living in retirement living was not associated with most physical activity measures, it was positively associated with ADL duration, likely because current residents pilot tended to report greater frequency and duration of ADLs in retirement living. There was also a

significant negative correlation between years of education and portion of time in any physical activity ($r_s = -0.44$, $p = 0.010$) and light physical activity ($r_s = -0.50$, $p = 0.005$). Education was not associated with moderate/vigorous physical activity or self-reported duration of physical activity.

Balance confidence, as measured with the activities specific balance confidence (ABC) scale was positively correlated with several measures of physical activity. Correlations were similar regardless of which ABC scale was used. In general, ABC scores were positively associated with self-reported duration of total physical activity, intentional exercise, and ADL as well as objectively measured portion of time in moderate/vigorous physical activity and total physical activity ($p < 0.06$). ABC scores were not associated with portion of time in light physical activity. Detailed results regarding the correlations between participant characteristics and physical activity levels can be found in Table 8.3.

Table 8.3: Association between participant characteristics and physical activity levels in retirement living, r_s (p-value)*.

Participant Characteristic	CHAMPS questionnaire (hrs/wk)			Actigraph (% daily time)		
	Total Physical Activity Duration	Intentional Exercise Duration	ADL Duration	% Total Physical Activity	% Light Physical Activity	% Moderate /Vigorous Physical Activity
Gender						
- Male	8.2 (5.4)	6.3 (3.7)	1.9 (2.9)	11.9 (5.6)	7.5 (3.3)	4.5 (2.6)
- Female	8.8 (4.9)	7.6 (4.6)	1.2 (1.5)	13.0 (5.7)	9.7 (4.1)	3.3 (2.3)
(p-value)	(0.59)	(0.48)	(0.82)	(0.94)	(0.12)	(0.28)
Marital Status						
- Married	8.6 (5.6)	7.2 (5.0)	1.4 (2.1)	13.3 (6.1)	9.0 (4.1)	4.3 (2.7)
- Widowed	8.5 (4.4)	6.7 (2.6)	1.8 (2.6)	10.8 (4.3)	7.6 (3.2)	3.2 (2.0)
(p-value)	(0.93)	(0.94)	(0.76)	(0.26)	(0.31)	(0.29)
Age (yrs)	0.23 (0.20)	0.06 (0.74)	0.426 (0.01)	0.11 (0.55)	0.20 (0.29)	-0.006(0.97)
Education (yrs)	-0.34(0.06)	-0.25(0.17)	-0.23 (0.19)	-0.44 (0.01)	-0.50(0.005)	-0.19 (0.30)
Time at Village (mos)	0.26 (0.14)	0.08 (0.65)	0.51 (0.002)	0.27 (0.15)	0.28 (0.13)	0.20 (0.29)
ABC-16**	0.59(0.006)	0.54 (0.01)	0.59 (0.007)	0.73 (0.001)	0.36 (0.14)	0.77(<0.001)
ABC-27**	0.49 (0.03)	0.43 (0.06)	0.64 (0.002)	0.78 (<0.001)	0.35 (0.15)	0.88(<0.001)
ABC-20**	0.52 (0.02)	0.45 (0.05)	0.64 (0.002)	0.79 (<0.001)	0.36 (0.15)	0.88(<0.001)
CESD**	-0.20(0.39)	-0.16(0.49)	-0.02 (0.92)	-0.12 (0.62)	-0.06 (0.83)	-0.34 (0.17)

*Analyzed with the Mann-Whitney U test or the Spearman Correlation, as appropriate.

**ABC and CESD reported by transitional residents and current residents (full protocol) only.

8.4: Association between Physical Function and Physical Activity in Retirement Living.

Several measures of physical function were strongly associated with physical activity in retirement living. Measures of endurance (6 min walk, 2 min step in place) were positively associated with ADL duration and objectively measured portion of time in total physical activity and moderate/vigorous physical activity ($r_s \geq 0.61$, $p \leq 0.008$). (see Table 8.4). Agility, measured with the 8ft timed up and go, was moderately associated with portion of time spent in moderate/vigorous physical activity ($r_s = -0.51$, $p = 0.03$). Lower body strength was significantly associated with portion of time in moderate/vigorous physical activity and ADL duration ($r_s \geq 0.54$, $p \leq 0.01$). Both lower and upper body strength were significantly associated with portion of time in total physical activity ($r_s \geq 0.47$, $p \leq 0.05$). Lower body flexibility was significantly associated with ADL duration and portion of time in total physical activity ($r_s \geq 0.46$, $p \leq 0.04$). Both lower and upper body flexibility were significantly associated with portion of time in light physical activity ($r_s \geq 0.64$, $p \leq 0.008$).

Table 8.4: Association between participants’ physical function and physical activity levels in retirement living for transitional residents (n=20) and current residents (full protocol, n=8), r_s (p-value)*.

Physical Function Measures	CHAMPS questionnaire (hrs/wk)			Actigraph (% daily time)		
	Total Physical Activity Duration	Intentional Exercise Duration	ADL Duration	% Total Physical Activity	% Light Physical Activity	% Moderate /Vigorous Physical Activity
Endurance						
6min Walk (m)	0.26(0.29)	0.17(0.51)	0.61(0.008)	0.63(0.009)	0.20(0.46)	0.82(<0.001)
2min Steps in place (no.)	0.23(0.33)	0.17(0.47)	0.47(0.04)	0.53(0.03)	0.12(0.64)	0.74(0.001)
Agility						
8ft Timed up and go (s)	-0.15(0.52)	-0.10(0.69)	-0.36(0.12)	-0.33(0.19)	0.09(0.73)	-0.51(0.03)
Strength						
Arm Curls (no. in 30 sec)	0.37(0.11)	0.34(0.14)	0.31(0.19)	0.47(0.05)	0.13(0.61)	0.43(0.08)
Chair Stands (no. in 30 sec)	0.41(0.07)	0.36(0.12)	0.54(0.01)	0.53(0.03)	0.12(0.63)	0.67(0.002)
Flexibility						
Back Scratch distance (cm)	0.13(0.62)	0.13(0.61)	0.17(0.53)	0.47(0.07)	0.64(0.008)	0.21(0.43)
Sit & Reach distance (cm)	0.37(0.11)	0.31(0.18)	0.46(0.04)	0.55(0.02)	0.62(0.006)	0.45(0.06)

* Analyzed with the Spearman Correlation.

8.5: Association between Cognitive Function and Physical Activity in Retirement Living.

There were few associations between cognitive function and physical activity. HVLT and semantic fluency were the only tests to have correlations with some measures of physical activity. Immediate recall on the HVLT was associated with ADL duration, portion of time in light physical activity, and portion of time in total physical activity ($r_s \geq 0.48$, $p \leq 0.05$).

Delayed recall on the HVLT was positively associated with intentional exercise duration and total physical activity duration (as measured with CHAMPS) as well as portion of time in light physical activity (as measured with Actigraph) ($r_s \geq 0.52$, $p \leq 0.02$). Semantic fluency was associated with longer ADL duration and percentage time in moderate/vigorous physical activity and total physical activity ($r_s \geq 0.47$, $p \leq 0.05$). No significant associations occurred between physical activity and the MoCA, digit symbol coding, phonemic fluency, or Trails A/B. See Table 8.5 for all correlations.

Table 8.5: Association between participants’ cognitive function and physical activity levels in retirement living for transitional residents (n=20) and current residents (full protocol, n=8), r_s (p-value)*.

Cognitive Measures	CHAMPS questionnaire (hrs/wk)			Actigraph (% daily time)		
	Total Physical Activity Duration	Intentional Exercise Duration	ADL Duration	% Total Physical activity	% Light Physical activity	% Moderate /Vigorous Physical activity
MOCA	0.23 (0.34)	0.22 (0.35)	0.35 (0.13)	0.45 (0.06)	0.14 (0.59)	0.43 (0.08)
HVLT						
Total recall	0.18 (0.46)	0.16 (0.51)	0.48 (0.03)	0.52 (0.03)	0.48 (0.05)	0.45 (0.06)
Delayed recall	0.48 (0.03)	0.52 (0.02)	-0.003(0.99)	0.43 (0.08)	0.53 (0.03)	0.27 (0.28)
Retention	0.43 (0.06)	0.48 (0.03)	-0.07 (0.78)	0.39 (0.12)	0.48 (0.04)	0.23 (0.36)
Digit Symbol	0.29 (0.22)	0.31 (0.19)	0.25 (0.29)	0.28 (0.26)	0.05 (0.84)	0.31 (0.21)
Phonemic Fluency	-0.01(0.97)	-0.03(0.89)	0.22 (0.36)	0.41 (0.09)	0.08 (0.76)	0.46 (0.06)
Semantic Fluency	0.24 (0.31)	0.21 (0.38)	0.54 (0.01)	0.47 (0.05)	0.21 (0.40)	0.60 (0.009)
Trails A	0.21 (0.37)	0.24 (0.32)	-0.22 (0.36)	-0.05(0.85)	0.19 (0.45)	-0.25 (0.31)
B	0.12 (0.64)	0.08 (0.75)	0.05 (0.85)	-0.13(0.61)	0.22 (0.41)	-0.20 (0.45)
B-A	-0.03(0.92)	-0.06(0.79)	0.05 (0.85)	-0.26(0.32)	0.09 (0.73)	-0.22 (0.41)

*Analyzed with the Spearman Correlation.

8.6: Association between Changes in Physical Activity and Changes in Physical and Cognitive Function.

There were very few significant associations between change in physical activity and change in either physical or cognitive function. Change in lower body flexibility was negatively associated with change in objectively measured portion of time in light, moderate/vigorous and total physical activity ($p \leq 0.02$). In addition, change in phonemic fluency was negatively correlated with change in objectively measured portion of time in light, moderate/vigorous, and total physical activity ($p \leq 0.04$). Insufficient group sizes made comparison between those who increased vs. decreased physical activity infeasible. See Table 8.6a for correlations between change in physical activity and change in physical function and 8.6b for correlations between change in physical activity and change in cognitive function.

Table 8.6a: Association between changes in physical activity and changes in physical function among transitional residents (n=20), r_s (p-value)*.

Measures of Physical Function	CHAMPS questionnaire (hrs/wk)			Actigraph (% daily time)		
	Total Physical Activity Duration	Intentional Exercise Duration	ADL Duration	% Total Physical activity	% Light Physical activity	% Moderate /Vigorous Physical activity
Endurance						
6min Walk (m)	0.02(0.96)	-0.01(0.99)	0.07(0.86)	-0.18(0.61)	-0.26(0.48)	0.14(0.70)
2min Steps in place (no.)	0.36(0.25)	-0.21(0.51)	-0.23(0.47)	0.06(0.86)	0.08(0.80)	0.10(0.76)
Agility						
8ft Timed up and go (s)	-0.52(0.08)	-0.34(0.28)	-0.44(0.16)	0.11(0.73)	0.25(0.44)	-0.15(0.63)
Strength						
Arm Curls (no. in 30 sec)	-0.03(0.94)	-0.04(0.90)	0.10(0.75)	-0.29(0.36)	-0.28(0.38)	-0.32(0.31)
Chair Stands (no. in 30 sec)	-0.22(0.49)	0.39(0.21)	-0.28(0.37)	0.24(0.45)	0.14(0.67)	0.27(0.40)
Flexibility						
Back Scratch distance (cm)	0.06(0.85)	-0.31(0.36)	0.12(0.73)	-0.36(0.28)	-0.43(0.19)	-0.41(-0.21)
Sit & Reach distance (cm)	0.04(0.91)	0.22(0.50)	-0.004(0.99)	-0.62(0.03)	-0.59(0.04)	-0.68(0.02)

*Analyzed with the Spearman Correlation

Table 8.6b: Association between changes in physical activity and changes in cognitive function for transitional residents (n=20), r_s (p-value)*.

	CHAMPS questionnaire (hrs/wk)			Actigraph (% daily time)		
	Total Physical Activity Duration	Intentional Exercise Duration	ADL Duration	% Total Physical Activity	% Light Physical Activity	% Moderate /Vigorous Physical Activity
Cognitive Function						
MOCA	0.18 (0.57)	-0.20 (0.53)	0.30 (0.35)	0.37 (0.24)	0.41 (0.19)	0.26 (0.42)
HVLT						
Total Recall	0.04 (0.91)	-0.50 (0.10)	0.14 (0.67)	-0.21 (0.51)	-0.09 (0.79)	-0.25 (0.43)
Delayed Recall	-0.05 (0.89)	-0.06 (0.85)	0.08 (0.79)	0.49 (0.11)	0.38 (0.23)	0.38 (0.23)
Retention	-0.05 (0.88)	0.10 (0.76)	0.06 (0.85)	0.42 (0.17)	0.26 (0.41)	0.33 (0.29)
Digit Symbol	-0.19 (0.56)	-0.44 (0.15)	-0.05 (0.87)	-0.28 (0.38)	-0.16 (0.63)	-0.39 (0.21)
Phonemic Fluency	0.01 (0.97)	-0.18 (0.59)	0.16 (0.63)	-0.66 (0.02)	-0.67 (0.02)	-0.61 (0.04)
Semantic Fluency	-0.24 (0.45)	0.18 (0.57)	-0.26 (0.41)	0.34 (0.28)	0.18 (0.57)	0.34 (0.27)
Trails A	0.32 (0.31)	0.14 (0.67)	0.34 (0.29)	-0.66 (0.02)	-0.56 (0.06)	-0.60 (0.04)
B	0.11 (0.73)	0.22 (0.50)	-0.15 (0.65)	0.06 (0.86)	0.20 (0.54)	0.10 (0.76)
B-A	0.13 (0.68)	0.18 (0.59)	-0.14 (0.66)	0.32 (0.31)	0.44 (0.15)	0.18 (0.59)

*Analyzed with the Spearman Correlation

9.0 DISCUSSION

This study examined whether physical activity and physical function changed as older adults transitioned from community living to retirement living and found that total physical activity and, specifically, ADLs decreased after the transition. Additionally, this study looked at the association between physical activity and physical and cognitive function in older adults living in CCRCs and found significant associations between physical activity and measures of endurance, agility, and strength as well as memory and executive function. There were no significant positive associations, however, between the magnitude of change in physical activity upon transition to retirement living and the magnitude of change in physical or cognitive function.

9.1 Change in Physical Activity with the Transition to Retirement Living

Objectively measured physical activity (measured with the Actigraph) decreased with the transition from community to retirement living. This is consistent with findings from a previous cross-sectional study of 78 community dwelling and 90 retirement living seniors in Thailand that suggested that adults living in retirement living were less physically active than their community dwelling counterparts (Henry et al., 2001). The results of this prior study were, however, limited by the fact that community-dwelling participants were significantly younger than the retirement living participants. Our finding of lower physical activity in retirement living, however, is in contrast to a study among 59 older adults in retirement living that found that those living in CCRCs had a sufficiently high step count (measured with an ankle accelerometer) to expect them to walk more than their independently living counterparts (Zalewski et al., 2009). Zalewski and colleagues (2009) suggested that the environment of retirement living may encourage walking

and minimize limitations to walking (such as weather, safe pathways) and contribute to the high daily step count. However, our results suggest that the facilities in retirement living are insufficient to increase total physical activity.

Self-reports of physical activity (with the CHAMPS questionnaire) in the community were low compared to a previous study and decreased further with the transition from community to retirement living. In the community, participants reported being physically active 15 times per week compared to 18 times per week in a prior study of 50 older adults (Godard & Standley, 2007). Of note, the slightly higher frequency reported in Godard's study may be due to the participant age differences between the studies (mean 83 years in the current study and mean 73 years in Godard & Standley, 2007).

The decline in self-reported physical activity was in line with the decline in objectively measured physical activity. However, when the self-reports were divided into questions pertaining to intentional exercise and ADL, the results indicated that the decrease in overall physical activity was driven by a large decrease in ADL. In retirement living, many ADLs that were addressed in the CHAMPS questionnaire (e.g., washing windows, sweeping, vacuuming, and gardening) are provided to residents, eliminating the need to perform these ADLs. However, it is plausible that participants over-estimated the amount of time spent doing ADLs while living in the community, as frequency and duration of ADLs reported at this time were high. For example, three participants reported that they spent over 25 hours a week doing housework including dusting, vacuuming, and maintaining garden, which may be an over-estimate of actual time in these activities.

In contrast to overall physical activity levels and ADLs, residents reported higher levels of intentional exercise after the transition to retirement living. Although opportunities for ADLs

may be lower in retirement living, there may be more opportunities for intentional exercise at the retirement community (e.g., aerobic exercise machines, aerobics, weight training, flexibility classes etc.), likely driving this increase in intentional exercise reports, especially among those who previously did not participate in exercise classes or have home fitness equipment. Through casual conversation with participants, many who did not previously engage in any formal exercise activities indicated that they have now become regularly involved in at least one or more exercise class and made use of the exercise equipment on site. Furthermore, barriers to physical activity such as proximity to exercise facilities and perceived safety of the environment may be less in retirement living.

Despite the fact that residents reported increases in intentional exercise, objectively measured moderate/vigorous physical activity did not increase. It would appear that increase in intentional exercise was not sufficient to replace some of the moderate/vigorous intensity ADLs (e.g., sweeping/vacuuming, raking leaves) lost with the transition (Knaggs et al., 2011). Given the relationship between moderate/vigorous physical activity and measures of physical and cognitive function (discussed in greater detail later), specific effort should be directed at increasing moderate/vigorous physical activity among retirement living residents.

One confounding factor that may affect the magnitude and direction of change in physical activity may be misrepresentative behaviour and, thus, physical activity levels during the pre-transition period. Activity monitoring pre-transition was completed 1 to 3 months prior to the transition to retirement living. Factors related to the upcoming move may have altered participants' behaviour and physical activity levels during this time. It is possible that participants were more physically active than usual during this time due to tasks and errands related to the transition (e.g., house cleaning, packing, shopping). Of note, self-reports of ADLs

were not correlated with objective measures in the pre-transition period, indicating a mismatch between self-reported usual behaviour and objectively measured actual behaviour in this time. In contrast, all measures of self-reported physical activity (intentional exercise and ADLs) were significantly correlated with objectively measured physical activity in the post-transition period ($p < 0.05$).

9.2 Change in Physical Function with the Transition to Retirement Living

Physical function improved among the residents following the transition to retirement living. This was consistent across measures of endurance, agility, and strength. Our finding is in contrast to a prior study of 169 community living and 172 retirement living adults between the ages of 70 and 98 that indicated that retirement living residents had poorer agility than community living older adults (Kang et al., 2004). The differences in study design and sample may explain the difference in results. In this prior study, the two samples (community living, retirement living) were compared cross-sectionally, and community living older adults were significantly younger than the retirement living older adults (ages 77 years versus 84 years, respectively), which likely contributed to the differences in physical function. Alternatively, it is possible that the increases in performance observed in this study may be due to measurement bias caused by repeated testing, given that the same tests of physical function were used prior to and following the transition to retirement living. Furthermore, the exercises included in exercise classes at CCRCs may mimic measures used in the Senior Fitness Test, which would lead to additional practice effects.

9.3 Association between Participant Characteristics and Physical Activity in Retirement Living

It was hypothesized that those who were male, married, and younger would be more physically active in retirement living (Schutzer & Graves, 2004, Chao et al., 2000, Statistics Canada, 2013). However, no significant differences in physical activity in retirement living were observed between these groups. It is possible that the many opportunities for exercise and social activity in retirement living negated the relationships between these characteristics and physical activity, which are usually observed among community living adults (O'Neill & Reid, 1991, Chao et al., 2000). The villages recruited for this study had several exercise programs offered for men and women separately and offered a variety of opportunities for individuals with limited functional ability, which may remove the barriers to physical activity particularly experienced by single, female, older adults in the community. Conclusions based on this finding, however, are limited due to small subgroup sample size and unequal distribution between groups.

Self-reported balance confidence was also positively correlated with physical activity, as expected. The 16-item ABC scale is a reliable and valid measure of balance confidence among older adults in the community (Jordstad et al, 2005, Myers et al., 1998, Myers et al., 1996, Powell & Myers, 1995). Previous studies found that physical activity is greater among people who report greater balance confidence with various ADLs (Myers et al., 2005). Similarly, the three ABC scores in this study showed similar positive correlations with both objectively measured and self-reported physical activity. Of note, ABC scores were strongly correlated with portion of time in moderate/vigorous physical activity and portion of time in total physical activity but not with portion of time in light physical activity. This suggests that balance confidence is more predictive of more intense physical activity. Of note, it is possible that

greater physical function among residents may be a potential mediator for this relationship specifically between balance confidence and moderate/vigorous physical activity.

This study found that years of education was negatively correlated with portion of time in light and total physical activity. This is in contrast to previous findings that higher educated individuals self-reported more physical activity than those who were less educated (Aichberger et al., 2013). The reason for this negative correlation is unclear but may be due to confounding factors not measured in this study such as personality traits. In addition, our sample was relatively high educated with only six of the participants with less than a high school education.

Although a negative correlation between depressive symptoms (as measured by CESD) and physical activity was hypothesized based on prior research (De Wit et al., 2010), there was only a weak negative, statistically insignificant correlation between depressive symptoms and physical activity in this study. The lack of significant relationship between depressive symptoms and physical activity may be due to the lack of variability among scores, where most participants reported very few depressive symptoms. It is also likely that individuals with many depressive symptoms were unlikely to participate in this study.

9.4 Association between Physical Function and Physical Activity

In this study, there were significant correlations between physical function (endurance, agility, and strength) and objectively measured total and moderate/vigorous physical activity (Actigraph), but not with objectively measured light physical activity or self-reported physical activity (CHAMPS questionnaire). This suggests that physical function is more strongly related to moderate/vigorous physical activity, likely driving the relationship with total physical activity. This relationship implies either that physical function is dependent on more intense physical

activity or that it is only moderate/vigorous physical activity which requires a high level of physical function.

Zalewski and colleagues (2009) found both similar and conflicting results with this study. Similarly to the current study, they found no association between physical function (measured with the 6 minute walk test, as well as comfortable and fast gait walking speeds) and physical activity measured with self-reports (measured with the Physical Activity Scale for the Elderly). However, in contrast to the current study, Zalewski and colleagues (2009) did not find a significant correlation between physical function and objectively measured physical activity. There are several possible explanations for this discrepancy. First, this discrepancy is possibly due to the use of step counts rather than accelerometry (which measures whole body movement). The latter may be more strongly related to physical function. Secondly, in the current study, we classified physical activity time as light or moderate/vigorous and did not see the relationship with light physical activity. However, Zalewski did not classify physical activity by intensity. Finally, we used different measures of physical function, with the exception of the 6-minute walk which was used in both studies. Our measures of strength and agility may be more sensitive to the effects of physical activity. Of note, it is unlikely that the difference in findings is due to differences in physical function as 6 minute walk distances were similar between studies (323m in this study and 322m in Zalewski et al. 2009).

In contrast to associations between physical function and moderate/vigorous physical activity once in retirement living, there were few observed associations between the change in physical activity and the change in physical function with the transition to retirement living. Only change in objectively measured physical activity was negatively associated with change in lower body flexibility. This appears to be driven by one outlying participant who experienced

the greatest decline in physical activity but experienced a slight increase in flexibility. The fact that change in other measures of physical function were not related to change in physical activity is in contrast to exercise training studies among older adults, that show improved upper and lower body strength and endurance following strength and endurance exercise training lasting a minimum of four months (Cress et al., 1999, Fiatarone et al., 1990, Castaneda et al., 2002, Cress et al., 1996, Fielding et al., 2002, Thomas et al., 2002). It is possible that positive change in physical activity did not predict positive change in physical function in this study because of the relatively short time living in retirement living (only 2 to 3 months).

9.5 Association between Cognitive Function and Physical Activity

Several correlations were observed between cognitive function and physical activity in retirement living. Measures of memory (both delayed recall and retention measured using the HVLTL) were correlated with portion of time in light physical activity. Only the total recall score from the HVLTL was also correlated with total physical activity and neared significance in its relationship with moderate/vigorous physical activity. In contrast, semantic fluency was correlated with moderate/vigorous and total physical activity. This suggests that light physical activity may be more strongly associated with memory but moderate/vigorous physical activity may be more strongly related to executive function or language. These findings are supported and in contrast to previous findings. Performance on the executive component of the trail making tests (Trails B-A) was significantly correlated with high intensity but not low intensity physical activity in a previous study (Kerr et al., 2013). Although there was no significant relationship between physical activity and the Trail Making test in this study, there was a similar relationship regarding intensity and executive function as measured with semantic fluency. In

contrast, Aichberger and colleagues (2013) found that greater self-reported physical activity, both light and vigorous, was associated with less decline in both memory as measured with delayed word recall and executive function as measured by semantic fluency respectively. Of note, semantic fluency may also be considered as a measure of language so, given our results, it is unclear whether physical activity is associated with executive function, language, or both.

Correlations between physical activity and the MoCA and the Trail Making Test did not reach statistical significance. The possibility that lack of significant correlations with the Trail Making Test, which is in contrast to findings by Kerr and colleagues (2013), was due to the poor performance of six participants who took greater than three minutes to complete Trails B was considered. However, with the removal of these participants correlations with physical activity were still insignificant, but the magnitude of change improved with association with percent time in light physical activity only ($r_s = 0.52$). The MoCA, on the other hand, is commonly used as a screening test for cognitive impairment and may not be sufficiently sensitive as a broad measure of cognitive function.

There were few correlations between the change in physical activity and the change in cognitive function with the transition to retirement living. Only the association between change in objectively measured total physical activity and change in phonemic fluency was significant, and this correlation was negative. The reason for this is unclear but may reflect unaccounted for confounding factors. Note that this negative correlation is in contrast to a meta-analysis of exercise interventions that found exercise interventions were associated with improvement in phonemic fluency (Gates et al., 2013). In general, it is possible that the short period of transition measured (2 to 3 months) was insufficient to drive change in cognitive function. Alternatively, it

is possible that the low number of transitional residents in this study was insufficient to reach statistical significance.

10.0 STRENGTHS AND LIMITATIONS

The main strength of this study is that it was the first study to assess the same individuals before and after the transition to retirement living. Previous studies only used cross-sectional designs (Kang et al., 2004, Henry et al., 2001). Another strength of this study was that physical activity was measured objectively as well as by self-reports. Self-reports of physical activity are prone to errors (Resnicow et al., 2003, Stewart et al., 2000), especially if cognitive deficits are present.

Results of this study should be interpreted cautiously as there are some limitations. The small sample size of transitional residents (n=12) reduced the power of our analyses. We required the assistance of marketing coordinators to contact potential participants, which was a challenge as they had not previously been involved with research. Additionally, many potential participants did not feel they could handle study participation at this time due to the overwhelming nature of transitioning to retirement living. Current residents were collected to add insight into the change in physical activity. However, self-reported physical activity in the community among current residents was based in retrospective reports. Although the sample size of retirement living older adults was quite small, the age of the participants was representative of retirement living older adults, as the mean age of 83 years in this study is similar to two larger studies of retirement living older adults (n=59, and n=172), both of which also reported mean age of participants to be 84 years (Zalewski et al., 2009, Kang et al., 2004).

In addition, the transitional residents and current residents (full protocol) were recruited from newly built retirement living communities. As a result, transition experiences among residents may be slightly different than transitions to established retirement living communities. However it is important to note that exercise facilities and groundwork outdoors, including well-

maintained walking paths, were already established when residents moved in. Also, all collection for this study was from one company of CCRCs (Schlegel Villages). The services offered and the overall retirement experience among residents at the Schlegel Villages may not be reflective of CCRCs in general.

Another limitation to consider was the timeline used in this study. To reduce the likelihood of age-related decline in cognitive and physical function, testing took place over a relatively short timeline (1 to 3 months prior to the transition and 2 to 3 months following the transition). However, during the months prior to the transition, participants may not be following their regular routine due to their upcoming move. In addition, the approximately 2 to 3 months post-transition may have been too short to exhibit changes in physical or cognitive function due to physical activity changes.

Seasonality is another limitation to this study. Collection of participants between groups and from pre to post transition varied by time of year. Since physical activities such as walking outdoors is affected by season in Canada, objectively measured physical activity could be quite different depending on the current weather conditions at the time of collection.

Lastly, there was no control group in the study which continued to measure physical activity and function associated with aging as adults continue to live in the community.

11.0 CONCLUSIONS AND FUTURE DIRECTIONS

These preliminary results indicate that objective measures of physical activity did not increase with the transition to retirement living, though participants reported an increase in intentional exercise. It appears that the magnitude of decrease in ADLs (both light and more vigorous) was too great to be compensated for by any increase in intentional exercise. Physical function measures of endurance, agility, and strength all increased with the transition to retirement living despite the reduction in physical activity. Therefore, intentional exercise may play a large role in physical function with aging. Additionally, memory, executive function and language were better among those who engaged in more physical activity, but few changes in cognitive function were related to the change in physical activity.

Based on our results, retirement living staff should be cognizant of encouraging physical activity outside of intentional exercise classes among the residents. Possible strategies could include increasing the events at the retirement facility including music, board games, and socials that would encourage residents to get out of their rooms and walk to the events. In addition, staff could ask residents to help with set up and clean up at the events to further increase their physical activity and encourage some of those ADLs that are lost with the household services provided to them.

Future studies should objectively measure time spent doing ADLs to accurately account for the change in physical activity as a result, though this may be difficult. In addition, other studies should examine change in physical activity with a broader timeline. Future studies could follow those living in retirement communities for a longer period of time at regular intervals, potentially up to two years, to determine if physical activity changes could also invoke changes

in cognitive function. Finally, research should aim to develop strategies to increase physical activity in retirement living to overcome the decline in ADL.

REFERENCES:

- Aichberger, M., Busch, M., Reischies, F., Strohle, A., Heinz, A., and Rapp, M. (2010). Effect of physical inactivity on cognitive performance after 2.5 years of follow-up. Longitudinal results from the survey of health, ageing, and retirement (SHARE). *GeroPsych*. 23 (1). 7-15.
- Albert M., DeKosky S., Dickson D., Dubois B., Feldman H., Fox N., Gamst A., Holtzman D., Jagust W., Petersen R., Snyder P., Carrillo M., Thies, B., Phelps C. (2011). The diagnosis of mild cognitive impairment due to Alzheimer's disease: recommendations from the National Institute on Aging Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. *Alzheimers Dementia*. (3):270-9.
- Aminzadeh F, Dalziel W. (2002). Older adults in the emergency department: a systematic review of patterns of use, adverse outcomes, and effectiveness of interventions. *Ann Emerg Med* ;39(3):238-47.
- Balde A, Figueras J, Hawking D. (2003). Physician advice to the elderly about physical activity. *JAPA*;11:90 – 7.
- Bandura A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev*;84:191 – 215.
- Baumgartner, R., Koehler, K., Gallagher, D., Romero, L., Heymsfield, S., Ross, R., Garry, P., Lindeman, R., (1998). Epidemiology of sarcopenia among the elderly in New Mexico. *Am. J. Epidemiol.* 147, 755–763.
- Belza, B., Walwick, J., Shiu-Thornton, S., Schwartz, S., Taylor, M., & LoGerfo, J. (2004). Older adult perspectives on physical activity and exercise: Voices from multiple cultures. *Preventing Chronic Disease, Public Health Research, Practice and Policy*, 1(4), 1–12. Retrieved from http://www.cdc.gov/pcd/issues/2004/oct/04_0028.htm.
- Bijnen, F., Feskens, E., Caspersen, C., Nagelkerke, N., Mosterd, W., Kromhout, D. (1999). Baseline and previous physical activity in relation to mortality in elderly men. *American Journal of Epidemiology*, 150, 1289–1999.
- Bjornsdottir, G., Arnadottir, S., Halldorsdottir, S. (2012). Facilitators of and barriers to physical activity in retirement communities: experiences of older women in urban areas. *Phys Ther*; 92(4):551-62.
- Booth, M., Owen, N., Bauman, A. (2000). Social-cognitive and perceived environment influences associated with physical activity in older Australians. *Prev Med*; 31:15 – 22.
- Brandt, J. (1991). The hopkins verbal learning test: Development of a new memory test with six equivalent forms. *Clinical Neuropsychologist*. 5(2), 125-142.

- Brassington, G., Atienza, A., Perczek, R. (2002). Intervention-related cognitive versus social mediators of exercise adherence in the elderly. *Am J Prev Med*; 23:80- 86.
- Brawley, L., Jung, M., Glazebrook, K. (2006). Physical activity and mental health. *Active Living Coalitions for Older Adults Research Update*, 11, 1–7.
- Calfas, K., Long, B., Sallis, J. (1996). A controlled trial of physician counseling to promote the adoption of physical activity. *Prev Med*. 25:225 – 33.
- Castaneda, C, Layne, J, Munoz-Orians, L. (2002). A randomized control trial of progressive resistance exercise training in older adults with type-2 diabetes. *Diabetes Care*. 25:235–41
- Chao, D., Foy, C., Farmer, D. (2000). Exercise adherence among older adults: challenges and strategies. *Control Clin Trials*; 21:212S – 7S.
- Cohen-Mansfield, J., Marx, M., Guralnik, J. (2003). Motivators and barriers to exercise in an older community-dwelling population. *JAPA*; 11:242 – 53
- Colbert, L., Matthews, C., Havighurst, T., Kim, K., Schoeller, D. (2011). Comparative validity of physical activity measures in older adults. *Med Sci Sports Exerc*; 43(5):867-76
- Colcombe, S., Kramer, A. (2003). Fitness Effects on the Cognitive Function of Older Adults: A Meta-Analytic Study. *Psychological Science*. 14(2) 125-130.
- Cress, E., Buchner, D., Questad, K., Esselman, P. DeLateur, B., and Schwartz, R. (1999). Exercise: Effects on physical functional performance in independent older adults. *Journal of Gerontology*. 54A(5) M242-M248.
- Cress, M., Conley, K., Balding, S., Hansen-Smith, F., Konczak, I. (1996). Functional training: muscle structure, function, and performance in older women. *J Orthop Sports Phys Ther.*; 24:4-10.
- Crizzle, A. (2011). Self-regulatory driving behaviour, perceived abilities and comfort level of older drivers with Parkinson’s disease compared to age-matched health controls. (Unpublished doctoral dissertation). University of Waterloo, Waterloo, Ontario, Canada.
- De Wit, L., Fokkema, M., Van, S., Lamers, F., Cuijpers, P., Penninx, B. (2010). Depressive and anxiety disorders and the association with obesity, physical, and social activities. *Depress Anxiety*; 27(11):1057-65.
- Dishman, R. (1994). Motivating older adults to exercise. *Southern Medical Journal*. 87(5). 79-82.
- Eyler, A., Baker, E., Cromer, L., King, A., Brownson, R., Donatelle, R. (1998). Physical activity and minority women: a qualitative study. *Health Education & Behaviour*; 25, 640-652.

- Fiatarone, M., Marks, E., Ryan, N., Meredith, C., Lipsitz, L., Evans, W. (1990). High-intensity strength training in nonagenarians. *JAMA.*; 263: 3029-3034.
- Fielding, R., LeBrasseur, N., Cuoco, A., Bean, J., Mizer, K., Fiatarone M. (2002). High-velocity resistance training increases skeletal muscle peak power in older women. *J Am Geriatr Soc*, 50 p. 655–662.
- Fried, L., Tangen, C., Walston, J., Newman, A., Hirsch, C., Gottdiener, J., Seeman, T., Tracy, R., Kop, W., Burke, G., McBurnie, M. (2001). Frailty in older adults: evidence for a phenotype. *J. Gerontol. A Biol. Sci. Med. Sci.* 56, M146–M156.
- Frisoli, A., Chaves, P., Ingham, S., Fried, L. (2011). Severe osteopenia and osteoporosis, sarcopenia, and frailty status in community-dwelling older women: Results from the Women’s Health and Aging Study (WHAS) II. *Bone* 48, 952–957.
- Gates, N., Fiatarone, Singh, M., Sachdev, P., Valenzuela, M. (2013). The effect of exercise training on cognitive function in older adults with mild cognitive impairment: a meta-analysis of randomized controlled trials. *Am J Geriatr Psychiatry.* 21(11):1086-97.
- Giles, K., Marshall, A. (2009). Repeatability and accuracy of CHAMPS as a measure of physical activity in a community sample of older Australian adults. *J Phys Act Health.*; 6(2):221-9.
- Godard, M., Standley, C. (2007). Relationship between CHAMPS physical activity questionnaire and functional fitness outcomes in older adults. *Activities, adaptation and aging.*; 31(1):19-40.
- Goh, J., An, Y., Resnick, S. (2011). Differential trajectories of age-related changes in components of executive and memory processes. *Psychol. Aging* 27 (3), 707–719.
- Gooderham, S. (2014). Examination of Factors Related to Driving, Travel Patterns and Falls in Retirement Living Seniors. (Unpublished master’s thesis). University of Waterloo, Waterloo, Ontario, Canada.
- Hachinski, V., Iadecola, C., Petersen, R., Breteler, M., Nyenhuis, D., Black S., Powers, W., DeCarli, C., Merino, J., Kalra, R., Vinters, H., Holtzman, D., Rosenberg, G., Wallin, A., Dichgans, M., Marler, J., Leblanc, G. (2006). National Institute of Neurological Disorders and Stroke-Canadian Stroke Network vascular cognitive impairment harmonization standards. *Stroke*; 37(9):2220-41.
- Hage P. (1983). Primary care physicians: first stop for exercise advice? *Physician Sportsmed* ;11:149 – 52.

- Hall, K., Howe, C., Rana, S., Martin, C., Morey, M. (2012). METs and accelerometry of walking in older adults: standard versus measured energy cost. *Journal of the American College of Sports Medicine*. 45(3); 574-82.
- Hall, K., McAuley E. (2011). Examining indirect associations between physical activity, function, and disability in independent- and assisted-living residents. *J Phys Act Health*;8(5):716-23.
- Hamer, M., Chida, Y. (2009). Physical activity and risk of neurodegenerative disease: a systematic review of prospective evidence. *Physiological Medicine*, 39(1)3-11.
- Hekler, E., Buman, M., Haskell, W., Conway, T., Cain, K., Sallis, J., Saelens, B., Frank, L., Kerr J., King, A. (2012). Reliability and validity of CHAMPS self-reported sedentary-to-vigorous intensity physical activity in older adults. *J Phys Act Health*.;9(2):225-36.
- Henry, C., Webster-Gandy, J., Varakamin, C. (2001). A comparison of physical activity levels in two contrasting elderly populations in Thailand. *Am J Hum Biol*;13(3):310-5.
- Heuberger, R. (2011). The frailty syndrome: a comprehensive review. *J.Nutr.Gerontol. Geriatr.* 30, 315–368.
- Hollenberg, M., Yang, J., Haight, T., Tager, I. (2006). Longitudinal changes in aerobic capacity: implications for concepts of aging. *J. Gerontol.ABiol. Sci.Med.* 61, 851–858.
- Janssen, I. (2006). Influence of sarcopenia on the development of physical disability: the Cardiovascular Health Study. *J. Am. Geriatr. Soc.* 54, 56–62.
- Janssen, I., Heymsfield, S.B., Ross, R. (2002). Low relative skeletal muscle mass (sarcopenia) in older persons is associated with functional impairment and physical disability. *J. Am. Geriatr. Soc.* 50, 889–896.
- Jones, C., Rikli, R. (2002). Measuring functional fitness of older adults, *The Journal on Active Aging*, pp. 24–30.
- Jorstad, E., Hauer, K., Becker, C., Lamb, S. (2005). Measuring the psychological outcomes of falling: A systematic review. *Journal of the American Geriatrics Society*, 53, 501-510.
- Kaleth, A., Ang, D., Chakr, R., Tong, Y. (2010). Validity and reliability of community health activities model program for seniors and short-form international physical activity questionnaire as physical activity assessment tools in patients with fibromyalgia. *Disabil Rehabil*.;32(5):353-9
- Kang, K., White, K., Hayes, W., Snow, C. (2004). Agility and Balance Differ Between Older Community and Retirement Facility Residents. *J Appl Geront*;23(4):457-68.

- Kerr, J., Marshall, S., Patterson, R., Marinac, C., Natarajan, L., Rosenberg, D., Wasilenko, K., and Crist, K. (2013). Objectively measured physical activity is related to cognitive function in older adults. *JAGS*. 61(11). 1927-1931.
- Knaggs, J., Larkin, K., Manini, T. (2011). Metabolic Cost of Daily Activities and Effect of Mobility Impairment in Older Adults. *J Amer Geriatric Assoc*; 59: 2118-2123.
- Kozey-Keadle, S., Libertine, A., Lyden, K., Staudenmayer, J., Freedson, P. (2011). Validation of wearable monitors for assessing sedentary behaviour. *Journal of the American College of Sports Medicine*. 43(8): 1561-1567.
- Krout, J., Oggins, J., Holmes, H. (2000). Patterns of service use in a continuing care retirement community. *Gerontologist*; 40(6):698-705.
- Landi, F., Abbatecola, A., Provinciali, M., Corsonello, A., Bustacchini, S., Manigrasso, L., Cherubini, A., Bernabei, R., Lattanzio, F. (2010). Moving against frailty: does physical activity matter? *Biogerontology*;11(5):537-45.
- Lauretani, F., Russo, C., Bandinelli, S., Bartali, B., Cavazzini, C., DiIorio, A., Corsi, A., Rantanen, T., Guralnik, J., Ferrucci, L. (2003). Age-associated changes in skeletal muscles and their effect on mobility: an operational diagnosis of sarcopenia. *J. Appl. Physiol.* 95, 1851–1860.
- Lexell, J., Taylor, C.C., Sjostrom, M. (1988). What is the cause of the ageing atrophy? Total number, size and proportion of different fiber types studied in whole vastus lateralis muscle from 15- to 83-year-old men. *J. Neurol. Sci.* 84, 275–294.
- Lezak, M. (1983). Neuropsychological assessment. New York: Oxford University Press.
- Litt, M., Kleppinger, A., Judge, J. (2002). Initiation and maintenance of exercise behavior in older women: predictors from the social learning model. *J Behav Med*;25:83 – 97.
- Luben, J. (1988). Assessing social networks among elderly populations;11:42-52.
- Luppa, M., Luck, T., Weyerer, S., Konig, H., Braehler, E., Riedel-Heller, S. (2010). Prediction of institutionalization in the elderly. A systematic review. *Age Ageing*;39(1):31-8.
- Lyketsos, C., Lopez, O., Jones, B., Fitzpatrick, A., DeKosky, S. (2002) Prevalence of Neuropsychiatric symptoms in Dementia and Mild Cognitive Impairment. *The Journal of the American Medical Association*, 288(12). 1475-1483.
- Masur, D., Sliwinski, M., Lipton, R., Blau, A., Crystal, H. (1994). Neuropsychological prediction of dementia and the absence of dementia in healthy elderly persons. *Neurology*, 44, 1427–1432.
- McAuley, E., Lox, C., Duncan, T. (1993). Long-term maintenance of exercise, self-efficacy, and physiological change in older adults. *J Gerontol*;48:218 – 24.

- Menec, V., Chipperfield, J. (1997). Remaining active in later life. The role of locus of control in seniors' leisure activity participation, health, and life satisfaction. *J Aging Health*;9(1):105-25.
- Middleton, L., Barnes, D., Lui, L., Yaffe, K. (2010), Physical Activity Over the Life Course and Its Association with Cognitive Performance and Impairment in Old Age. *Journal of the American Geriatrics Society*, 58: 1322–1326.
- Moore, D., Ellis, R., Allen, P., Cherry, K., Monroe, P., O'Neil, C., Wood, R. (2008). Construct validation of physical activity surveys in culturally diverse older adults: a comparison of four commonly used questionnaires. *Res Q Exerc Sport*;79(1):42-50
- Myers, A., Cyarto, E., Blanchard, A. (2005). Challenges in quantifying mobility in frail older adults. *European Review of Aging and Physical Activity*, 2, 13-21.
- Myers, A., Fletcher, P., Myers, A., Sherk, W. (1998). Discriminative and evaluative properties of the Activities-specific Balance Confidence (ABC) Scale. *Journal of Gerontology: Medical Science*, 53, M287-94.
- Myers, A., Powell, L., Maki, B., Holliday, P., Brawley, L., Sherk, W. (1996). Psychological indicators of balance confidence: Relationship to Actual and Perceived Abilities. *Journal of Gerontology: Medical Sciences*, 51A(1), M37-43.
- Nasreddine, Z., Phillips, N., Bedirian, V., Charbonneau, S., Whitehead, V., Collin, I. (2005). The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *J Am Geriatr Soc*; 53:695– 699.
- Nicholson, N. (2009). Social isolation in older adults: an evolutionary concept analysis. *J Adv Nurs*;65(6):1342-52
- Nieman, D. (2003). *Exercise testing and prescription: a health-related approach*. fifth ed. Mountain View (CA): Mayfield; p. 31 – 3.
- O'Neill, K., Reid, G. (1991). Perceived barriers to physical activity by older adults. *Can J Public Health*;82:392 – 6.
- Pate, R., Pratt, M., Blair, S. (1995). Physical activity and public health. *JAMA*;273:402 – 7.
- Pereira, M., Kriska, A., Day, R. (1998). A randomized walking trial in postmenopausal women. *Arch Intern Med*;58:1695 – 701.
- Powell, L., Myers, A. (1995). The Activities-specific Balance Confidence (ABC) Scale. *J Gerontol A Biol Sci Med Sci*;50A(1):M28-M34.



- Public Health Agency of Canada (PHAC). Physical activity tips for older adults- 65 years and older. (2012) retrieved from: <http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/pa-ap/08paap-eng.php>.
- Radloff, L., Teri, L. (1986). Use of the center for epidemiological studies depression scale with older adults. *Clinical Gerontologist*;5:119.
- Reitan, R., Wolfson, D. (1985). The Halstead-Reitan Neuropsychological Battery: Theory and Clinical Interpretation. Tuscon, AZ: Neuropsychology Press.
- Resnick, B. (2001). Testing a model of exercise behavior in older adults. *Res Nurs Health*;24:83 – 92.
- Resnicow, K., McCarty, F., Blissett, D., Wang, T., Heitzler, C., Lee, R. (2003). Validity of a modified CHAMPS physical activity questionnaire among African-Americans. *Med Sci Sports Exerc*;35(9):1537-45.
- Rickli, R., Jones, J. (1999). Functional fitness normative scores for community-residing older adults, ages 60-94. *Journal of Aging and Physical Activity*;7:161-81.
- Rising Tide: The Impact of Dementia on Canadian Society. (2009). *Alzheimer Society*.
- Rolland, Y., Lauwers-Cances, V., Cournot, M., Nourhashemi, F., Reynish, W., Riviere, D., Vellas, B., Grandjean, H. (2003). Sarcopenia, calf circumference, and physical function of elderly women: a cross-sectional study. *J. Am. Geriatr. Soc.* 51, 1120–1124.
- Rowe, J. W., Kahn, R. L. (1998). Successful Aging. *Aging Clinical and Experimental Research*. 10 (2), 142.
- Saini, A., Faulkner, S., Al-Shanti, N., Stewart, C. (2009). Powerful signals for weak muscles. *Age. Res. Rev.* 8, 251–267.
- Sallis, J., Johnson, M., Calfas, K. (1997). Assessing perceived physical environmental variables that may influence physical activity. *Res Q Exerc Sport*;68:345 – 51.
- Schuit, A., Feskens, E., Launer, L., Kromhout, D. (2001). Physical activity and cognitive decline, the role of the apolipoprotein e4 allele. *Medicine and Science in Sports and Exercise*, 33(5), 772-777.
- Schlegel villages. Copyright 2012. Retrieved from <http://schlegelvillages.com>.
- Schutzer, K. & Graves, S. (2004). Barriers and motivations to exercise in older adults. *Preventive Medicine*. 39: 1056-1061.
- Stathokostas, L., Jacob-Johnson, S., Petrella, R.J., Paterson, D.H. (2004). Longitudinal changes in aerobic power in older men and women. *J.Appl.Physiol.*97,781–789

- Statistics Canada. Physical activity during leisure time, by age group and sex (2013). Retrieved from: <http://www.statcan.gc.ca/tables-tableaux/sum-som/101/cst01/health77b-eng.htm>.
- Statistics Canada. The senior population continues to grow (2011). Retrieved from: <http://www.statcan.gc.ca/pub/91-209-x/2011001/article/11511-eng.htm#a2>
- Sternberg, S., Wershof Schwartz, A., Karunanathan, S., Bergman, H., Mark Clarfield, A., (2011). The identification of frailty: a systematic literature review. *J. Am. Geriatr. Soc.* 59, 2129–2138.
- Stewart, A., Mills, K., King, A, Haskell, W., Gillis, D., & Ritter, P. (2000). CHAMPS Physical Activity Questionnaire for Older Adults: outcomes for interventions. *Medicine & Science in sports & exercise.*(1126-1141).
- Thomas K, Muir K, Doherty M, Jones A, O'Reilly S, Bassey E. (2002). Home based exercise programme for knee pain and knee osteoarthritis: randomised controlled trial. *BMJ.* 325:752.
- Webber, S., Porter, M., Menec, V. (2010). Mobility in older adults: A comprehensive framework. *The Gerontologist*, 50, 443-450.
- Wechsler, D. (1997). Wechsler Adult Intelligence Scale: Third Edition. An Antonio, TX: The psychological Corporation.
- Yaffe, K., Barnes, D., Nevitt, M., Lui, L. -, & Covinsky, K. (2001). A prospective study of physical activity and cognitive decline in elderly women who walk. *Archives of Internal Medicine*, 161(14), 1703-1708.
- Zalewski, K., Smith, J., Malzahn, J., VanHart, M., O'Connell, D. (2009). Measures of physical ability are unrelated to objectively measured physical activity behavior in older adults residing in continuing care retirement communities. *Arch Phys Med Rehabil*;90(6):982-6.

Appendix A:

Schlegel Village Sample Calendar..... 77

Aberfoyle and Wellington Neighbourhoods JULY 2014

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
<p>Where Is The Program? C—Chapel HS—Hobby Shop L—Library TH—Town Hall RC—Rockwood Café and Conservatory—2nd Floor Fitness Program For Active Living are held in the MF Fitness Centre FC NOTE: Programs, their times and location are subject to change</p> <p> 'Like' us on Facebook! www.facebook.com/ArbourTrails</p> <p> Follow Arbour Trails on Twitter @ArbourTrails</p>	<p>E—Everton (Memory Care—2nd Floor) R—Rockwood (Assisted Care—2nd Floor) MF—Main Floor SC—Social Club</p>	<p>1 CANADA DAY NuStep Challenge Begins today! Visit Carrington in the Gym to try 10:00 Better Balance FC 10:30 Tai Chi with Lola 1:30 National Park Project DVD TH 3:00 Canada Day Trivial Pursuit and Maple Treats in the MF Cafe 5:00 - 6:30 pm BBQ Dinner 6:30 Entertainment by 'Jalopy' on the Backyard Patio</p>	<p>2 10am SMART Fitness FC 10am AQUA Program 1:30 National Cookie Day Bake a Bunch! Country Kitchen on Everton - 2nd FI 2:00 Hand Therapy FC 3:00 Knit and Crochet in the Library 3:15 Bookmobile 4:00 Yahtzee - 2nd FI E 4:15 Cribbage & Euchre Lessons SC 6:45 Bingo HS</p>	<p>3 10:00 Better Balance FC 10:30 Bible Study with Terry C 1:00 Open Gym (until 2:00) 2:00 Drop In Bridge FC 4:00 Bocce Ball - MF Patio Courtyard 6:45 Curling in the Hobby Shop</p>	<p>4 10:00 Sit and Strength FC 10:45 Heat Therapy FC 11:00 Guelph Library Services Info Session & Library Card Drive TH 11:00 Pole Walking FC 1:45 Photography in Nature in the MF Patio Courtyard 3:00 Afternoon Trivia - 2nd FI E Patio 4:30 Scott's Spirits At The Pub 6:30 Friday Night Feature TH 108 min 'Guess Who's Coming To Dinner'</p>	<p>5 10:00 Bowling - MF Patio Courtyard 11:00 Navigating the Computer L Bring your iPads, laptops or learn on a desktop computer! 1:30 Penny Ante in the MF Cafe 2:30 Ice Cream Social & Trivia MF Cafe 4:00 Puzzles and Ponderings - 2nd FI E</p>
<p>6 10:15 Exercises with Amanda on 2nd FI R 11:00 Sing A Long on Everton 2:00 Church Service 3:00 Fellowship MF Café 3:30 Bingo in the Hobby Shop</p>	<p>7 10:00 SMART Fitness FC 11:00 Pole Walking FC 1:45 Books and Bookworms - 2nd FI R 2:00 Drop In Bridge FC 2:30 Monday Movie Matinee TH 'Meet Me in St. Louis' 113 minutes 4:00 Scrabble on Everton 6:30 Village Games Night MF 6:45 Billiards in the Social Club</p>	<p>8 10:00 Better Balance FC 10:30 Tai Chi with Lola 10:45 Bible Study - Living Joy' with volunteer Marguerite C 10:45 Java Music Club in the Library 1:15 Actor's Studio in the Library 3:00 Exploring Leisure on Everton 6:30 Sing A Long with Amanda TH 6:45 Euchre in the Social Club</p>	<p>9 10:00 SMART Fitness FC 1:30 Chocolate Making - 2nd FI R 3:00 Knit and Crochet in the Library 4:15 Cribbage & Euchre Lessons SC 6:45 Bingo in the Hobby Shop</p>	<p>10 Dental Clinic Today Appointments - call ext. 805 10:00 Better Balance FC 10:30 Bible Study with Terry C 1:00 Open Gym (until 2:00) 2:00 Ice Cream Outing + Sign Up 2:00 Hand Therapy in the Hobby Shop 2:00 Drop In Bridge FC 2 - 5pm Living In My Today TH 2:00 Afternoon Stroll - Meet in MF Café 3:00 Bowling - MF Patio Courtyard 6:45 Classic Country Sing A Long and Line Dancing in the Hobby Shop</p>	<p>11 10:00 Tea and Tales Outing - Stories by the Enabling Garden in Riverside Park 10:00 Sit and Strength FC 10:45 Heat Therapy FC 11:00 Pole Walking FC 3:30 Actor's Studio - 2nd FI E 4:30 Scott's Spirits At The Pub 6:30 Friday Night Feature TH 'Sabrina' 113 minutes</p>	<p>12 10:00 Java Music Club - 2nd FI R 11:00 Navigating the Computer L Bring your iPads, laptops or learn on a desktop computer! 1:30 Classical Sensations - 2nd FI E 2:30 Fresh Fruit Popsicles MF Cafe 4:00 Ted Talks - Pamela Meyer 'How to spot liar'</p>
<p>13 WORLDCUP FINALE 10:15 Exercises with Steph on 2nd FI R 11:00 Clay Creations HS 2:00 Church Service 1:30 What in the World! 2:45 World Cup Soccer TH 3:00 Fellowship in the MF Café 3:30 Pole Walking FC</p>	<p>14 9:30 Washer Toss - MF Patio Ctyard 10:00 SMART Fitness FC 10:45 Summer Baking in the Hobby Shop 10:45 BioPed Information TH 11:00 Pole Walking FC 1:45 Books and Bookworms - 2nd FI R 2:00 Drop In Bridge FC 2:30 Monday Movie Matinee TH 'West Side Story' 152 minutes 6:30 Village Games Night MF 6:45 Billiards in the Social Club</p>	<p>15 10:00 Better Balance FC 10:30 Tai Chi with Lola 10:45 Java Music Club in the Library 1:15 Actor's Studio in the Library 3:00 Stories with Sya TH 3:30 Welcome Wine and Cheese For all new residents - 2nd FI RC 6:00 Village Advisory Team Meeting HS 6:30 Sing A Long with Amanda TH 6:45 Euchre in the Social Club</p>	<p>16 Phase II Open House 11 - 4 pm 10:00 SMART Fitness FC 10:00 AQUA Program 1:30 Cool Treats on Rockwood - 2nd FI 2:00 Hand Therapy FC 3:00 Knit and Crochet in the Library 3:15 Bookmobile 4:00 Yahtzee on Everton 4:15 Cribbage & Euchre Lessons SC 6:45 Bingo in the Hobby Shop</p>	<p>17 Phase II Open House 11 - 4 pm 10:00 Better Balance FC 10:30 Bible Study with Terry C 1:00 Open Gym (until 2:00) 2:00 Drop In Bridge FC 2:00 Afternoon Stroll - Meet in MF Café 3:00 Resident Council TH 4:00 Reminiscing Tea - 2nd FI E Patio 7:00 841 Sound HandBell Quartet TH</p>	<p>18 Phase II Open House 11 - 4 pm 10:00 Sit and Strength FC 10:45 Heat Therapy FC 11:00 Pole Walking FC 1:45 Photography in Nature in the MF Patio Courtyard 3:00 Board Games - 2nd FI E Patio 4:30 Scott's Spirits At The Pub 6:30 Friday Night Feature TH 'Oklahoma' 145 minutes</p>	<p>19 10:00 Bowling - MF Patio Courtyard 11:00 Navigating the Computer L Bring your iPads, laptops or learn on a desktop computer! 1:30 Summer Strolls - Meet in MF Cafe 2:30 Cool Treats Patio Social on the MF Patio Courtyard 4:00 Puzzles and Ponderings - 2nd FI E</p>
<p>20 10:15 Exercises with Steph on 2nd FI R 11:00 Purr O' Cups - 2nd FI E 2:00 Church Service 3:00 Fellowship in the MF Café 3:30 Bingo in the Hobby Shop</p>	<p>21 10:00 SMART Fitness FC 11:00 Pole Walking FC 1:45 Books and Bookworms - 2nd FI R 2:00 Drop In Bridge FC 2:30 Monday Movie Matinee TH 'Singing in the Rain' 103 minutes 6:30 Village Games Night MF 6:45 Billiards in the Social Club</p>	<p>22 10:00 Better Balance FC 10:30 Tai Chi with Lola 10:45 Java Music Club in the Library 1:15 Actor's Studio in the Library 3:00 Exploring Leisure on Everton 6:30 Sing A Long with Amanda TH 6:45 Euchre in the Social Club</p>	<p>23 10:00 SMART Fitness FC 1:30 Summer Smoothie Making - 2nd FI 2:00 Hand Therapy FC 2:00 Keith Tobey Entertainment TS 3:00 Knit and Crochet in the Library 4:15 Cribbage & Euchre Lessons SC 6:45 Bingo in the Hobby Shop</p>	<p>24 10:00 Better Balance FC 10:30 Bible Study with Terry C 1:00 Open Gym (until 2:00) 2:00 Drop In Bridge FC 2:00 Afternoon Stroll - Meet in MF Café 3:00 Bowling - MF Patio Courtyard 6:45 Classic Country Sing A Long and Line Dancing in the Hobby Shop</p>	<p>25 10:00 Sit and Strength FC 10:45 Heat Therapy FC 11:00 Pole Walking FC 3:00 Actor's Studio - 2nd FI E 4:30 Scott's Spirits At The Pub 6:30 Friday Night Feature TH 'The Devil Wears Prada' 110 minutes</p>	<p>26 10:00 Java Music Club - 2nd FI R 11:00 Navigating the Computer L Bring your iPads, laptops or learn on a desktop computer! 1:30 Classical Sensations - 2nd FI E 2:30 Ice Cream Sandwiches MF Cafe 4:00 Ted Talks - Ken Robinson 'How schools kill creativity'</p>
<p>27 10:15 Exercises with Steph on 2nd FI R 11:00 Clay Creations HS 1:00 Blue Jays Game on Big Screen! Come to Town Hall to cheer 2:00 Church Service - UNITED 3:00 Fellowship in the MF Café 3:30 Pole Walking FC</p>	<p>28 9:30 Washer Toss - MF Patio Ctyard 10:00 SMART Fitness FC 10:45 Baking in the Hobby Shop 11:00 Pole Walking FC 1:00 Stone Road Mall Outing 1:45 Books and Bookworms - 2nd FI R 2:00 Drop In Bridge FC 2:30 Monday Movie Matinee TH 'Hairspray' 120 minutes 6:30 Village Games Night MF 6:45 Billiards in the Social Club</p>	<p>29 10:00 Better Balance FC 10:30 Tai Chi with Lola 10:45 Java Music Club in the Library 1:15 Actor's Studio in the Library 3:00 Stories with Sya TH 6:30 Sing A Long with Amanda TH 6:45 Euchre in the Social Club</p>	<p>30 10:00 Smart Fitness FC 10:00 AQUA Program 1:30 Cool Treats on Rockwood - 2nd FI 2:00 Hand Therapy FC 3:00 Knit and Crochet in the Library 3:15 Bookmobile 4:00 Yahtzee on Everton 4:15 Cribbage & Euchre Lessons SC 6:45 Bingo in the Hobby Shop</p>	<p>31 10:00 Better Balance FC 10:30 Bible Study with Terry C 1:00 Open Gym (until 2:00) 2:00 Drop In Bridge FC 2:00 Afternoon Stroll 3:00 Bocce Ball - MF Patio Courtyard 4:00 Reminiscing Tea - 2nd FI E Patio 6:45 Curling in the Hobby Shop</p>		

Appendix B:

(Recruitment Materials)

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TALKING, WALKING, AND HEALTH RESEARCH PROJECT

Hello future residents of The Schlegel Villages!

One of the biggest ways the Schlegel Villages differ from other retirement communities is its relationship with the Schlegel-UW Research Institute for Aging (RIA) which promotes research relevant to aging in community and congregate settings. The RIA focuses on practical research as a driving force behind innovation and quality care.

Currently, the RIA has a research project called “Talking, Walking and Health” which we would like to invite you to learn more about or take part in. This project is taking place at The Villages of: Humber Heights, Arbour Trails, Tansley Woods, Riverside Glen, Taunton Mills and Winston Park. The project is being led by Dr. Laura Middleton from the Department of Kinesiology at the University of Waterloo. Professor Middleton is very interested in studying the effects of physical activity on various aspects of health in older adults.

You are being invited to participate in this project with the aim to understand change in physical and social activity between community living and retirement living so that eventually we can develop programs to help make this transition smoother. Before you make a decision, here is some additional information. In this package, you will find:

Project Brochure. This brochure briefly outlines the project in terms of why it is important, how it aims to help older adults, what would be involved in participating.

Information Letter. This letter explains the project in detail and should answer most of your questions. If you have additional questions, however, please do not hesitate to contact Kaylen Pfisterer (Assistant Research Coordinator) at the Schlegel-UW Research Institute for Aging at any time. Her contact information is on the reverse.

As you read the information in this package, please contact Kaylen if you have any questions about the project specifically, or about the recruitment process in general.

Just to review, here is what will happen next:

1. You are invited to read the information letter in this package and think of any questions you might have about participating in the project.
2. After reading the information letter, please either return the Participant Response Form to Kaylen in the envelope provided OR contact Kaylen directly.
3. If you choose to participate, Kaylen will forward your name and contact information to the research team. A member of the research team will then contact you to talk about arranging participation in the study and timelines specific for you.
4. If you choose not to participate but are still interested in receiving information about the results of the project, please complete the Publications Request Form and return it to Kaylen.

As you are reviewing this material, please remember that just because you are being invited to participate in the study does not mean that you are expected to be part of this project.

This information is simply to let you know that the project is happening so that you can decide if you'd like to participate! If you decide that you do not wish to participate, no questions will be asked. **The decision to participate (or not) in this study will in NO WAY affect the care or services that you will receive from The Village, the Schlegel-UW Research Institute for Aging, or the University of Waterloo.**

Take care –

Marketing Coordinator
The Village of Humber Heights

Kaylen Pfisterer BSc, MSc (student)
Assistant Research Coordinator
Schlegel-UW Research Institute for Aging
325 Max Becker Drive, Suite 202, Kitchener, ON, N2E 4H5
Email: kpfisterer@uwaterloo.ca
Phone: 519.571.1873 ext 109

PARTICIPANT RESPONSE FORM

If you would like more information on this project or if you would like to be added to the “do not contact list”, please complete this send it to Kaylen Pfisterer at the RIA.

You may also respond by calling or emailing Kaylen Pfisterer
(see middle panel for contact details)

I would like to participate. Please pass on my information (as indicated below) to the researchers to establish a meeting time that is suitable for me.

I would not like to participate.

Please add me to the “do not contact list”. I would not like to participate in any research projects.

NAME: _____

ADDRESS: _____

PHONE #: _____

Talking, Walking and Health Future Residents - AT



This is your invitation to participate in this upcoming study looking at changes in activity between community living and retirement being led by Laura Middleton (PhD) from the University of Waterloo and her student, Kayla Regan (MSc Candidate).

FOR MORE INFORMATION ABOUT THIS PROJECT, PLEASE CONTACT:

Kaylen Pfisterer (BSc)
Assistant Research Coordinator

PHONE: 519.571.1873 ext. 109
EMAIL: kpfinder@uwaterloo.ca

Schlegel-UW Research Institute
for Aging
325 Max Becker Dr.
Kitchener, ON
N2E 4H5

WHAT IS THE RIA?

The Schlegel-UW Research Institute for Aging (RIA) promotes research relevant to aging in community and congregate settings. It focuses on practice-relevant research as a driving force behind innovation and quality care.

Through partnerships with the University of Waterloo and Conestoga College, the RIA attracts research projects to “living research environments” within Long Term Care and retirement communities, with a view to immediate translation of research to practical training applications for caregivers.

Materials and information generated through our research-to-practice initiatives are shared with other LTC facilities and system networks to promote research-informed quality care.

RIA is a product of the philanthropic spirit and vision of Dr. Ron Schlegel, whose family has been providing long-term care to Ontario residents since the 1950s. Owners of the 12 LTC facilities operating as Schlegel Villages, the Schlegel family has committed over \$40 million, to develop the Institute. Additional funds and in-kind supports were secured and continue to be solicited.

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Talking, Walking and Health

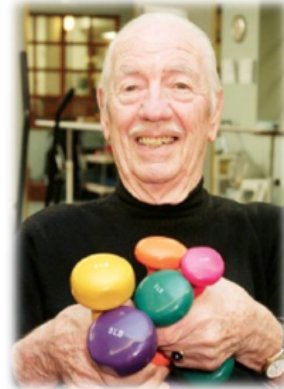
*Activity in the
community and in
Retirement Living*
(General Future Residents)

RIA RESEARCH INSTITUTE
for AGING

Schlegel • UWaterloo • Conestoga

WHAT IS THE STUDY ABOUT?

Understanding change in physical and social activity between community living and retirement living so that eventually we can develop programs to help make this transition smoother.



WHAT WILL I BE ASKED TO DO?

- Participate in 2 assessments (one while you are living in your current home, and one after you have moved into one of our Schlegel Villages).
- Report your levels of physical and social activity.
- Have your cognitive and physical function measured.
- Wear a small activity monitor on your hip.

CONFIDENTIALITY

All information collected from you will be kept strictly confidential and data resulting from your participation that may be published in scientific journals, texts, or other media will not reveal your identity

This study has been reviewed by, and received ethics clearance through the Office of Research Ethics at the University of Waterloo.

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OUR TEAM OF INVESTIGATORS

Kayla Regan (MSc Candidate)
Department of Kinesiology
University of Waterloo

Dr. Laura Middleton (PhD)
Department of Kinesiology
University of Waterloo

Dr. Mike Sharratt (PhD)
Schlegel-UW Research Institute for Aging

Susan Brown (MSc)
Schlegel-UW Research Institute for Aging

Dr. Heather Keller (PhD)
Department of Kinesiology
University of Waterloo

Dr. Eric Roy (PhD)
Department of Kinesiology
University of Waterloo

Brittany Intzandt (Research Intern)
Department of Kinesiology
University of Waterloo

PUBLICATIONS REQUEST FORM

If you would like copies of any publications that result from this project (even if you choose not to participate) please complete this form and return it to Kaylen Pfisterer at the RIA.

NAME: _____

ADDRESS: _____

CITY: _____

POSTAL CODE: _____

EMAIL: _____

Please add me to the electronic mailing list of Research Institute for Aging (RIA).

Please add me to the distribution list for the RIA's Quarterly Newsletter.

Please add me to the electronic mailing list (Agri-Food for Healthy Aging Program).





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TELEPHONE RECRUITMENT SCRIPT

Hello [name], my name is Brittany Intzandt/Kayla Regan and I am a research assistant/masters student at the University of Waterloo. How are you doing today? I am calling about a study you had signed up for through [name Schlegel Village/Chartwell residence]. This study is looking at how physical and social activities change when people move from living in the community to a retirement facility and how this affects your daily function.

If you are still interested in participating, we would like to assess your regular activity habits on 2 separate occasions. The first visit will take place between 1 and 4 months prior to you moving into [name Schlegel Village/Chartwell residence] and the second visit will take place after you have settled in at [name Schlegel Village/Chartwell residences] after approximately 2- 3 months.

Is this still a study you are interested in participating in?

If “No”:

Ok, thank you for your time and if you do change your mind about your participation here is my information;

Telephone: 519.888.4567 ext. 38548

Email: bnintzan@uwaterloo.ca / kregan@uwaterloo.ca

If “yes”:

That’s great. In the sessions, we will ask you about the physical and social activities that you do regularly. We will also ask you to perform some tasks that give us an idea of your functional abilities. We also request that you to wear a device to monitor your activity for 7 days. You just wear this around your waist and go through your day as usual. After the week is up, we will come back to pick it up and also ask you to perform some activities that address your mental function, such as puzzles and memory tasks. Do you have any questions?

If “yes”:

Answer, conversation will continue as per necessary based on questions and concerns from the future participant

If “no”

Great. We may be able to schedule our first visit. Do you know when you will be moving into [name of Schlegel Village/Chartwell Residence]?

If “No”:

Okay, no problem. I will follow up with you in a month to see if you have a move in date at that time. I will also give you my phone number so that you can contact me. Do you have a pen? You can reach me at 519-888-4567 ex. 38548. Do you have any more questions? ... wait and answer if applicable...(if not) Have a great day!

If “Yes”:

Great, when is your move in date? We would like to have the first visit 1-3 months before you move in so that would mean the visit would be between [xx] and [xx]. Are there days or weeks that are better for you? ...

Great. I need to talk to [*the Village/retirement home*] and other researchers involved. Do you mind if I call you back to finalize the date?

Thank you for your time and if you have any further questions or inquiries about this study please don't hesitate to contact me at [*give information i.e. phone number and name*].

I Look forward to meeting with you and appreciate your participation. Have a great day.



UNIVERSITY OF WATERLOO

REMINDER TELEPHONE RECRUITMENT SCRIPT

Hi [*name*] this is Brittany Intzandt/Kayla Regan calling from the University of Waterloo. How are you doing today? I am just calling to remind you of your appointment on [*date*] at [*time*] to participate in the study looking at how physical and social activities change when people move from community living to retirement living. Let's meet in the entrance way of [*Schlegel Village/Chartwell residence*].

I would like to remind you to wear comfortable loose fitting clothing as we will be doing a couple of exercises and taking your blood pressure. As well if you can wear walking shoes that you feel comfortable in that would also be great. The appointment will take approximately two hours to complete. Did you have any questions or concerns at all about what we will be doing?

Do you have a pen and piece of paper? I am going to give you mine and Kayla's number in case you are unable to make it last minute. My number is 519-860-5717 and Kayla's number is 519-998-1384. Otherwise we will see you [*date*] at [*time*]. Have a good day.



UNIVERSITY OF WATERLOO

INFORMATION LETTER

Activity in the Community and Retirement Living

Student Investigator

Kayla Regan, MSc Candidate, University of Waterloo, Department of Kinesiology,
519.888.4567 Ext. 38548

Faculty Investigator

Laura Middleton, PhD, University of Waterloo, Department of Kinesiology,
519-888-4567 Ext. 33045

INTRODUCTION

You are being invited to take part in a research study. Before agreeing to participate in this study, it is important that you read about the study. The following information describes the study purpose, what you will be asked to do, the benefits of the study, the risks of participation, and who cannot participate in the study. It also describes your right to refuse to participate or to withdraw from the study at any time. In order to decide whether you wish to participate in this research study, you should be aware of its risks and benefits to be able to make an informed decision. This is known as the informed consent process. Please ask the study staff to explain any details that are unclear before signing the consent form. Make sure all your questions have been answered to your satisfaction before signing this form.

WHO CANNOT PARTICIPATE IN THIS STUDY

If your mental or physical condition is currently worse than usual because of illness, medications, or other factors, you should not participate in this study at this time. You cannot participate in this study if you are wait-listed for long-term care as opposed to retirement living.

WHAT IS THE PURPOSE OF THIS STUDY?

Physical activity and social activity are associated with physical and mental health in older adults. Many retirement living facilities offer a variety of physical and social activities to their residents. As a result, some people may increase their physical and social activity when they move into retirement living facilities. Such increases may be associated with improvements in physical and mental health. *The purpose of this study is to examine how physical and social activity changes when someone transitions from community to retirement living. A second purpose of this study is to examine whether these changes in physical and social activity are associated with changes in physical and mental health.*

WHAT WILL YOU BE ASKED TO DO?

If you agree to participate, you will be asked to complete assessments at two time points, once while you are still living at your home and once after you have moved into the retirement community. The assessments at each time point will be the same. You will be carefully monitored during each session, and encouraged to ask questions at any point.

Prior to or at the first assessment, you will sign this consent form. At the first assessment, while you are still living a home, you will complete a health screening form to assess any conditions or symptoms that you might have.

At each time point, you will complete two sessions as well as at-home monitoring in between. At the first session, you will also complete a series of questionnaires that assess your physical and social activity. These questionnaires will ask about the activities that you participate in on a regular basis. They will also ask about the number of people that you interact with on a regular basis. After this, your physical health will be assessed with a series of tasks and measurements. You will complete a series of physical tasks to assess your physical function. These tasks include standing from a seated position, lifting a small weight, high steps for two minutes, and standing and walking around a cone and back again. You may use your usual mobility aid (cane, walker) if appropriate. In addition, your flexibility will be assessed using a sit and reach test and another test where you stretch behind your back. We will also measure your height, weight, waist circumference, along with your resting heart rate and blood pressure.

At the end of this, we will send you home with an activity monitor to track your physical activity for seven days. You should complete your daily activities as usual. The activity monitor will be worn around your waist, on your right hip, and will record your movement throughout the day. You should complete your normal daily activities during this time and should remove the monitors when you bathe and at night when you sleep. You will bring the activity monitor back at the next session.

At the second session, you will be asked to complete a series of tasks that assess your memory, planning, and attention, which are types of cognitive function. These tasks will require you to complete puzzles and remember words and numbers.

At the second time point, after you have settled in for a few months at your new retirement home, you will complete these two sessions and at-home monitoring again.

HOW MUCH TIME WILL IT TAKE?

The assessments at each time point will take the same amount of time, and consist of 3 parts. The first session will take approximately 1.5 hours with the researcher. The at-home monitoring will measure your physical activity while you continue your regular routine for 1 week. The second session will take approximately 30 minutes again with the researcher.

Participation in this study is voluntary and you may quit the study at any time without any penalty by advising the researcher.

RISKS

You may experience temporary muscle fatigue after the tests of physical function. However, this soreness should be temporary. If you experience any pain or unusual discomfort during the study, you should inform the researchers. You will only be included in this study if you are considered at low risk for injury or cardiovascular events. You will be under direct supervision for the entire study to ensure your safety. In particular, a researcher will be next to you during the assessment of physical function to give you support if necessary.

If you experience any pain or unusual discomfort after the study, you should contact your doctor or local medical facility as well as Kayla Regan 519.888.4567 Ext. 38548, kregan@uwaterloo.ca

BENEFITS

There are no direct benefits of participating in this study. Your participation will improve our understanding of how activity changes in retirement living and whether any changes might be associated with health benefits. Our research will indicate whether some people might benefit from retirement living.

PARTICIPATION

Participation in this study is entirely voluntary and you may refuse to participate or you may withdraw at any time. Likewise, the researchers may also stop participation of anyone in the study at any time. If we learn any new information that might affect your desire to participate or decision to remain in the study you will be told of this. Your decision to participate (or not) in the study will not affect the care or services that you receive from your retirement community or the University of Waterloo.

CONFIDENTIALITY AND SECURITY OF INFORMATION

Your identity will be kept confidential and will not be passed to a third party. Only the researchers associated with the study (Kayla Regan, Laura Middleton and associated research assistants) will have access to the data. The collected data will be coded with participant numbers (not names) and will be kept in a locked file cabinet at the University of Waterloo in Burt Matthews Hall room 1114 or on a password-protected computer for seven years after publication. After this time, all paper copies will be shredded and computer disks erased.

ETHICS CLEARANCE

This study has received ethics clearance through the Office of Research Ethics at the University of Waterloo. However, the final decision about participation is yours. Any questions with regard to this research can be directed to either Kaylen Pfisterer at the Schlegel-UW Research Institute for Aging (519-571-1873 Ext. 109; kpfisterer@uwaterloo.ca) Kayla Regan at the University of Waterloo (519.888.4567 Ext. 38548, kregan@uwaterloo.ca) or to Laura Middleton at the University of Waterloo (519-888-4567 Ext. 33045, laura.middleton@uwaterloo.ca). If you have any comments or concerns resulting from your participation in this study, you may contact the Office of Research Ethics (519-888-4567 Ext. 36005).



UNIVERSITY OF WATERLOO

CONSENT FORM

Activity in the Community and Retirement Living

K Regan, L Middleton

I have been informed of the aim of this study, and have read the INFORMATION LETTER. I am aware that I am under no obligation to take part and may withdraw from the study at any time.

I am aware that the researchers will be asking me questions concerning my health. This information will remain confidential and I will be free to refuse to reply to any question that I am unwilling to answer.

I am aware that I am free to ask questions and to withdraw from this study at any time. I am also aware that, if I feel uncomfortable during exercise, I may ask the researcher to stop it immediately.

I am aware that by signing this consent form, I am not waiving my legal rights, nor does it relieve the investigators or involved institution from their legal and professional responsibilities.

This project has been reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. I was informed that if I have any comments or concerns resulting from my participation in this study, I may contact the Director, Office of Research Ethics at (519) 888-4567 ext. 36005.

_____ I agree to take part in the study. I will receive a copy of the signed consent form.

PARTICIPANT NAME

DATE

PARTICIPANT SIGNATURE

WITNESS

LOCATION

Appendix C:

(Session One Materials)

Participant Demographics and Medical Information.....	91
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Participant ID:

Retirement community:



Date(dd/mm/yyyy):

Visit Type: A1 B1

Activity in the Community and Retirement Living

Participant Information

Move In Date: _____

DOB (dd/mm/yyyy): _____

Gender: M F

Years of Education (starting at gr. 1): _____ years

Current Marital Status Married With Partner Single Widowed

Height (to the nearest cm): _____ cm

Weight (to the nearest 0.1 kg): _____ kg

BMI (to the nearest 0.1 kg/m²): _____ kg/m²

BP (to the nearest 1mmHg): _____ / _____ mmHg HR: _____ bpm

_____ / _____ mmHg HR: _____ bpm

Waist Circumference (to the nearest cm): _____ cm

Mobility Aid: Y N If yes explain: _____

In the past 2 months, have you fallen (ended up on the ground or floor)? Y N

If yes:

a) Have you fallen more than once? Y N

b) Were you injured as a result of the fall (s) Y N

c) Did you have trouble getting up? Y N

Participant ID:

Retirement community:

Date(dd/mm/yyyy):

Visit Type: A1 B1

Activity in the Community and Retirement Living

Could you please report any health problems you have experienced?

- | | | |
|-----------------------------------|---|---|
| <i>Heart Attack or Operation</i> | Y | N |
| <i>Disease of the Arteries</i> | Y | N |
| <i>High Cholesterol</i> | Y | N |
| <i>Diabetes (diet or insulin)</i> | Y | N |
| <i>Heart Murmur</i> | Y | N |
| <i>Congenital Heart Disease</i> | Y | N |
| <i>High Blood Pressure</i> | Y | N |
| <i>Chronic Back Pain</i> | Y | N |
| <i>Knee Injury</i> | Y | N |
| <i>Hip Injury</i> | Y | N |

[] *Other:* _____

Can you please list any CURRENT health problems that you are experiencing and medications that you are currently taking?

Current Health Problems

Current Medication

1. _____
2. _____
3. _____
4. _____

1. _____
2. _____
3. _____
4. _____

Activity in the Community and Retirement Living

This questionnaire is about activities that you may have done in the past 4 weeks. The questions on the following pages are similar to the example shown below.

You will find that some questions are relevant to your life inside the Schlegel Village while other questions will be more relevant to your life before you moved into the Schlegel Village.

INSTRUCTIONS

If you **DID** the activity in the past 4 weeks:

Step #1 Check the YES box.

Step #2 Think about how many **TIMES** a week you usually did it, and write your response in the space provided.

Step #3 Circle how many **TOTAL HOURS** in a typical week you did the activity.

EXAMPLE: Here is an example of how Mrs. Jones would answer question #1: Mrs. Jones usually visits her friends Maria and Olga twice a week. She usually spends one hour on Monday with Maria and two hours on Wednesday with Olga. Therefore, the total hours a week that she visits with friends is 3 hours a week.

In a typical week during the past 4 weeks, did you:

1. Visit with friends or family (other than those you live with)?

Yes

No

How many times per week? 2

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

If you **DID NOT** do the activity:

- Check the **NO** box and move to the next question

Activity in the Community and Retirement Living

CURRENT ACTIVITY

In a typical week during the past 4 weeks, did you:

1. Visit with friends or family (other than those you live with)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

2. Go to a seniors centre?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

3. Do volunteer work?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

4. Attend church or take part in church activities?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

Activity in the Community and Retirement Living

CURRENT ACTIVITY

5. Attend other club or group meetings?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

6. Use a computer?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

7. Dance (such as square, folk, line, ballroom) (do not count aerobic dance here)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

8. Do wordworking, needlework, drawing, or other arts or crafts?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

9. Play golf, carrying or pulling your equipment (count walking time only)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

Activity in the Community and Retirement Living

CURRENT ACTIVITY

10. Play golf, riding a cart (count walking time only)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

11. Attend a concern, movie, lecture, or sport event?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

12. Play cards, bingo, or board games with other people?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

13. Shoot pool or billiards?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

14. Play singles tennis (do not count doubles)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

Activity in the Community and Retirement Living

CURRENT ACTIVITY

15. Play doubles tennis (do not count singles)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

16. Skate (ice, roller, in-line)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

17. Play musical instrument?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

18. Read?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

19. Do heavy work around the house/apartment/room (such as washing windows, cleaning gutters)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

Activity in the Community and Retirement Living

CURRENT ACTIVITY

20. Do light work around the house/apartment/room (such as sweeping or vacuuming)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

21. Do heavy gardening (such as spading, raking)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

22. Do light gardening (such as watering plants)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

23. Work on your car, truck, lawn mower, or other machinery?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

24. Jog or run?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

Activity in the Community and Retirement Living

CURRENT ACTIVITY

25. Walk uphill or hike uphill (count only uphill part)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

26. Walk fast or briskly for exercise (do not count walking leisurely or uphill)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

27. Walk to do errands such as to/from a store (count walk time only)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

28. Walk leisurely for exercise or pleasure?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

29. Ride a bicycle or stationary cycle?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

Activity in the Community and Retirement Living

CURRENT ACTIVITY

30. Do other aerobic machines such as rowing or step machines (do not count treadmill or stationary cycle)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

31. Do water exercises (do not count other swimming)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

32. Swim moderately or fast?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

33. Swim gently?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

34. Do stretching or flexibility exercises (do not count yoga or Tai-chi)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

Activity in the Community and Retirement Living

CURRENT ACTIVITY

35. Do yoga or Tai-chi?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

36. Do aerobics or aerobic dancing?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

37. Do moderately to heavy strength training (such as hand-held weights of more than 5lbs, weight machines or push-ups)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

38. Do light strength training (such as hand-held weights of 5lbs or less or elastic bands)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

Activity in the Community and Retirement Living

CURRENT ACTIVITY

39. Do general conditioning exercises, such as light calisthenics or chair exercises (do not count strength training)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

40. Play basketball, soccer, or racquetball (do not count time on sidelines)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

41. Do other types of physical activity not previously mentioned (please specify)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

42. Do other types of physical activity not previously mentioned (please specify)?

Yes

No

How many times per week? _____

How many total hours a week did you usually do it?

<1 hr 1-2 ½ hrs 3-4 ½ hrs

5-6 ½ hrs 7-8 ½ hrs >9 hrs

Participant ID:

Date(dd/mm/yyyy):

Retirement community:

Visit Type: A1 B1

Activity in the Community and Retirement Living

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%	25%	50%	75%	100%
No				Completely
Confidence				Confident

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

Balance Confidence	No Confidence 0%	25%	50%	75%	Completely Confident 100%
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 door?					
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?					

Participant ID:

Date(dd/mm/yyyy):

Retirement community:

Visit Type: A1 B1

Activity in the Community and Retirement Living

	0%	25%	50%	75%	100%
14. Step onto or off 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?					
17. Walk around outside (in neighbourhood/on retirement home grounds)					
18. Walk outside at night					
19. Get into/out of bathtub/shower					
20. Walk down stairs or ramp when carrying something in one hand					
21. Walk outside when very windy					
22. Walk in heavy rain while holding an umbrella					
23. Walk on uneven paths/sidewalks					
24. Step on or off a sidewalk curb or median					
25. Get on and off a bus					
26. Stand on a bus or train when it starts or stops					
27. Cross a busy street at timed or signaled pedestrian crosswalk					
28. Cross a busy street with no pedestrian crosswalk					

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Activity in the Community and Retirement Living

CURRENT RELATIONSHIPS

FAMILY: Considering the people to whom you are related by birth, marriage, adoption, etc...

1. How many relatives do you see or hear from at least once a month?

0 = none 1 = one 2 = two
3 = three or four 4 = five thru eight 5 = nine or more

2. How often do you see or hear from relatives with whom you have the most contact?

0 = less than monthly 1 = monthly 2 = few times a month
3 = weekly 4 = few times a week 5 = daily

3. How many relatives do you feel at ease with that you can talk about private matters?

0 = none 1 = one 2 = two
3 = three or four 4 = five thru eight 5 = nine or more

4. How many relatives do you feel close to such that you could call on them for help?

0 = none 1 = one 2 = two
3 = three or four 4 = five thru eight 5 = nine or more

5. When one of your relatives has an important decision to make, how often do they talk to you about it?

0 = never 1 = seldom 2 = sometimes
3 = often 4 = very often 5 = always

6. How often is one of your relatives available for you to talk to when you have an important decision to make?

0 = never 1 = seldom 2 = sometimes
3 = often 4 = very often 5 = always

Activity in the Community and Retirement Living

CURRENT RELATIONSHIPS

NEIGHBORS: Considering those people who live in your neighborhood...

1. How many neighbours do you see or hear from at least once a month?

0 = none 1 = one 2 = two
3 = three or four 4 = five thru eight 5 = nine or more

2. How often do you see or hear from neighbours with whom you have the most contact?

0 = less than monthly 1 = monthly 2 = few times a month
3 = weekly 4 = few times a week 5 = daily

3. How many neighbours do you feel at ease with that you can talk about private matters?

0 = none 1 = one 2 = two
3 = three or four 4 = five thru eight 5 = nine or more

4. How many neighbours do you feel close to such that you could call on them for help?

0 = none 1 = one 2 = two
3 = three or four 4 = five thru eight 5 = nine or more

5. When one of your neighbours has an important decision to make, how often do they talk to you about it?

0 = never 1 = seldom 2 = sometimes
3 = often 4 = very often 5 = always

6. How often is one of your neighbours available for you to talk to when you have an important decision to make?

0 = never 1 = seldom 2 = sometimes
3 = often 4 = very often 5 = always

Activity in the Community and Retirement Living

CURRENT RELATIONSHIPS

FRIENDSHIPS: Considering your friends who do not live in your neighborhood...

1. How many friends do you see or hear from at least once a month?

0 = none 1 = one 2 = two
3 = three or four 4 = five thru eight 5 = nine or more

2. How often do you see or hear from friend with whom you have the most contact?

0 = less than monthly 1 = monthly 2 = few times a month
3 = weekly 4 = few times a week 5 = daily

3. How many friends do you feel at ease with that you can talk about private matters?

0 = none 1 = one 2 = two
3 = three or four 4 = five thru eight 5 = nine or more

4. How many friends do you feel close to such that you could call on them for help?

0 = none 1 = one 2 = two
3 = three or four 4 = five thru eight 5 = nine or more

5. When one of your friends has an important decision to make, how often do they talk to you about it?

0 = never 1 = seldom 2 = sometimes
3 = often 4 = very often 5 = always

6. How often is one of your friends available for you to talk to when you have an important decision to make?

0 = never 1 = seldom 2 = sometimes
3 = often 4 = very often 5 = always

The Senior Fitness Test items: a brief overview

References

Alliance for Aging Research. (1999). *Independence for older Americans: An investment for our nation's future*. Washington, DC: Alliance for Aging Research

Blair, S.N., Dunn, A.L., Marcus, B.H., Carpenter, R.A., and Jaret, P. (2001). *Active Living Every Day*. Champaign, IL: Human Kinetics

Dishman, R. (1998). *Exercise Adherence*. Champaign, IL: Human Kinetics

Evans, W.J. (1995, October). *Keys to successful aging*. Paper presented at the International Conference on Aging and Physical Activity, Colorado Springs, CO

Jones, C.J. & Clark, J. (1998). "National standards for preparing senior fitness instructors." *Journal of Aging and Physical Activity*, 6, 207-221

Rikli, R. & Jones, C.J. (2001). *Senior Fitness Test Manual*. Champaign, IL: Human Kinetics

Rikli, R. & Jones, J. (1999a). "Development and validation of a functional fitness test for community-residing older adults." *Journal of Aging and Physical Activity*, 7, 129-161

Rikli, R. & Jones J. (1999b). "Functional fitness normative scores for community-residing older adults, ages 60-94." *Journal of Aging and Physical Activity*, 7, 162-181

Rikli, R. & Jones, J. (1997). "Assessing physical performance in independent older adults: Issues and guidelines." *Journal of Aging and Physical Activity*, 5, 244-261

Russeck, L., Wooden, M., Ekedahl, S., and Bush, A. (1997). "Attitudes toward standardized data collection." *Physical Therapy*, 77, 714-729

Rose, D.J. (in press). "Promoting functional independence in older adults at risk for falls: The need for a multidimensional programming approach." *Journal of Aging and Physical Activity*

Table 1: Normal range of scores for men, with *normal* defined as the middle 50% of the population. Those scoring above this range would be considered *above average* for their age and those below the range as *below average*.

Normal Range of Scores - Men

	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Chair stand (no. of stands)	14 - 19	12 - 18	12 - 17	11 - 17	10 - 15	8 - 14	7 - 12
Arm Curl (no. of reps)	16 - 22	15 - 21	14 - 21	13 - 19	13 - 19	11 - 17	10 - 14
6-Min Walk (no. of yds)	610 - 735	560 - 700	545 - 680	470 - 640	445 - 605	380 - 570	305 - 500
2-Min Step (no. of steps)	87 - 115	86 - 116	80 - 110	73 - 109	71 - 103	59 - 91	52 - 86
Chair Sit-&-Reach (inches +/-)	-2.5 - +4.0	-3.0 - +3.0	-3.5 - +2.5	-4.0 - +2.0	-5.5 - +1.5	-5.5 - +0.5	-6.5 - -0.5
Back Scratch (inches +/-)	-6.5 - +0.0	-7.5 - -1.0	-8.0 - -1.0	-9.0 - -2.0	-9.5 - -2.0	-10.0 - -3.0	-10.5 - -4.0
8-Ft Up-&-Go (seconds)	5.6 - 3.8	5.7 - 4.3	6.0 - 4.2	7.2 - 4.6	7.6 - 5.2	8.9 - 5.3	10.0 - 6.2

Table 2: Normal range of scores for women, with *normal* defined as the middle 50% of the population. Those scoring above this range would be considered *above average* for their age and those below the range as *below average*.

Normal Range of Scores - Women

	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Chair stand (no. of stands)	12 - 17	11 - 16	10 - 15	10 - 15	9 - 14	8 - 13	4 - 11
Arm Curl (no. of reps)	13 - 19	12 - 18	12 - 17	11 - 17	10 - 16	10 - 15	8 - 13
6-Min Walk (no. of yds)	545 - 660	500 - 635	480 - 615	430 - 585	385 - 540	340 - 510	275 - 440
2-Min Step (no. of steps)	75 - 107	73 - 107	68 - 101	68 - 100	60 - 91	55 - 85	44 - 72
Chair Sit-&-Reach (inches +/-)	-0.5 - +5.0	-0.5 - +4.5	-1.0 - +4.0	-1.5 - +3.5	-2.0 - +3.0	-2.5 - +2.5	-4.5 - +1.0
Back Scratch (inches +/-)	-3.0 - +1.5	-3.5 - +1.5	-4.0 - +1.0	-5.0 - +0.5	-5.5 - +0.0	-7.0 - -1.0	-8.0 - -1.0
8-Ft Up-&-Go (seconds)	6.0 - 4.4	6.4 - 4.8	7.1 - 4.9	7.4 - 5.2	8.7 - 5.7	9.6 - 6.2	11.5 - 7.3

30-Second Chair Stand



Purpose

To assess lower body strength, needed for numerous tasks such as climbing stairs, walking and getting out of a chair, tub or car. Also reduces the chance of falling.

Description

Number of full stands that can be completed in 30 seconds with arms folded across chest.

Risk zone

Less than 8 unassisted stands for men and women.

Arm Curl



Purpose

To assess upper body strength, needed for performing household and other activities involving lifting and carrying things such as groceries, suitcases and grandchildren.

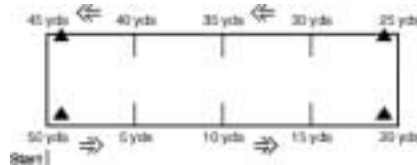
Description

Number of bicep curls that can be completed in 30 seconds holding a hand weight of 5 lbs (2.27 kg) for women; 8 lbs (3.63 kg) for men.

Risk zone

Less than 11 curls using correct form for men and women.

6-Minute Walk



Purpose

To assess aerobic endurance, which is important for walking distances, stair climbing, shopping, sightseeing while on vacation, etc.

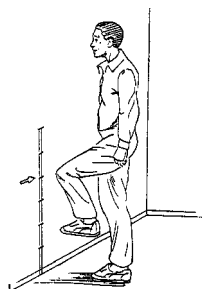
Description

Number of yards/meters that can be walked in 6 minutes around a 50-yard (45.7 meter) course. (5 yds = 4.57 meters)

Risk zone

Less than 350 yards for men and women.

2-Minute Step Test



Purpose

Alternate aerobic endurance test, for use when space limitations or weather prohibits taking the 6-minute walk test.

Description

Number of full steps completed in 2 minutes, raising each knee to a point midway between the patella (kneecap) and iliac crest (top hip bone). Score is number of times right knee reaches the required height.

Risk zone

Less than 65 steps for men and women.

Chair Sit-and-Reach



Purpose

To assess lower body flexibility, which is important for good posture, for normal gait patterns and for various mobility tasks, such as getting in and out of a bathtub or car.

Description

From a sitting position at front of chair, with leg extended and hands reaching toward toes, the number of inches (cm) (+ or -) between extended fingers and tip of toe.

Risk zone

Men: Minus (-) 4 inches or more
Women: Minus (-) 2 inches or more

SFT Brief Summary

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Continued on page 30

Back Scratch



Purpose

To assess upper body (shoulder) flexibility, which is important in tasks such as combing one's hair, putting on overhead garments and reaching for a seat belt

Description

With one hand reaching over the shoulder and one up the middle of the

back, the number of inches (cm) between extended middle fingers (+ or -).

Risk zone

Men: Minus (-) 4 inches or more

Women: Minus (-) 2 inches or more

8-Foot Up-and-Go



Purpose

To assess agility/dynamic balance, which is important in tasks that require quick

maneuvering, such as getting off a bus in time or getting up to attend to something in the kitchen, to go to the bathroom or to answer the phone.

Description

Number of seconds required to get up from a seated position, walk 8 feet (2.44 m), turn, and return to seated position.

Risk zone

More than 9 seconds.

SFT Brief Summary

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The *Senior Fitness Test Manual* and accompanying training video and software can be purchased through Human Kinetics: 1-800-747-4457 (U.S.), 1-800-465-7301 (Canada), or www.humankinetics.com

1/2 Page B/W Ad

Participant ID:

Retirement community:

Date(dd/mm/yyyy):

Visit Type: A1 B1

Activity in the Community and Retirement Living

Senior Fitness Test

<u>Test</u>	<u>Measures</u>	<u>Comments</u>
1. 6 minute walk	Distance:	
2. Arm Curl (30 sec) [] male (8lbs) [] female (5lbs)	Arm: # of curls:	
3. Chair Stand Test (30 sec)	# of stands:	
4. Timed Up and Go (TUG)	Time:	
5. Back Scratch Test	Preferred hand over shoulder: Distance (no touch - overlap +) <i>Trial 1:</i> <i>Trial 2:</i>	
6. Chair Sit and Reach	Preferred leg (extended) Distance (no touch -, overlap +) <i>Trial 1:</i> <i>Trial 2:</i>	
7. 2 Minute Step in Place	# times right knee reached tape:	

Any additional comments:



UNIVERSITY OF WATERLOO

TAKE HOME INSTRUCTIONS

1. The activity monitors should be worn for the next 7 days and are only to be removed during bathing and sleeping hours.
2. For consistency please begin wearing the activity monitors **tomorrow morning** when you wake up. Please make sure that you record this time in your activity diary.
3. After 7 full days of constant wear, we ask that you bring the monitors with you to the cognitive function session on: _____.
4. Please record all times when the activity monitors are removed and when they are replaced in your activity diary.
5. Whenever possible, please record as much information as possible in the “Comments” section of the activity diary, as the greater amount of detail will be helpful in the interpretations of your data.
6. Please treat these monitors with respect as if they are your own. We hope that while they are in your care, they will not get wet, cracked or chipped.
7. Please perform your activity as usual over the next 7 days and try not to alter your regular behaviour so that these 7 days are an accurate representation of your regular activity levels.

If you encounter any difficulties or complications please contact:

Kayla Regan, Student Investigator, 519.888.4567 ext. 38548, kregan@uwaterloo.ca

Brittany Inzandt, Research Assistant, 519.888.4567 ext. 38548, bnintzandt@gmail.com

Below is an example of what your activity diary may look like. The greater amount of detail you can provide the better, but do not worry if some things are forgotten.

Daily Diary ID:

DAY 1

Date:	Time	List of activities in order or comments:
Mon April 22, 2013	7-8am	Activity monitor on (7:10)
	8-9	walk to breakfast sit & eat breakfast
	9-10	Tai Chi
	10-11	Remove monitor for shower Back on (10:35)
	11am-12pm	
	12-1	Went out for lunch
	1-2	Went for a walk around the building, very nice day out!
	2-3	
	3-4	Light dusting and tidying up my room
	4-5	
	5-6	
	6-7	Went to dining room for dinner
	7-8	
	8-9	Reading
	9-10	Reading
	10-11	Busy day, ready for bed – remove monitor @ 10:40
	11pm-12am	

Appendix D:

(Session Two Materials)

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Activity in the Community and Retirement Living

Participant Information

Physical Activity:

1. Would you say that your level of physical activity over the past week was fairly typical of your activity over the past 2 months? [] Yes [] No

- If No, would you say you were: [] more active than usual
[] less active than usual

2. Were there any specific circumstances that altered your activity over the past week?

Residence:

1. What is your current residence?

- [] House (one-floor)
- [] House (2+ floors)
- [] Apartment/condo
- [] Seniors Community
- [] Other, please specify: _____

2. Please rank in ascending order the reasons why you are moving to retirement living. Please rank **ONLY** those that apply to you

- [] Suggestion from a family member
- [] For the assistance
- [] Location
- [] More social interaction
- [] Spouse would like/need more assistance
- [] other: _____

Participant ID:

Retirement community:

Date(dd/mm/yyyy):

Visit Type: A2

Activity in the Community and Retirement Living

Driving:

1. Do you currently drive? Yes No

If yes, how many times a week on average? _____

2. If you have a spouse/partner, do they currently drive? Yes No N/A

3. If yes to (1) and (2), who is the primary driver (ie. More than 70% of the time?)

Me My spouse/partner we share the driving equally

Participant ID:

Date(dd/mm/yyyy):

Retirement community:

Visit Type: B2

Activity in the Community and Retirement Living

Participant Information

Physical Activity:

1. Would you say that your level of physical activity over the past week was fairly typical of your activity over the past 2 months? [] Yes [] No
 - If No, would you say you were: [] more active than usual
[] less active than usual

2. Were there any specific circumstances that altered your activity over the past week?

Residence:

1. In your retirement community _____, do you live in:
(name of retirement community)

- [] an apartment with a full kitchen
- [] an apartment with a kitchenette
- [] a room on the main floor

2. Do you live:

- [] Alone
- [] with spouse/partner

Activity in the Community and Retirement Living

Driving: (for drivers pre-transition ONLY)

1. Are you still driving now? [] Yes [] No

If yes,

- i. how many times a week on average? _____
- ii. Do you keep your vehicle at the retirement community? [] Yes [] No

If no,

- i. When did you stop driving? _____ (Months)
- ii. When did you stop relative to the move?
[] Before [] At the same time [] After

2. If your spouse drove before the transition, do they still drive now?
[] Yes [] No [] N/A

*If you reported that you are currently still driving,
would you be interested in taking part in a driving study?*

[] Yes [] No [] N/A

Participant ID:

Date(dd/mm/yyyy):

Retirement community:

Visit Type: B1

Activity in the Community and Retirement Living

Social Connectedness Scale

For these statements, please comment on your social connections. Social network refers to the number of family and friends that you regularly interact with inside or outside of the Retirement Community.

	Strongly disagree		Neutral		Strongly agree
Since moving into retirement living, my social network has increased.	1	2	3	4	5
I feel strong ties with other people in the retirement community	1	2	3	4	5
I feel strong ties with other people in the outside community	1	2	3	4	5
I see myself as being part of the retirement community	1	2	3	4	5
I am pleased to be a part of the retirement community	1	2	3	4	5
I can identify with other people in the retirement community	1	2	3	4	5
I feel that I am very different from other people here in the retirement community	1	2	3	4	5
The activities offered at the retirement community are satisfactory.	1	2	3	4	5
The opportunities for activity/trips outside the retirement community are satisfactory.	1	2	3	4	5
The location of the retirement community is satisfactory.	1	2	3	4	5
I do not have enough opportunities to interact with friends.	1	2	3	4	5
I do not have enough opportunities to interact with family.	1	2	3	4	5

Participant ID:

Retirement community:

Date(dd/mm/yyyy):

Visit Type: B1

Activity in the Community and Retirement Living

Do you belong to/attend any of the following:

	Inside the Retirement Community	In the Outside Community
1. Sports club/team (ex. Golf, curling, bowling, etc.)		
2. Recreation or special interest group (ex. Quilting, bridge club etc.)		
3. Cultural/educational group (ex. Book club, theatre group etc.)		
4. Service club (ex. Kiwanis, Legion etc.)		
5. Religious affiliated group (ex. Bible study, choir etc.)		
6. Political Party or group		
7. Volunteer group		

Please identify the 3 favourite aspects of retirement living.

1. _____
2. _____
3. _____

Please identify 3 changes that limit physical or social activity in the retirement community.

1. _____
2. _____
3. _____

Montreal Cognitive Assessment (MoCA)

Administration and Scoring Instructions

The Montreal Cognitive Assessment (MoCA) was designed as a rapid screening instrument for mild cognitive dysfunction. It assesses different cognitive domains: attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation. Time to administer the MoCA is approximately 10 minutes. The total possible score is 30 points; a score of 26 or above is considered normal.

1. Alternating Trail Making:

Administration: The examiner instructs the subject: *"Please draw a line, going from a number to a letter in ascending order. Begin here [point to (1)] and draw a line from 1 then to A then to 2 and so on. End here [point to (E)]."*

Scoring: Allocate one point if the subject successfully draws the following pattern: 1 -A- 2- B- 3- C- 4- D- 5- E, without drawing any lines that cross. Any error that is not immediately self-corrected earns a score of 0.

2. Visuoconstructional Skills (Cube):

Administration: The examiner gives the following instructions, pointing to the **cube**: *"Copy this drawing as accurately as you can, in the space below"*.

Scoring: One point is allocated for a correctly executed drawing.

- Drawing must be three-dimensional
- All lines are drawn
- No line is added
- Lines are relatively parallel and their length is similar (rectangular prisms are accepted)

A point is not assigned if any of the above-criteria are not met.

3. Visuoconstructional Skills (Clock):

Administration: Indicate the right third of the space and give the following instructions: *"Draw a clock. Put in all the numbers and set the time to 10 past 11"*.

Scoring: One point is allocated for each of the following three criteria:

- Contour (1 pt.): the clock face must be a circle with only minor distortion acceptable (e.g., slight imperfection on closing the circle);
- Numbers (1 pt.): all clock numbers must be present with no additional numbers; numbers must be in the correct order and placed in the approximate quadrants on the clock face; Roman numerals are acceptable; numbers can be placed outside the circle contour;
- Hands (1 pt.): there must be two hands jointly indicating the correct time; the hour hand must be clearly shorter than the minute hand; hands must be centred within the clock face with their junction close to the clock centre.

A point is not assigned for a given element if any of the above-criteria are not met.

4. Naming:

Administration: Beginning on the left, point to each figure and say: *“Tell me the name of this animal”*.

Scoring: One point each is given for the following responses: (1) lion (2) rhinoceros or rhino (3) camel or dromedary.

5. Memory:

Administration: The examiner reads a list of 5 words at a rate of one per second, giving the following instructions: *“This is a memory test. I am going to read a list of words that you will have to remember now and later on. Listen carefully. When I am through, tell me as many words as you can remember. It doesn’t matter in what order you say them”*. Mark a check in the allocated space for each word the subject produces on this first trial. When the subject indicates that (s)he has finished (has recalled all words), or can recall no more words, read the list a second time with the following instructions: *“I am going to read the same list for a second time. Try to remember and tell me as many words as you can, including words you said the first time.”* Put a check in the allocated space for each word the subject recalls after the second trial.

At the end of the second trial, inform the subject that (s)he will be asked to recall these words again by saying, *“I will ask you to recall those words again at the end of the test.”*

Scoring: No points are given for Trials One and Two.

6. Attention:

Forward Digit Span: Administration: Give the following instruction: *“I am going to say some numbers and when I am through, repeat them to me exactly as I said them”*. Read the five number sequence at a rate of one digit per second.

Backward Digit Span: Administration: Give the following instruction: *“Now I am going to say some more numbers, but when I am through you must repeat them to me in the backwards order.”* Read the three number sequence at a rate of one digit per second.

Scoring: Allocate one point for each sequence correctly repeated, (*N.B.:* the correct response for the backwards trial is 2-4-7).

Vigilance: Administration: The examiner reads the list of letters at a rate of one per second, after giving the following instruction: *“I am going to read a sequence of letters. Every time I say the letter A, tap your hand once. If I say a different letter, do not tap your hand”*.

Scoring: Give one point if there is zero to one errors (an error is a tap on a wrong letter or a failure to tap on letter A).

Serial 7s: Administration: The examiner gives the following instruction: “Now, I will ask you to count by subtracting seven from 100, and then, keep subtracting seven from your answer until I tell you to stop.” Give this instruction twice if necessary.

Scoring: This item is scored out of 3 points. Give no (0) points for no correct subtractions, 1 point for one correction subtraction, 2 points for two-to-three correct subtractions, and 3 points if the participant successfully makes four or five correct subtractions. Count each correct subtraction of 7 beginning at 100. Each subtraction is evaluated independently; that is, if the participant responds with an incorrect number but continues to correctly subtract 7 from it, give a point for each correct subtraction. For example, a participant may respond “92 – 85 – 78 – 71 – 64” where the “92” is incorrect, but all subsequent numbers are subtracted correctly. This is one error and the item would be given a score of 3.

7. **Sentence repetition:**

Administration: The examiner gives the following instructions: “I am going to read you a sentence. Repeat it after me, exactly as I say it [pause]: ***I only know that John is the one to help today.***” Following the response, say: “Now I am going to read you another sentence. Repeat it after me, exactly as I say it [pause]: ***The cat always hid under the couch when dogs were in the room.***”

Scoring: Allocate 1 point for each sentence correctly repeated. Repetition must be exact. Be alert for errors that are omissions (e.g., omitting “only”, “always”) and substitutions/additions (e.g., “John is the one who helped today;” substituting “hides” for “hid”, altering plurals, etc.).

8. **Verbal fluency:**

Administration: The examiner gives the following instruction: “Tell me as many words as you can think of that begin with a certain letter of the alphabet that I will tell you in a moment. You can say any kind of word you want, except for proper nouns (like Bob or Boston), numbers, or words that begin with the same sound but have a different suffix, for example, love, lover, loving. I will tell you to stop after one minute. Are you ready? [Pause] Now, tell me as many words as you can think of that begin with the letter F. [time for 60 sec]. Stop.”

Scoring: Allocate one point if the subject generates 11 words or more in 60 sec. Record the subject’s response in the bottom or side margins.

9. **Abstraction:**

Administration: The examiner asks the subject to explain what each pair of words has in common, starting with the example: “Tell me how an orange and a banana are alike”. If the subject answers in a concrete manner, then say only one additional time: “Tell me another way in which those items are alike”. If the subject does not give the appropriate response (*fruit*), say, “Yes, and they are also both fruit.” Do not give any additional instructions or clarification. After the practice trial, say: “Now, tell me how a train and a bicycle are alike”. Following the response, administer the second trial, saying: “Now tell me how a ruler and a watch are alike”. Do not give any additional instructions or prompts.

Scoring: Only the last two item pairs are scored. Give 1 point to each item pair correctly answered. The following responses are acceptable:

Train-bicycle = means of transportation, means of travelling, you take trips in both;

Ruler-watch = measuring instruments, used to measure.

The following responses are **not** acceptable: Train-bicycle = they have wheels; Ruler-watch = they have numbers.

10. **Delayed recall:**

Administration: The examiner gives the following instruction: “I read some words to you earlier, which I asked you to remember. Tell me as many of those words as you can remember.” Make a check mark (✓) for each of the words correctly recalled spontaneously without any cues, in the allocated space.

Scoring: Allocate 1 point for each word recalled freely **without any cues.**

Optional:

Following the delayed free recall trial, prompt the subject with the semantic category cue provided below for any word not recalled. Make a check mark (✓) in the allocated space if the subject remembered the word with the help of a category or multiple-choice cue. Prompt all non-recalled words in this manner. If the subject does not recall the word after the category cue, give him/her a multiple choice trial, using the following example instruction, “Which of the following words do you think it was, NOSE, FACE, or HAND?”

Use the following category and/or multiple-choice cues for each word, when appropriate:

FACE: category cue: part of the body

multiple choice: nose, face, hand

VELVET: category cue: type of fabric

multiple choice: denim, cotton, velvet

CHURCH: category cue: type of building

multiple choice: church, school, hospital

DAISY: category cue: type of flower

multiple choice: rose, daisy, tulip

RED: category cue: a colour

multiple choice: red, blue, green

Scoring: No points are allocated for words recalled with a cue. A cue is used for clinical information purposes only and can give the test interpreter additional information about the type of memory disorder. For memory deficits due to retrieval failures, performance can be improved with a cue. For memory deficits due to encoding failures, performance does not improve with a cue.

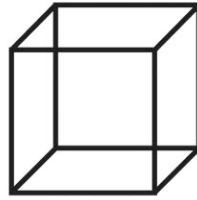
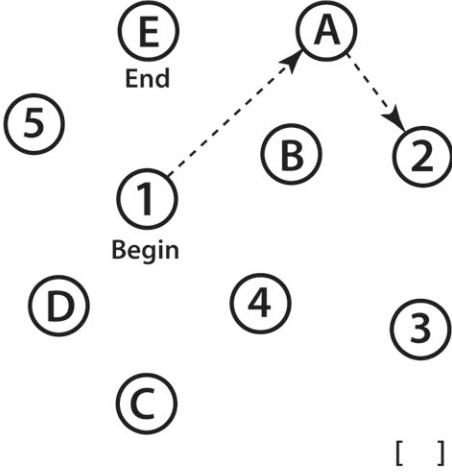
11. **Orientation:**

Administration: The examiner gives the following instructions: “Tell me the date today”. If the subject does not give a complete answer, then prompt accordingly by saying: “Tell me the [year, month, exact date, and day of the week].” Then say: “Now, tell me the name of this place, and which city it is in.”

Scoring: Give one point for each item correctly answered. The subject must tell the exact date and the exact place (name of hospital, clinic, office). No points are allocated if subject makes an error of one day for the day and date.

TOTAL SCORE: Sum all subscores listed on the right-hand side. Add one point for an individual who has 12 years or fewer of formal education, for a possible maximum of 30 points. A final total score of 26 and above is considered normal.

VISUOSPATIAL / EXECUTIVE



Copy cube

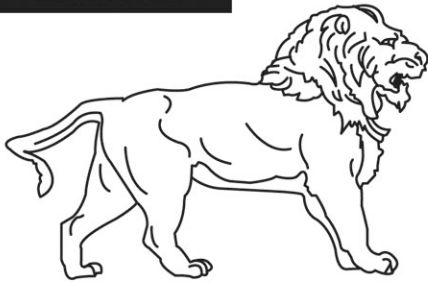
Draw CLOCK (Ten past eleven)
(3 points)

POINTS

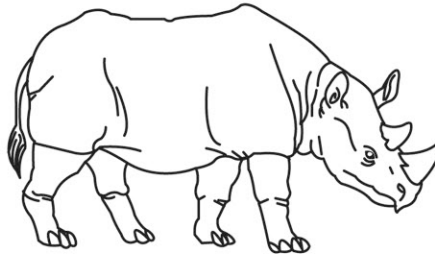
[] [] []
Contour Numbers Hands

___/5

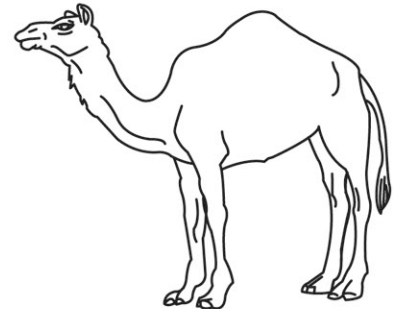
NAMING



[]



[]



[]

___/3

MEMORY

Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION

Read list of digits (1 digit/ sec.).

Subject has to repeat them in the forward order

[] 2 1 8 5 4

Subject has to repeat them in the backward order

[] 7 4 2

___/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors

[] FBACMNAAJKLBAFAKDEAAAJAMOF AAB

___/1

Serial 7 subtraction starting at 100

[] 93

[] 86

[] 79

[] 72

[] 65

4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt**

___/3

LANGUAGE

Repeat : I only know that John is the one to help today. []

The cat always hid under the couch when dogs were in the room. []

___/2

Fluency / Name maximum number of words in one minute that begin with the letter F

[] _____ (N \geq 11 words)

___/1

ABSTRACTION

Similarity between e.g. banana - orange = fruit

[] train - bicycle [] watch - ruler

___/2

DELAYED RECALL

Has to recall words

WITH NO CUE

FACE

[]

VELVET

[]

CHURCH

[]

DAISY

[]

RED

[]

Points for UNCUED recall only

___/5

Optional

Category cue

Multiple choice cue

ORIENTATION

[] Date

[] Month

[] Year

[] Day

[] Place

[] City

___/6

HVLT-R™

Form 1

Test Booklet

Jason Brandt, PhD

Ralph H. B. Benedict, PhD

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Learning Trial Instructions

Trial 1

Say the following:

I am going to read a list of words to you. Listen carefully, because when I'm through, I'd like you to tell me as many of the words as you can remember. You can tell them to me in any order. Are you ready?

- Repeat or paraphrase the instructions if necessary.
- Read the words at the rate of approximately one word every 2 seconds.
- If the individual does not spontaneously begin reporting words after the last word is read, say the following:

OK. Now tell me as many of those words as you can remember.

Record the responses verbatim (including repetitions and intrusions) in the Trial 1 column. When the individual indicates no more words can be recalled, proceed to Trial 2.

Trial 2

Say the following:

Now we are going to try it again. I am going to read the same list of words to you. Listen carefully, and tell me as many of the words as you can remember, in any order, including all the words you told me the first time.

Use the same procedure as in Trial 1 to record the responses in the column for Trial 2. Then proceed to Trial 3.

Trial 3

Say the following:

I am going to read the list one more time. As before, I'd like you to tell me as many of the words as you can remember, in any order, including all the words you've already told me.

Record the responses in the column for Trial 3 using the same procedure as in the previous trials.

NOTE: Do not tell the respondent that recall of the words will be tested later.

Delayed Recall Trial Instructions

After the 20-25 minute delay, say the following:

Do you remember that list of words you tried to learn before?

If the response is "No," remind the individual that you read the list three times and that he or she was asked to recall the words each time. Say the following:

Tell me as many of those words as you can remember.

Delayed Recognition Trial Instructions

The Delayed Recognition (Forced Choice) trial is administered immediately after the Delayed Recall trial. Say the following:

Now I am going to read a longer list of words to you. Some of them are words from the original list, and some are not. After I read each word, I'd like you to say "Yes" if it was on the original list, or "No" if it was not.

Read the words of the Delayed Recognition trial list in numerical order. Allow the individual as much time as needed to respond. You may use the prompt, "Was horse on the list? Yes or no?" The individual must give you a response for every word. If the individual is not sure, ask for a guess.

Delayed Recognition Trial (Forced Choice)							
1. HORSE	Y N	7. house	Y N	13. HUT	Y N	19. TENT	Y N
2. ruby	Y N	8. OPAL	Y N	14. EMERALD	Y N	20. mountain	Y N
3. CAVE	Y N	9. TIGER	Y N	15. SAPPHIRE	Y N	21. cat	Y N
4. balloon	Y N	10. boat	Y N	16. dog	Y N	22. HOTEL	Y N
5. coffee	Y N	11. scarf	Y N	17. apartment	Y N	23. COW	Y N
6. LION	Y N	12. PEARL	Y N	18. penny	Y N	24. diamond	Y N

Total number of true-positive responses ("hits"): _____ /12 (no shading)

Semantically-related false-positive errors: _____ /6 (light shading)

Semantically-unrelated false-positive errors: _____ /6 (darker shading)

Total number of false-positive errors: _____ /12

	Raw score	T score
Total Recall (sum of total correct responses for Trials 1, 2, & 3)		
Delayed Recall (Trial 4)		
Retention (%) [(Trial 4 ÷ Higher score of Trials 2 and 3) x 100]		
Recognition Discrimination Index (Total no. of true-positives) – (Total no. of false-positives)		

Normative table (Appendix A): _____

Digit Symbol—Coding

1	2	3	4	5	6	7	8	9
—	⊥	□	└	┌	○	∧	×	≡

Sample Items

2	1	3	7	2	4	8	2	1	3	2	1	4	2	3	5	2	3	1	4

5	6	3	1	4	1	5	4	2	7	6	3	5	7	2	8	5	4	6	3

7	2	8	1	9	5	8	4	7	3	6	2	5	1	9	2	8	3	7	4

6	5	9	4	8	3	7	2	6	1	5	4	6	3	7	9	2	8	1	7

9	4	6	8	5	9	7	1	8	5	2	9	4	8	6	3	7	9	8	6

2	7	3	6	5	1	9	8	4	5	7	3	1	4	8	7	9	1	4	5

7	1	8	2	9	3	6	7	2	8	5	2	3	1	4	8	4	2	7	6

Phonemic Fluency

EXAMINER

Verbal Fluency – “FAS” Words

Instructions:

I'm going to say a letter of the alphabet. I want you to give me as many words that begin with that letter as quickly as you can. For instance, if I say “B”, you might say bad, battle, bed, boxand so on I do not want you to use words which are proper nouns, that is names of people, places and brand names. So, if the letter was “B” you would not say Boston, Bob, or Buick. Also, do not use the same word again with a different ending such as bounce, bounces, bounced and bouncing. Any questions? (Pause) Begin when I say the letter. The first letter is “_”. Go ahead. Begin timing immediately.

Allow 1 minute. Say, “fine” or “good” after each 1-minute performance. If patients discontinue before the end of the minute, encourage them to try to think of more words. If there is a silence of 15 seconds, repeat the basic instructions, and the letter. For scoring purposes, write down the actual words in the order in which they were produced. If repetitions occur that may be accepted if an alternate meaning of the word was intended by the patient (e.g. “four”, “for”, “son”, “sun”)

Verbal Fluency – “FAS” Words

	F	A	S	
15	1	1	1	1
	2	2	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	5
	6	6	6	6
	7	7	7	7
	8	8	8	8
30	1	1	1	1
	2	2	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	5
	6	6	6	6
	7	7	7	7
	8	8	8	8
45	1	1	1	1
	2	2	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	5
	6	6	6	6
	7	7	7	7
	8	8	8	8
60	1	1	1	1
	2	2	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	5
	6	6	6	6
	7	7	7	7
	8	8	8	8
	total F =	total A =	total S ₆₀ =	total S ₁₂₀ =

Verbal (FAS) Fluency (1min each)

Total Correct: _____

0 to 15 seconds: _____

16 to 60 seconds: _____

Total Perseverations: _____

Total Intrusions: _____

Total Variations: _____

Scoring: Any word beginning with the appropriate letter and adhering to the two scoring criteria is acceptable. No repetitions are scored. Norms: Heaton, et al: Revised Comprehensive Norms for an Expanded Halsted-Reitan Battery

Extra Minute (S)

Total Correct: _____

0 to 15 seconds: _____

16 to 60 seconds: _____

60 to 120 seconds: _____

Total Perseverations: _____

Total Intrusions: _____

Semantic Fluency

Animal Naming

Say **“Great. I’m going to change things a little now. This time I’d like you to think of words that belong to a certain category. It does not matter what letter of the alphabet the word begins with, as long as the word belongs to the category. Now, when I say ‘go,’ I’d like you to tell me all the different animals that you can think of.”**

Say: **“Ready? Go.”**

Begin timing, recording responses verbatim by 15 second increments.

First

15" 1 _____ 2 _____ 3 _____ 4 _____
 5 _____ 6 _____ 7 _____ 8 _____
 9 _____ 10 _____ 11 _____ 12 _____

16-30" 1 _____ 2 _____ 3 _____ 4 _____
 5 _____ 6 _____ 7 _____ 8 _____
 9 _____ 10 _____ 11 _____ 12 _____

31"-45" 1 _____ 2 _____ 3 _____ 4 _____
 5 _____ 6 _____ 7 _____ 8 _____
 9 _____ 10 _____ 11 _____ 12 _____

46-60" 1 _____ 2 _____ 3 _____ 4 _____
 5 _____ 6 _____ 7 _____ 8 _____
 9 _____ 10 _____ 11 _____ 12 _____

Scores:

Total _____ (ANIMTOT)
 1st 15" _____ (ANIM115)
 16"-60" _____ (ANIM1660)
 Total Perseverations _____ (ANIMP)
 Total Intrusions _____ (ANIMI)
 Total Variations: _____ (ANIMTV)
 ss _____ T Score _____ (ANIMTSR)

Scoring: Any member of animal kingdom (i.e., not vegetable or mineral), real or imaginary, is acceptable. No repetitions or proper nouns. Species name (e.g., Dog) and accompanying breeds (e.g., Labrador) are acceptable as are male/female or infant names of a species (e.g., sheep, lamb, ewe = each receive one point: total=3, but are counted together as 1 variation of 'sheep'. E.g. Dog and Labrador= 2 points, 1 variation)

Norms: Heaton, et al: Revised Comprehensive Norms for an Expanded Halsted-Reitan Battery

Trail Making Test

EXAMINER:

Trails A: Sample

Instructions

When ready to begin the test, place Part A test sheet in front of the subject, give the subject a pencil, and say: ***On this page (point) are some numbers. Begin at number 1 (point to '1') and draw a line from one to two, (point to '2'), two to three (point to '3'), three to four (point to '4'), and so on, in order, until you reach the end (pointing to the circle marked 'END'). Draw the lines as fast as you can. Do not lift the pencil from the paper. Ready! Begin!***

If the subject makes a mistake on Sample A, point it out and explain it. The following explanations of mistakes are acceptable:

1. ***You started with the wrong circle. This is where you start (point to "1").***
2. ***You skipped this circle (point to the one omitted). You should go from number one (point) to two (point), two to three (point) and so on, until you reach the circle marked "END" (point).***
3. ***Please keep the pencil on the paper, and continue right on to the next circle.***

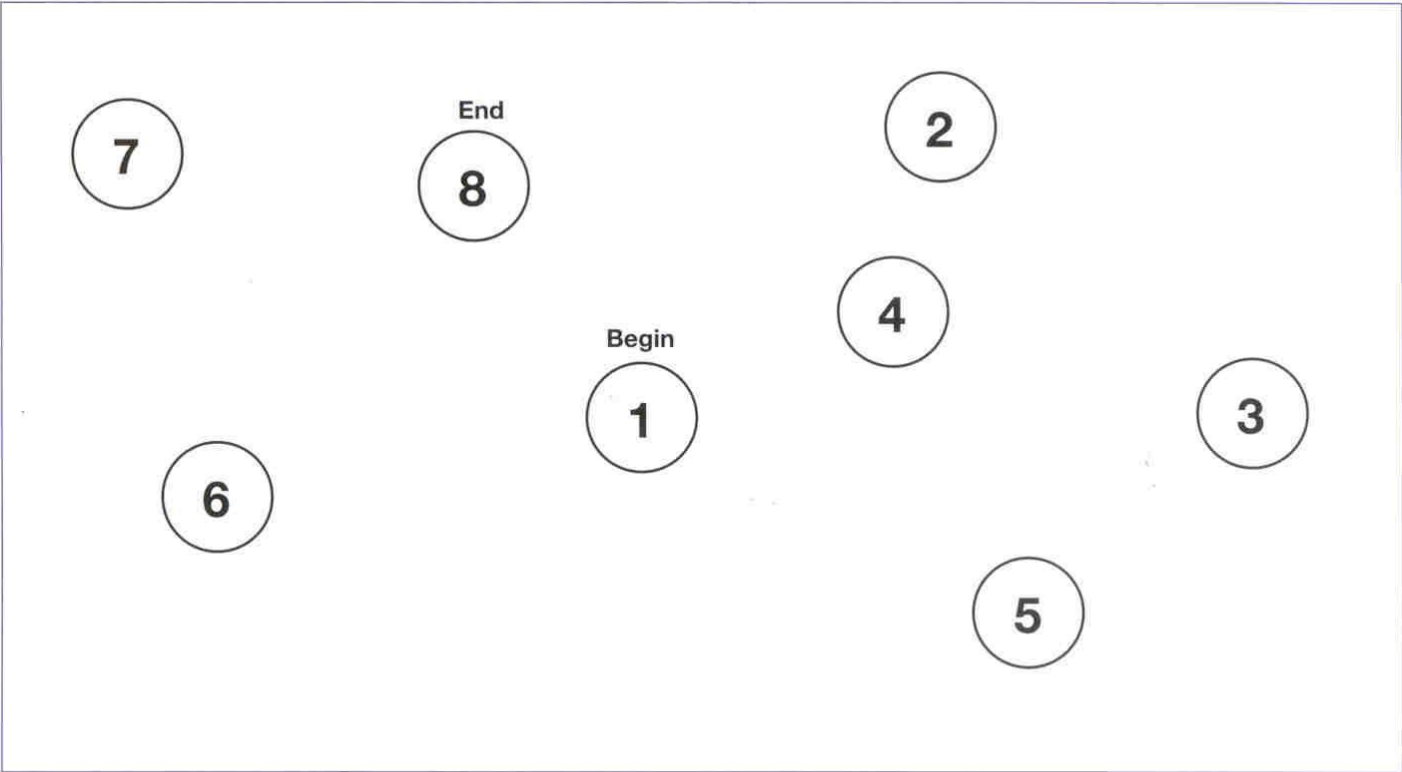
After the mistake has been explained, the examiner marks out the wrong part and says: ***Go on from here (point to the last circle completed correctly in the sequence).***

If the subject still cannot complete Sample A, take the subject's hand and guide the pencil (eraser down) through the trail. Then say: ***Now you try it. Remember, begin at number one (point to '1') and draw a line from one to two (point to '2'), two to three (point to '3'), three to four (point to '4') and so on, in order until you reach the circle marked 'END' (point). Do not skip around but go from one number to the next in the proper order. Remember, work as fast as you can. Ready! Begin!***

If the subject succeeds this time, go on to Part A of the test. If not, repeat the procedure until the subject does succeed, or it becomes evident that he or she cannot do it.

If the subject completes the sample item correctly, and in a manner which shows that he or she knows what to do, say: ***Good! Let's try the next one.*** Turn the page and give Part A of the test.

PARTICIPANT:
Trails A: Sample



SAMPLE ONLY

EXAMINER

Trails A: Test

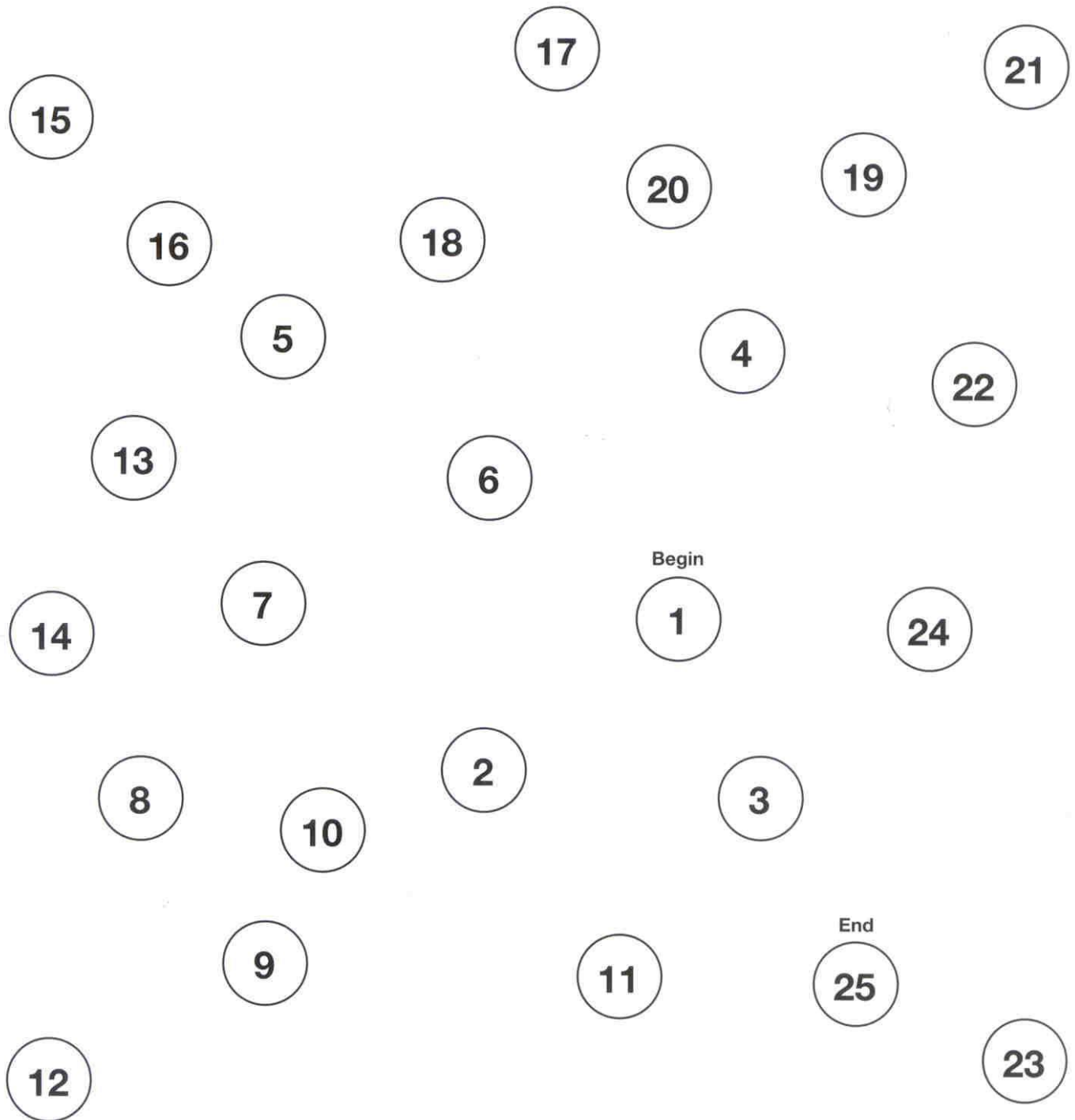
Instructions:

On this page are numbers 1 to 25. Do this the same way. Begin at number one (point to '1') and draw a line from one to two (point to '2'), two to three (point to '3'), three to four (point to '4') and so on, in order until you reach the end. Remember work as fast as you can. Ready! Begin!

Start timing. If the subject makes an error, call it to his or her attention immediately, and have the subject proceed from the point where the mistake occurred. Do not stop timing.

If the examinee completes Part A without error, remove the test sheet. Record the time in seconds. Errors count only in the increased time of performance. Then say: ***That's fine. Now we'll try another one.*** Proceed immediately to Part B, sample.

Trails A: Test



EXAMINER

Trails B: Sample

Instructions:

Place the test sheet for Part B sample side up, flat on the table in front of the examinee, in the same position as the sheet for Part A was placed. Point with the right hand to the sample and say: ***On this page are some numbers and letters. Begin at number one*** (point to '1') ***and draw a line from one to A*** (point to 'A'), ***A to two*** (point to '2'), ***two to B*** (point to 'B'), ***B to three*** (point to '3'), ***three to C*** (point to 'C'), ***and so on, in order until you reach the end*** (point to the circle marked 'END'). ***Remember, first you have a number*** (point to '1'), ***then a letter*** (point to 'A'), ***then a number*** (point to '2'), ***then a letter*** (point to 'B'), ***and so on. Draw the lines as fast as you can. Ready! Begin!***

If the subject makes a mistake on Sample B, point it out and explain it. The following explanations of mistakes are acceptable:

1. ***You started with the wrong circle. This is where you start***
2. ***You should go from one*** (point to '1') ***to A*** (point), ***A to two*** (point), ***two to B*** (point), ***B to three*** (point), ***and so on until you reach the circle marked 'END'*** (point). If it is clear that the subject intended to touch the circle but missed it, do not count it as an omission, but caution him or her to touch the circle.
3. ***You only went as far as this circle*** (point). ***You should have gone to the circle marked 'END'*** (point).
4. ***Please keep the pencil on the paper and go right on to the next circle.***

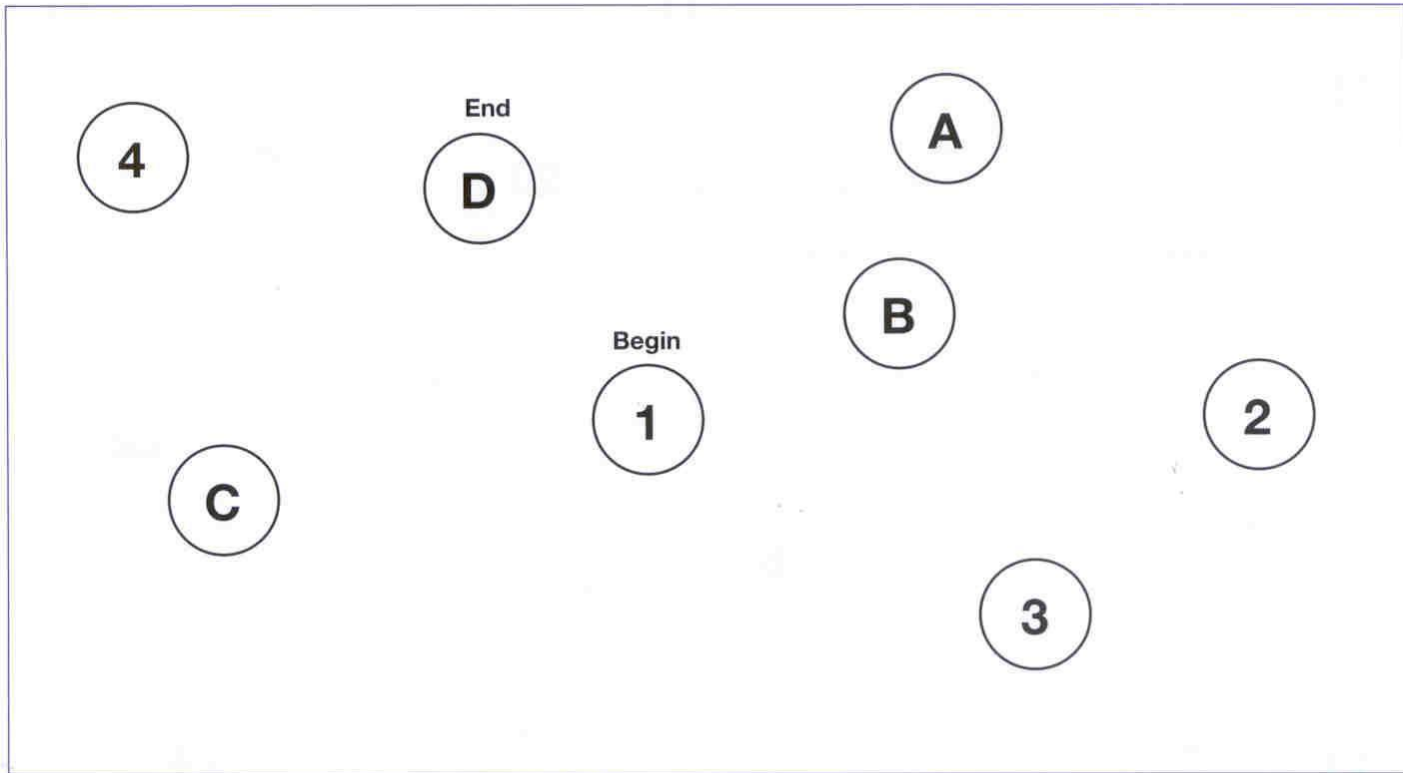
After the mistake has been explained, the examiner marks out the wrong part and says: ***Go on from here*** (point to the last circle completed correctly in the sequence).

If the subject still cannot complete Sample B, take the subject's hand and guide the pencil (eraser down) through the circles. Then say: ***Now you try it. Remember you begin at number one*** (point to '1') ***and draw a line from one to A*** (point to 'A'), ***A to two*** (point to '2'), ***two to B*** (point to 'B'), ***B to three*** (point to '3'), ***and so on until you reach the circle marked 'END'*** (point). ***Ready! Begin!***

If the subject succeeds this time go on to Part B of the test. If not, repeat the procedure until the subject does succeed or it becomes evident that he or she cannot do it.

If the subject completes the sample item correctly, and in a manner which shows that he or she knows what to do, say: ***Good! Let's try the next one.*** Turn the page over and proceed immediately to Part B.

PARTICIPANT
Trails B: Sample



SAMPLE ONLY

EXAMINER
Trails B: Test

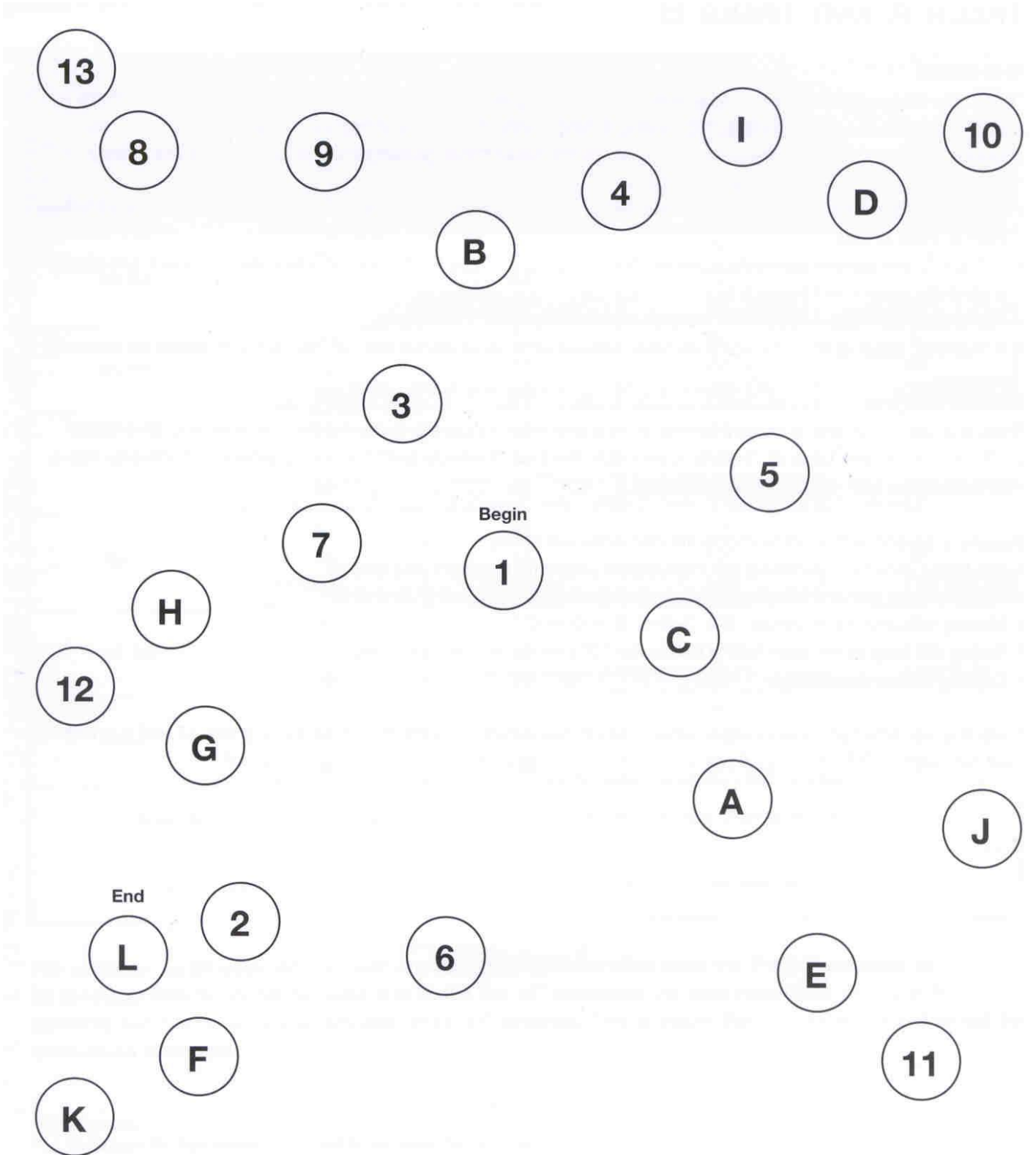
Instructions:

On this page are both numbers and letters. Do this the same way. Begin at number 1 (point to '1') and draw a line from one to A (point to 'A'), A to two (point to '2'), two to B (point to B), B to three (point to '3'), three to C (point to 'C'), and so on, in order, until you reach the end. Remember, first you have a number, then a letter, and so on. Do not skip around, but go from one circle to the next in the proper order. Draw the lines as fast as you can. Ready! Begin!

Start timing. If the subject makes an error, immediately call it to his or her attention and have the subject proceed from the point at which the mistake occurred. Do not stop timing.

If the subject completes Part B without error remove the test sheet. Record the time in seconds. Errors count only in the increased time of performance.

Trails B: Test



Trails A & B Summary Scores

Total Time A (seconds) _____ (TRAIATT)

Total Errors A _____(TRAIATE)

ss A _____(TRAIASS)

Total A pencil lifts _____(TRAIAPL)

Total Time B (seconds) _____(TRAI BTT)

Total Errors B _____(TRAI BTE)

Total B Error Type A _____(TRAI BEA)

Total B Error Type B _____(TRAI BEB)

Total B Error Type C _____(TRAI BEC)

Total B Error Type D _____(TRAI BED)

ss B _____(TRAI BSS)

Total B pencil lifts _____(TRAI BPL)

Proportion Score _____(TRAILP)
(B-A)/A

Center for Epidemiologic Studies Depression Scale (CES-D), NIMH

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

During the past week.....	Rarely or none of the time (< 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me				
2. I did not feel like eating; my appetite was poor				
3. I felt that I could not shake off the blues even with help from my family or friends				
4. I felt I was just as good as other people				
5. I had trouble keeping my mind on what I was doing				
6. I felt depressed				
7. I felt that everything I did was an effort				
8. I felt hopeful about the future				
9. I thought my life had been a failure				
10. I felt fearful				
11. My sleep was restless				
12. I was happy				
13. I talked less than usual				
14. I felt lonely				
15. People were unfriendly				
16. I enjoyed life				
17. I had crying spells				
18. I felt sad				
19. I felt that people dislike me				
20. I could not get "going"				

Scoring: zero for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of positive items is reversed. Possible range of scores is zero-60, with the higher scores indicating the presence of more symptomatology.

Behavioral Assessment – Neuropsychiatric Inventory Questionnaire (NPI-Q)

(to be completed by clinician per informant report)

Informant: ☞ •Spouse ☞ •Child ☞ •Other: _____

Please ask the following questions based upon changes. Indicate "yes" only if the symptom has been present in the past month; otherwise, indicate "no".

Please answer each question honestly and carefully. Ask for assistance if you are not sure how to answer any question.

For each item marked "yes":	
<p>Rate the SEVERITY of the symptom (how it affects the patient):</p> <p>1 = Mild (noticeable, but not a significant change)</p> <p>2 = Moderate (significant, but not a dramatic change)</p> <p>3 = Severe (very marked or prominent; a dramatic change)</p>	<p>Rate the DISTRESS you experience because of the symptom (how it affects you):</p> <p>0 = Not distressing at all</p> <p>1 = Minimal (slightly distressing, not a problem to cope with)</p> <p>2 = Mild (not very distressing, generally easy to cope with)</p> <p>3 = Moderate (fairly distressing, not always easy to cope with)</p> <p>4 = Severe (very distressing, difficult to cope with)</p> <p>5 = Extreme or very severe (extremely distressing, unable to cope with)</p>

	Yes	No	Severity			Distress					
DELUSIONS: Does your spouse believe that others are stealing from him or her, or planning to harm him or her in some way?	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
HALLUCINATIONS: Does your spouse act as if he or she hears voices? Does he or she talk to people who are not there?	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
AGITATION OR AGGRESSION: Is your spouse stubborn and resistive to help from others?	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
DEPRESSION OR DYSPHORIA: Does your spouse act as if he or she is sad or in low spirits? Does he or she cry?	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
ANXIETY: Does your spouse become upset when separated from you? Does he or she have any other signs of nervousness, such as shortness of breath, sighing, being unable to relax, or feeling excessively tense?	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>

ELATION OR EUPHORIA: Does your spouse appear to feel too good or act excessively happy?	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
APATHY OR INDIFFERENCE: Does your spouse seem less interested in his or her usual activities and in the activities and plans of others?	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
DISINHIBITION: Does your spouse seem to act impulsively? For example, does the patient talk to strangers as if he or she knows them, or does the patient say things that may hurt people's feelings?	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
IRRITABILITY OR LABILITY: Is your spouse impatient or cranky? Does he or she have difficulty coping with delays or waiting for planned activities?	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>

<p>MOTOR DISTURBANCE: Does your spouse engage in repetitive activities, such as pacing around the house, handling buttons, wrapping string, or doing other things repeatedly?</p>	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
<p>NIGHTTIME BEHAVIORS: Does your spouse awaken you during the night, rise too early in the morning, or take excessive naps during the day?</p>	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
<p>APPETITE AND EATING: Has your spouse lost or gained weight, or had a change in the food he or she likes?</p>	1 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>



University of Waterloo - Kinesiology

Letter of Appreciation

Dear

I would like to take this opportunity to personally thank you for your time and contribution to this research study. With your help and that of the other participants I will be able to better understand the transition from community living to retirement living, and how this relates to one's involvement in physical activity. The purpose of the present study, entitled "Changes in physical activity and function with the transition to retirement living", was to understand how physical activity levels may change with the transition to retirement living and the impact this may have on both physical and cognitive function.

The data collected during all assessments will contribute to a better understanding of the physical activity levels and needs of older adults living in retirement communities. The findings from this study will provide retirement communities with the information necessary to make the transition from community to retirement living optimal. It will also provide information about the physical activity level of residents, and offer insight on how to optimize physical activity involvement among residents.

Please remember that any data pertaining to you as an individual participant will be kept confidential. Once all the data are collected and analyzed for this project, we plan on sharing this information with the research community through seminars, conferences, presentations, and journal articles. If you are interested in receiving more information regarding the results of this study, or would like a summary of the results, please provide your email address, and when the study is completed, we will send you the information. In the meantime, if you have any questions about the study, please do not hesitate to contact us by email or telephone as noted below. As with all University of Waterloo projects involving human participants, this project was reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. Should you have any comments or concerns resulting from your participation in this study, please contact Dr. Maureen Nummelin Director, Office of Research Ethics at 519-888-4567, Ext., 36005 or maureen.nummelin@uwaterloo.ca.

Once again, I sincerely appreciate the time you took to participate in this study

Thank you,

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