Examination of Factors Related to Driving, Travel Patterns and Falls in Retirement Living Seniors

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

Introduction: To date, there has been little research on driving or transportation use in retirement living seniors or the associations with quality of life, including staying active, socially engaged and connected with the outside community. This thesis is part of a larger project being conducted by a team of researchers at the University of Waterloo to examine these issues in collaboration with the Schlegel-UW Research Institute for Aging, the Schlegel Villages and Luther Village on the Park.

Purpose: The primary objectives of this thesis were to: 1) examine the actual driving practices and other modes of travel in relation to functional abilities and other characteristics; 2) examine associations between driving and other modes of travel with community engagement; 3) examine fall status and compare fallers and non-fallers; and 4) compare current drivers to a sample of former drivers with respect to falls, balance confidence, depression, activity levels in and out of Village (engagement) and travel patterns.

Methods: A convenience sample of 55 drivers (mean age 81.9 ± 6.2, 49% male) from five retirement villages located in Southern Ontario were assessed between February and October, 2013. Participants completed questionnaires (background and driving history, activities inside and outside the village), scales (depression, well-being, self-reported driving restrictions, perceived driving abilities, balance and driving confidence) and assessments of cognition and executive function, lower body mobility and contrast sensitivity. In addition, participant vehicles were equipped with two electronic data logging devices (vehicle diagnostics and GPS) for two weeks, while they concurrently kept trip logs (for driving trips) and travel diaries (for non-driving trips). Falls were assessed through both self-report and incident reports from the villages. Similar data (from scales, questionnaires, travel diaries, falls) previously collected on a sample of

20 former drivers from these retirement villages was merged into the database to permit statistical comparisons between current and former drivers.

Primary Results: Overall, the sample reported driving less after moving to the villages. Compared to prior studies with community seniors, older drivers living in the retirement villages had more restricted driving practices. Residents who were considering driving cessation were not only restricting their driving, but had diminished functional abilities, were more likely to fall, had worse balance and driving confidence, and were less engaged with the community. Compared to current drivers, former drivers were more likely to have fallen in the past year, had lower balance confidence, and were less active outside the village, although they were equally socially engaged. Level of independent living (townhomes versus apartments or suites, versus assisted living rooms) emerged as a significant predictor of community engagement. When level of independent living was controlled for, greater community engagement was associated with younger age, being able to walk 1/4 mile and better balance confidence scores. Driving status approached significance with higher community engagement scores associated with being a current (versus former) driver.

Conclusions: The results indicate that although residents of retirement villages may not drive as much as community living seniors, continuing to drive enables them to stay more connected to the broader community. Although few had considered driving cessation prior to relocation, about half the sample were now considering this transition. Retirement living may make the transition to driving cessation easier, particularly for those who take advantage of village shuttle buses and retain the ability to walk to shops and services in the area. Alternate modes of transportation are critical as older adults retire from driving to ensure continued mobility and independence, as well as to maintain productive community and social engagement.

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Chapter 1: Introduction

Mobility is considered fundamental for healthy aging and has been broadly defined as the ability to move oneself by various means through one's environment ranging from one's home and neighborhood to regions beyond (Myers, Cyarto & Blanchard, 2005; Shumway-Cooke & Woolacott, 2001; Webber, Porter & Menec, 2010). Mobility impairment is the leading cause of *disability* (defined as functional limitations affecting normal activities of daily living) in seniors and increases from about 24% in adults aged 65-74 to over 60% of those aged 85+ (Statistics Canada, 2006).

Mobility is affected by multiple factors and becomes increasingly complex as a person's "life space" or environment expands (Myers et al., 2005; Webber et al., 2010). According to Myers et al. (2005), quantifying mobility entails looking at: 1) extent of movement (how much); 2) modes of movement (how); as well as 3) patterns of movement (where and when). In addition to walking, people use various means to get around, including: wheelchairs or motorized scooters, private vehicles (either driving oneself or as a passenger), as well as public and accessible (special) forms of transport.

Key parameters of mobility include: physical/cognitive abilities, psychological factors related to self-imposed activity restrictions (importantly balance confidence) and environmental factors (Myers et al., 2005). More recently, Webber et al. (2010) developed a comprehensive framework for understanding and assessing mobility (in terms of increasing life space) in older adults. According to their framework, key determinants include cognitive, physical and psychosocial factors, plus environmental demands. These factors/determinants are discussed in detail in Chapter Two.

Physical and cognitive impairments that make it difficult for older adults to keep driving also make it difficult to walk and use public transportation (e.g., Dickerson et al., 2007; Turcotte, 2012). Challenges getting around one's home as well as the broader community may also precipitate relocation to retirement housing. To set the stage for this project, this chapter addresses safety concerns, followed by the primary modes of transportation used by older adults. Transitions in driving (self-regulation and cessation) are discussed next, followed by transitions in housing (specifically relocation to retirement communities). Finally, an overview of subsequent chapters is presented.

1.1 Safety Concerns

Falling is the leading cause of accidental injury in older adults (aged 65+) often resulting in emergency room visits, hospitalization and possibly admission to long-term care (LTC). One in three adults aged 65+ fall at least once a year and the rate triples after age 80 (Public Health Agency of Canada, 2010). The rate of falls per year is considerably higher (up to 50%) for seniors in LTC (Public Health Agency of Canada, 2010), however, we could not find any information pertaining to falls in retirement facilities.

Apart from health care costs, falls can have significant personal consequences, including pain and suffering (and possibly death), physical deconditioning, depression, social isolation and activity restrictions (often due to fear of falling) and risk of institutionalization (Ferrini & Ferrini, 2013). Vision, motor and cognitive impairments resulting from various chronic health conditions (and medications used to treat these conditions) increase the risk of both falls and motor vehicle accidents (e.g., Fuller, 2000; Gaspar, Neider & Kramer, 2013).

Motor vehicle accidents (MVAs) are the second leading cause of accidental injury and death in seniors, even after adjusting for amount of driving (Staplin, Lococo, Gish & Decina, 2003). Similar to fall risk, the risk of being in an MVA increases with age, usually beginning at age 70 and escalating thereafter (Bedard, Stones, Guyatt & Hirdes, 2001; Dickerson et al., 2007). Drivers over 65 account for 14% of licensed drivers, while they represent 17% of the MVA fatalities (Transport Canada, 2011).

Many of the factors that put seniors at higher risk for falls and MVAs (i.e., advanced age, poor vision, slower gait and reaction times, impaired executive and cognitive function) also increase the potential risk of pedestrian accidents. There is some evidence that pedestrian accidents may increase when older adults who no longer drive are forced to rely on walking and public transport (e.g., Hakamies-Blomquist, Johansson & Lundburg, 1996). Although incidents of pedestrian accidents are low compared to falls (Ontario Injury Report data for 2007-2009), over one third of fatally injured pedestrians in Canada between 1996 and 2001 were seniors (Transport Canada, 2010). The majority of accidents involving older pedestrians occur at crosswalks and during the early evening (Ferrini & Ferrini, 2013). Seniors may not walk fast enough to get across timed crosswalks, as well as have problems negotiating curbs and judging the speed and distance of oncoming vehicles. It is also reasonable to assume that mobility impairments may increase the risk of falls and related injuries when using public transportation.

1.2 Primary Modes of Transportation

For most seniors in North America, independent mobility, spontaneity and freedom equates to having a private vehicle and a valid driver's license (Dickerson et al., 2007; Turcotte, 2012). Having a valid driver’s license and access to a private vehicle

have been associated with the probability of leaving one's home on a given day and engaging with the outside community (Turcotte, 2006). Shah, Maitra, Barnes, James, Leurgans & Bennett (2012) found that having a driver's license was prospectively related to greater spatial mobility (going beyond one's neighborhood and town or community).

Using longitudinal data from the national Health and Retirement Study (HRS) of non-institutionalized adults (N=4,778, mean age 74, 48% female), Curl, Stowe, Cooney & Proulx (2013) found that not being able to drive negatively affected productive engagement (formal and informal volunteering, paid work), but not social engagement (how often they get together with neighbors or people nearby for a visit or chat; # days in past week). Physical and mental health did not appear to mediate this association.

Other studies have also found that driving reduction or complete cessation adversely affects community engagement and contributes to social isolation (Burkhardy, Berger, Creedon & Gravok, 1998; Marotolli, de Leon, Glass, Williams, Cooney & Berkman, 2000; Mollenkopf et al., 1997). Marotolli et al. (2000), found that driving cessation was associated with a decrease in level of out-of-home activity even after adjusting for socio-demographic and health-related factors in a cohort (N=1,316) of older adults followed longitudinally.

Using data from the 2009 Canadian Community Health Survey (16,369 community seniors, aged 65+), Turcotte (2012) reported that 73% of older drivers had engaged in a social activity over the prior week, compared to only 53% of those who were not licensed and 46% who used accessible transit. Previously, Turcotte (2006) reported that 32% of older adults with a license and vehicle participated in volunteer

work compared to 17% without a vehicle, suggesting that access to convenient transportation promoted volunteerism.

Driving one's own vehicle is the preferred mode of transportation for older Canadians, particularly men, well into their 80's (Turcotte, 2012), followed by being a passenger in a private vehicle. In 2009, over three quarters of Canadians aged 65+ had a valid driver's license (over 3 million) and this number is expected to double within the next decade (Transport Canada, 2009). Those over 80 are the fastest growing segment of older drivers (Turcotte, 2012).

Although the gender gap is declining, in the oldest cohort (aged 85+), a much higher proportion of men (67%) compared to women (26%) had a driver's license. A greater percentage of women in both the 74 to 85 and 85+ age groups reported being a passenger as their primary form of transportation. Relatively few seniors used other modes of transportation such as walking, public or accessible transit, and taxis. Women over the age of 85 reported transportation problems as the second most common reason (after health) for not participating in more social, recreation and group activities. Over half the women aged 90+ reportedly needed transportation assistance (Turcotte, 2012).

Turcotte's (2012) study, similar to most of the research on driving and transportation, has been restricted to community living seniors. In Ontario alone, it is estimated that 40,000 seniors live in retirement housing and the demand is expected to increase (Welsh, 2012). Yet little is known about the driving patterns and use of other modes of transportation in this segment of the senior population.

1.3 Transitions in Driving

For many older adults, the transition from driving to non-driving is often a gradual process which can take several years. Driving cessation is often preceded by a process of self-regulation: reductions in driving frequency and changes in driving patterns such as avoiding challenging situations (e.g., Baldock, Mathias, McLean & Berndt, 2006; Dellinger, Sehgal, Sleut & Barret-Connor, 2001; Dickerson et al., 2007; Donorfio, D'Ambrosio, Coughlin & Mohyde, 2009).

1.3.1 Self-regulation

Self-imposed reductions, restrictions or modifications to driving (such as avoidance of night driving) may be due to noticeable declines in functional abilities (such as poor vision), driving discomfort (e.g., Myers, Paradis & Blanchard, 2008; Rudman, Friedland, Chipman & Sciortino, 2006), as well as changes in lifestyle (e.g., no longer working) and preferences (e.g., Donorfio et al., 2009; Molnar & Eby, 2008). It may also be a compensation or coping strategy to reduce the stresses of driving and drive longer, although it is still unclear whether self-imposed restrictions enhance safety.

There is a growing body of research on self-regulation, including the development of theoretical models (e.g., Rudman et al., 2006; Lindstrom-Forneri, Tuokko, Garrett & Molnar, 2010) to guide this research. These models suggest that self-regulation is influenced by a host of personal, intrapersonal (influence of others) and environmental factors. One of the most important factors (according to older drivers themselves) is level of driving confidence or comfort (Myers et al., 2008; Rudman et al., 2006). Recently, Meng & Siren (2012) suggested that driving reduction and the avoidance of selected driving situations should be treated separately. The former may be primarily due to less

need for mobility, whereas avoidance appears to be motivated by negative feelings or discomfort driving in certain situations (Meng & Siren, 2012).

Although vehicle operation and *tactical* driving skills (such as adjusting one's speed and following distance) are important for safe driving, higher order *strategic* decision-making (such as where and when to drive, route planning), as well as lifestyle (such as where to live or what type of vehicle to buy) are most germane to effective self-regulation (Molnar & Eby, 2008). A study of driving practices by 246 older Australian drivers found that self-regulatory practices at the strategic and tactical levels were influenced by different sets of factors (Molnar, Charlton, Eby, Langford, Koppel, Kolenic & Marshall, 2014). Four months after completing a comprehensive clinical assessment (visual, cognitive and psychomotor functioning) and objective driving data, participants completed a computerized questionnaire on driving patterns and decision-making. Perceived driving abilities and feelings of comfort were both strongly and significantly related to strategic self-regulation practices, however most functional measures were not. Meanwhile, age and contrast sensitivity scores were found to be significant predictors of tactical self-regulation. Strategic self-regulation was significantly higher in female drivers, while there were no significant gender differences for tactical self-regulation.

Until recently, most of the research on self-regulation has relied on self-report data (self-estimates of driving distance and ratings of avoidance). Several studies have now shown that distance estimates are inaccurate relative to objective measures and that people may not restrict their patterns as much as they say they do on questionnaires (Blanchard, Myers & Porter, 2010; Crizzle, Myers & Almeida, 2012; Heubner, Porter & Marshall, 2006; Porter et al. 2014). Led by researchers from the Universities of Waterloo

and Manitoba, there have now been several naturalistic driving studies with older adults (Blanchard et al., 2010; Blanchard & Myers, 2010; Crizzle & Myers, 2012; Myers, Trang & Crizzle, 2011). These studies have used in-vehicle devices (including GPS) to examine driving exposure and patterns over a one to two week period.

More sophisticated devices which permit longer monitoring are being used in the ongoing longitudinal Candrive/Ozcandrive II study with 928 drivers aged 70 and over (Marshall et al., 2013). Recently, Porter et al. (2014) examined the ability of 159 of these participants (n=159) to accurately estimate km driven over one year relative to objectively measured driving. Almost half chose the wrong distance category and some drivers misestimated their distance by up to 20,000 km. Those who misjudged in the low mileage group (≤ 5,000) consistently under-estimated, while those who misjudged in the high mileage category (≥ 20,000) consistently over-estimated. Porter and colleagues discourage the use of self-reported estimates for individual level decisions (by clinicians or licensing authorities) and research studies looking at detailed driving patterns of older adults. Prior to the current project, there have been no naturalistic (objective) driving studies with retirement (versus community living) older drivers.

1.3.2 Driving cessation

Losing one's license abruptly (i.e., taken away by licensing authorities) can be particularly distressing (e.g., Kulikov, 2011). Even those who voluntarily relinquish their license may regret this decision, reporting loss of identity and freedom, loneliness, social isolation and dependence on family members or friends for transport (e.g., Harrison & Ragland, 2003; Rudman et al., 2006). Choi, Mezuk & Rebok (2012) suggested the distinction between voluntary and involuntary driving cessation is ambiguous. They

found that even among seniors who identified themselves as voluntary driver retirees, the influence of external factors (e.g., financial difficulties, lack of access to an operable car) left them little choice in the matter (Choi et al., 2012).

In addition to reduced out of home activity (Marotolli et al., 2000) and social engagement (Curl et al., 2013), driving cessation has been prospectively associated with reduced social networks (Mezuk & Rebok, 2008), increased depression (e.g., Fonda, Wallace & Herzog, 2001; Marotolli, de Leon, Glass, Williams, Cooney, Berkman & Tinetti, 1997; Windsor, Antsey, Butterworth, Luszcz & Andrews, 2007), out-of-home activity levels (Marotolli et al., 2000) and early mortality (Edwards, Lunsman, Perkins, Rebok & Roth, 2009). Freeman, Gange, Munez & West (2006) showed that driving status (never drove or stopped driving) and the absence of other household drivers were independent risk factors for relocation to institutional living (defined broadly as retirement homes, assisted living facilities and nursing homes).

Seniors in rural and remote communities are particularly disadvantaged, which may explain why some continue to drive against medical advice and even without a valid license (e.g., Johnson, 2002). O'Connor, Edwards, Waters, Hudak & Valdés (2013) examined health and physical performance as mediators of the association between driving cessation and mortality among older residents of small and large cities. They found higher mortality rates in driving retirees of small cities over a 5-year follow-up suggested that fewer alternate transportation options might play a role.

Even in urban areas, problems with mobility (impairments in functional abilities) make it difficult for some seniors to walk or use public transportation (Dickerson et al., 2007; Turcotte, 2012). For the most part, public transportation services are not designed

to meet the needs of individuals with physical, sensory or cognitive impairments, which increase with age (Dickerson et al., 2007; Turcotte, 2012). Even paratransit (accessible) services and taxis cannot replace the freedom and spontaneity of travel by car. Difficulties getting around the community when older adults (or their spouses) no longer drive, together with social isolation, reluctance to depend on others for rides and safety concerns (particularly falls) may lead some to consider alternative housing.

1.4 Relocation to Retirement Housing

Functional impairments and safety issues (such as falls) affect one's ability to live independently in the community (Grigsby, Kaye, Baxter, Shetterly, & Hamman, 1998) which may precipitate the decision to relocate (Longino, Jackson, Zimmerman, & Bradsher, 1991). Those with physical and cognitive limitations considered to be in the 'disability stage' may move closer to adult children and/or to a facility with support services, while those with more severe decrements may move to a nursing home (Novak & Campbell, 2006). At the other end of the spectrum, healthy seniors may also chose to live in a continuing care retirement community (CCRC, described below) to accompany a spouse who needs more care, as an 'anticipatory move' to meet future health care needs (aging in place) and/or to avoid becoming a burden on family (Krout, Moen, Holmes, Oggins & Bowen, 2005).

There is no standard definition of retirement housing, likely due to the fact that in many jurisdictions such facilities have not been provincially regulated; this has just recently changed in Ontario. The facilities themselves vary widely (from basic housing to luxurious communities) as do the costs involved and the services provided (Biggs, Bernard, Kingston & Nettleton, 2000; Gardner, Browning & Kendig, 2005; Gibler,

Moschis & Lee, 1998). In Ontario, there are approximately 700 facilities across the province, which vary widely in terms of costs (ranging from $1,200 to over $6,000 per month), provision of services and amenities (Welsh, 2012).

Retirement housing is considered distinct from nursing homes or long-term care (LTC) facilities that provide skilled nursing and medical care as well as 24-hour support services (e.g., Gibler et al., 1998). Continuing care retirement communities (CCRCs), which permit older adults to 'age in place' while moving between levels of care (from total independence to assisted/supportive care, to LTC) as their needs change, are becoming popular with seniors (Gibler et al., 1998; Shippee, 2009).

1.5 Overview of Subsequent Chapters

As noted above, there has been little research to date on driving or transportation use in retirement living seniors or the associations with quality of life, including staying active, socially engaged and connected with the outside community. The broad aim of this project was to gain a better understanding of the mobility patterns and needs of older adults in retirement homes to expand our knowledge base and ultimately inform services to address residents' transportation needs and enhance quality of life.

Chapter Two reviews the published literature on the physical, cognitive, psychological and environmental factors which influence mobility and safety in older adults, as well the few studies that have examined the association between falls and driving. Chapter Three provides background on the larger project being conducted by researchers at the University of Waterloo in collaboration with the Schlegel-UW Research Institute on Aging (RIA) and Luther Village on the Park. Work to date has

consisted of surveys on resident driving status and transportation use, as well as an in-depth study on former drivers and a preliminary study on current drivers.

The objectives and methods for the current study are detailed in Chapter Four. This chapter also discusses ethics approval and consent, further sample recruitment at a local retirement complex (Luther Village), data collection procedures, instruments and data handling and analyses. The results of the study are presented in Chapter Five and discussed in Chapter Six.

Chapter 2: Literature Review

Functional mobility is important for a variety of reasons, including: maintaining activities of daily living, remaining connected to friends and family, and accessing essential shops, services and appointments. Beyond the utilities of travel, mobility is associated with independence, freedom, spontaneity and control over one's life. As noted in Chapter One, impaired mobility is the leading cause of disability in seniors and factors that compromise mobility also put seniors at greater risk of falls, motor vehicle and pedestrian accidents. Mobility is a complex function of physical, cognitive, psychological and environmental determinants (Myers et al., 2005; Webber et al., 2010); other influences include finances, gender and household composition (e.g., Donorfio et al., 2009; Webber et al., 2010). This chapter reviews this body of literature, as well as studies that have examined possible linkages between falls and driving problems.

2.1 Factors Affecting Mobility

2.1.1 Physical Factors

As people age, they often experience declines in muscle strength, postural stability, range of motion and reaction time, as well as sensory impairments such as decreased vision and hearing (Foldvari et al., 2000; Rantanen et al., 2001; Sakari, Era, Rantanen, Leskinen, Laukkanen & Heikkinen, 2010; Tiedemann, Sherringtion & Lord, 2005). Lower extremity muscle strength is one of the most important requirements for walking and mobility (Foldvari et al., 2000). In addition to sufficient muscle strength, balance is crucial in maintaining upright posture and walking around one’s environment. Although there are multiple aspects of physical and sensorimotor function, this review focuses on two of the most important: balance/gait and vision.

Balance & Gait

The essential requirements of gait are progression, postural stability, speed and adaptation to meet environmental demands (Shumway-Cook & Woolacott, 2001). For instance, Bohannon (1997) found maximum walking speed decreased from an average of 2.5 m/s in adulthood to 1.7 m/s in 60-70 year-olds, with the greatest differences seen in female participants. In the 2000 Finnish Health Survey, 11% of women and 7% of men aged 55-64 had a maximal walking speed of less than 1.2 m/s, whereas among 75-84 year-olds the corresponding proportions were 67% and 49% (Aromaa & Koskinen, 2004). Slow walk speed is a major risk factor in pedestrian accidents as seniors may not walk fast enough to get across streets or crosswalks.

Measures of physical ability typically used with older adults include: the Timed "Up & Go" or TUG Test (Podsiadlo & Richardson, 1991), the Berg Balance Scale or BBS (Berg, Wood-Dauphinee, Williams & Maki, 1992), and Tinetti's Performance Oriented Mobility Assessment (Tinetti, 1986). The Rapid Pace Walk (RPW) Test (Staplin et al., 2003) has become a widely used measure of overall mobility as it assesses stride length, balance and speed (e.g., Crizzle et al., 2013). Maximal speed tests (such as the RPW Test) capture the highest level of neuromuscular capacity, giving an idea of the individual’s potential to adapt to varying environmental and task demands, for example when crossing a street (Manty, 2010).

The sensorimotor requirements necessary for successful balance and gait are also necessary for the safe operation of basic vehicle controls. Lower limb function is needed to quickly shift the right foot from the accelerator to the brake in an emergency situation, and to apply the correct pressure on the gas and brake for smooth stopping and speed

control (Staplin, et al., 2003). A large study examining the predictability of clinical assessments on driving performance in older adults found a strong correlation with scores on the RPW test (Stav, Justiss, McCarthy, Mann & Lanford, 2008). Similarly, Marotolli, Cooney, Wagner, Doucette & Tinetti (1994) found that the RPW test was most strongly associated with adverse driving events, including collisions.

Vision

Age-related changes in visual function also have implications for safe driving, balance and gait. Visual impairment increases with age (Attebo, Mitchell, & Smith, 1996) due to both the normal aging process and the increased prevalence of eye disease. Normal aging is associated with increased yellowing and cloudiness of the crystalline lens, a decrease in pupil size and alterations in the integrity of the macular pigment and neural pathways. These changes lead to reductions in visual acuity, contrast sensitivity and increased glare sensitivity observed in older populations (Haegerstrom-Portnoy, Schneck, & Brabyn, 1999). The early work of Burg (1967, 1968) found statistically significant correlations between various vision test results and crash records. Older drivers who recognize declines in vision may be more likely to self-restrict their driving (e.g., Satariano, MacLeod, Cohn & Ragland, 2004).

A study using baseline data from the Candrive II cohort (detailed in section **2.1.3**) examined self-reported health, symptoms (including vision) and driving-related psychosocial measures (Tuokko, Myers, Jouk, Marshall, Man-Son-Hing, Porter, et al., 2013). After controlling for age and gender, fewer self-reported visual symptoms were related to higher driving comfort scores (day and night); better perceptions of driving abilities; and intention to continue driving.

Recently, research has focused more specifically on the role of contrast sensitivity in mediating both fall risk and driving performance. Contrast sensitivity (CS) is the difference in colour and brightness that makes an object distinguishable (for instance, identifying the transition in stairs or a curb or median when driving). CS has been identified as one of the most important aspects of visual functioning (versus acuity for example) concerning driving performance (Owsley, Ball, Sloane, Roenker, White & Overly, 1998); walking speed and mobility (Marron & Baily, 1982); and falls (Lord & Menz, 2002). Measured by the Pelli-Robson charts (Pelli, Robson & Wilkins, 1988), binocular contrast sensitivity closely resembles a person's 'real-world' visual performance (Haymes et al., 2006; Owsley, 2003).

Some studies have found that poor contrast sensitivity is closely associated with lower driving confidence and greater avoidance of challenging situations (e.g., Ball et al., 1998; McGwin & Brown, 1999). Brabyn, Schneck, Lott & Haegerstrom-Portnoy (2005) directly examined the relationship between self-reported restrictions in night driving and several aspects of vision function (high- and low-contrast acuity using the Bailey Charts, contrast sensitivity using the Pelli-Robson charts, low-luminance acuity using the SKILL Card, stereopsis using the Frisby Stereo Test, Berkeley Glare Test, glare recovery time and visual fields) in a sample (N=752, mean age=73, 50% female) of community drivers. There were significant associations between several of the spatial vision measures and avoidance of night driving. Contrast sensitivity was the most predictive of self-restriction in men, while low-contrast acuity in glare was most predictive in women. Despite women having slightly better visual function than men, they were twice as likely as men to restrict their driving to daytime.

Other studies (e.g., Stav et al. 2008) have concluded that contrast sensitivity scores were more predictive of driving performance then the Useful Field of View Test (UFOV; Goode et al., 1998), the Functional Acuity Contrast Test (FACT; Ginsburg, 1984) and several motor performance tasks (including the RPWT). A study by Elliott, McGwin & Owsley (2013) examined the rates of visual and cognitive impairment in residents of assisted living facilities. Of those screened (N=144, 81% over 80 years, 82% female), 70% had visual acuity worse than 20/40 for distance or near vision, and 90% had impaired contrast sensitivity, while 40% had cognitive impairment. Results indicated that cognitive status significantly contributed to the prediction of visual status for near vision (R^2 = 0.06, p=0.004) and contrast sensitivity (R^2 = 0.07, p=0.004).

2.1.2 Cognitive Factors

With normal aging, seniors tend to experience some decline in attention, orientation and memory, as well as executive function and the ability to integrate perceptual information which affect the ability to move effectively and safely (Shumway-Cook & Woolacott, 2001). Driving in traffic requires the ability to attend to relevant information and to ignore irrelevant information in often complex visual scenes. Therefore the speed at which information is processed is an important factor in successfully negotiating difficult or dangerous traffic situations (Antsey, Wood, Lord & Walker, 2004).

Similarly, when walking, one must monitor changes in the environment and plan the next step. When a walking or balance task was combined with a cognitively demanding task (e.g., memorizing a list of words) decrements were found for both tasks relative to performing each task separately (Woolacott & Shumway-Cook, 2002). Not

surprisingly, declines in cognitive ability experienced with aging increase the risk of falls. A recent study by Gaspar, et al. (2013) found that seniors at high risk of falls performed more poorly on dual-tasks on both a driving simulator and a computer paradigm.

Cognitive ability is typically examined through questionnaires such as the Mini-Mental State Examination (MMSE; Folstein, Folstein & McHugh, 1975) and the Montreal Cognitive Assessment (MoCA; Nasreddine et al., 2005). Several researchers have discussed the limitations of the MMSE in predicting driving performance (e.g., Ott et al., 2013; Dobbs, Carr & Morris, 2002). The more recent MoCA is often preferred as it is more comprehensive than the MMSE, assessing cognition across five domains: executive functioning, attention, language, memory, and visuospatial skills (Rapoport et al., 2013). A meta-review of studies on the influence of cognitive, sensory and physical factors on driving in older adults concluded that attention scores, visuospatial skills and memory scores were strongly associated with driving indicators (Anstey et al., 2004). However, these associations were outperformed by measures of executive function.

Executive Function

Another cognitive factor relevant to both falls and driving that declines with normal aging is executive function (Bryan & Luszcz, 2000). Supported by neuroimaging studies (see Raz, Gunning-Dixon, Williamson, & Acker, 2002), age-related changes in the prefrontal cortex slow the integration of information in selecting, scheduling and coordinating task processes. Thus, older adults with poor executive function are worse at managing complex task demands pertaining to balance or gait, and are, therefore, more likely to fall. Not surprisingly, for a much more complex task such as driving (attending to several areas of the environment to plan and execute responses to avoid collisions)

poorer performance on executive control tasks has shown to be predictive of crashes (Daigneault, Joly, & Figon, 2002).

Previous research suggests that deficits in executive function likely underlie the difficulties in multitasking performance (Hausdorff, Yogev, Springer, Simon & Giladi, 2006) and mediate the relationship between balance, falls and crash risk (Gaspar et al., 2013; Rapport, Hanks, Millis & Deshpande, 1998). The tool used most extensively to assess executive function with respect to driving performance is the Trail Marking Test, Parts A and B (Reitan, 1958). Trails A is a test of psychomotor speed, whereas Trails B is a test of processing speed, attention and executive function (Rapoport et al., 2013).

A systematic review found several studies reporting associations between Trails A and B and driving performance (Molnar, Patel, Marshall, Mon-Son-Hing & Wilson, 2006). For example, Ott et al. (2013) found that Trails B scores were highly correlated with road test scores, more so than other measures of visuospatial and cognitive function (e.g., MMSE). Similarly, a large cross-sectional analysis of the Candrive II baseline data (Rapoport et al., 2013) found that lower executive function, as measured by time to complete the Trails B task and number of errors, was associated with poorer perceptions of driving ability and comfort and a tendency to drive less frequently in challenging situations (using measures developed by Myers and colleagues as described in Chapter Four).

Longitudinal studies have shown that diminished functional performance (e.g., cognitive abilities, vision, balance) as well as health problems, were predictive of driving cessation over three to five years (e.g., Ackerman, Edward, Ross, Ball & Lunsman, 2008; Edwards et al., 2008). More recently, O'Conner, Edwards, Small & Andel (2011)

examined changes in self-regulation in a large sample of community seniors over a five-year period. Self-regulation was measured by a composite of several self-report measures: frequency (# days in a typical week), space (whether they drove beyond their neighborhood or two in past 2 weeks and beyond their county or state in past 2 months) and avoidance of challenging situations (e.g., at night). Relative to "stable drivers", those who decreased their driving over time had significantly more depressive symptoms, poorer vision (acuity), self-rated health, balance and speed of processing after controlling for education and age.

2.1.3 Psychological Factors

Despite the importance of balance, vision and cognition, effective or safe mobility is dependent on the interaction of physiological and psychological characteristics (Sakari-Rantala, Era, Rantanen & Heikkinen, 1998). Volition, or one's desire to move around the environment, is an important component of mobility as older adults may restrict their activities due to depression, disengagement, disinterest/apathy, as well as safety concerns (Myers et al., 2005). Research has shown that older individuals often restrict their driving due to depression (Gayman, Turner, & Cui, 2008), or in response to opinions voiced by friends, family, and physicians (Rudman et al. 2006).

Fear of falling (FOF), often operationalized as balance confidence, may be one of the most important psychological factors influencing mobility. There is substantial evidence that that fall concerns are highly prevalent in older adults (even in persons who have not fallen) and directly contribute to physical decline and self-imposed activity restriction (e.g., Jorstad, Havier, Becker & Lamb, 2005; Powell & Myers, 1995; Tinetti, Richman & Powell, 1990).

The Falls Efficacy Scale (FES; Tinetti, Richman & Powell, 1990) and the Activities-specific Balance Confidence Scale (ABC; Powell & Myers, 1995) operationalize fear of falling as a continuum of balance confidence (0-100%). Both these scales were based on Bandura's Social Cognitive Theory (Bandura, 1977) which asserts that confidence in one's abilities in a particular domain is a stronger determinant of behaviour than one's actual abilities or skills. Both of these scales have good psychometric properties, however, the ABC has a wider continuum of item difficulty and thus is more suitable for moderate to high functioning seniors. Furthermore, it was developed with older adults (Jorstad et al., 2005: Myers et al., 1996) and has normative values for different populations, including retirement living adults (Myers et al., 1998).

An individual's attitudes, beliefs and perceptions about driving can affect their driving behaviours and self-regulatory practices (Gwyther & Holland, 2012). As described in Chapter One, driving confidence (Marotolli & Richardson, 1998) or driving comfort level has been shown to be a key factor in the self-regulation process of older drivers (Blanchard & Myers, 2010; Myers et al., 2011). Similar to balance confidence, the development of the Driving Comfort Scales (DCSs), described in Chapter Four, were also based on Bandura's Social Cognitive Theory (Myers et al., 2008).

Recently, Tuokko et al., 2013 reported on the baseline characteristics, health ratings and scores on several psychosocial measures of the Candrive II cohort. Participants (n=928, mean age 76.2±4.9, 62.2% male) were given the day and night driving comfort scales (DCSs) and 15-item perceived driving abilities scale (both are described in Chapter 4); as well as the 36-item decision balance plus scale, which examines positive and negative aspects of driving relevant for the individual and for

others and intentions to keep driving. The results indicated that younger participants and men were more comfortable driving during the day and at night, while older drivers and men perceived others as holding more negative views about their driving. Controlling for age and gender, better self-ratings of health and fewer symptoms were associated with greater driving comfort during the day and night, better perceptions of abilities, and intent to continue driving.

2.1.4 Environmental Factors

Environmental factors can either facilitate or inhibit mobility behaviour. Examples of environmental demands include: walking distance, terrain, time constraints (e.g., crosswalks, traffic lights), ambient conditions (lighting/weather), attentional demands, postural transitions and traffic density (Shumway Cook; Webber et al., 2010).

While these factors also apply to retirement-living individuals, safety features (such as railings or grab-bars, non-skid flooring, lighting) are fairly standard in retirement complexes. Although home modifications also help reduce fall risk, the cost of major modifications (such as installing elevators or refitting washrooms) can be prohibitive (Pynoos & Nishita, 2003). Moving to a more supportive environment is one alternative.

2.1.5 Other Influences

In addition to the above factors, it is also necessary to consider the influence of gender, household composition, location and type of residence, lifestyle and finances (Webber et al., 2010).

Gender

Overall, senior women have higher rates of mobility impairments or disabilities than men (Statistics Canada, 2006). As noted in Chapter 1, a much higher proportion of

men in the oldest cohort (85+) have a valid driver's license compared to women, while a greater percentage of women report being a passenger in a vehicle as their primary form of transport. Over half of the women aged 90+ reported needing transportation assistance which was a primary reason for not participating in more social, recreation and group activities (Turcotte, 2012). Kulikov (2011) found in a large sample (9,638) that women were 3 times more likely than men to stop driving and 2.5 times more likely to reduce their driving (for instance not taking long trips). As described above, Brabyn et al. (2005) found that although women had better visual function, they were twice as likely as men to reportedly restrict their driving at night. Older women are more likely to give up driving prematurely, which may be related to lower levels of driving comfort and poorer perceptions of their driving abilities (e.g., Blanchard & Myers, 2010).

Household Composition

Household composition also plays an important role in transportation patterns. A large survey found that seniors in a two-person household were more willing to let their partner do the driving or share driving (Donorfio et al., 2009). Crizzle & Myers (2012), meanwhile, found that older drivers living alone (about a third of the sample) tended to drive more overall (days, trips, km and duration), while those living with other drivers drove more at night and further from home.

Location and Type of Residence

Although two thirds of Canadians live in urban areas (Andrey, 2010), rural drivers require special attention as they may be even more reliant on their vehicles (e.g., Johnson, 2002). Crizzle & Myers (2012) found that compared to urban drivers, rural drivers drove significantly more km and further from home, but made fewer trips and drove fewer days.

Marotolli et al. (2000) compared older adults living in either community dwellings, public housing complexes (age and income restriced) or private housing complexes (age restricted), and found that private housing complexes (compared to community dwellings) were associated with lower activity levels and higher rates of driving cessation. Although driving research in retirement settings is sparse, previous work has shown that individuals who continue to drive after relocating to a retirement residence may have lower levels of perceived disability (Kelly-Moore et al., 2006).

A study by Jenkins et al. (2002) examined activity levels in a sample of older adults (N=167) living in either independent apartments or assisted living areas from two continuing care retirement complexes (CCRC). Assisted living residents were significantly less likely to engage in activities outside their retirement community in the prior month. Activity engagement was associated to better quality of life using the SF-36. Although the authors stated that more of the independent living residents retained their driver's licenses thus having more ready access to the outside community, the proportion of residents still driving in each group were not reported.

Resources or Finances

Income, which is associated with education, affects social relationships and recreational pursuits, including physical activity and travel (Golant, 1984; Mollenkopf et al., 1997). People with lower incomes are at greater risk for mobility disability (Shumway-Cook et al., 2005). Economic resources influence activity options and modes of transportation. As noted by Kulikov (2011), higher incomes enable people to afford better cars and gas, as well as repair their vehicles. Higher income was associated with continued driving as well as the ability to afford taxis (Turcotte, 2012).

2.2 Associations Between Falls and Driving

Although similar factors (such as physical, sensory and cognitive impairments) are known to affect the risk of falls and impaired driving performance, only a few studies have directly examined the association between falls and driving. A prospective study by Margolis, Kerani, McGovern, Songer, Cauley & Ensrud (2002) found that, after adjusting for age and weekly driving mileage, one of the risk factors significantly associated with motor vehicle crashes in a large sample of older women, was falling in the previous year.

In a large sample (over 9,000 senior drivers), Kulikov (2011) found that difficulty walking several blocks was significantly related to driving reduction and cessation, as well as self-reported falls (which in turn was related to driving cessation). Gaspar et al. (2013), meanwhile, compared the driving performance of healthy older drivers classified as either high or low falls risk on a high-fidelity driving simulator. Fall risk (high or low) was determined through scores on several measures (contrast sensitivity, hand reaction time, proprioception, leg muscle strength and sway) previously shown to reliably predict falls in seniors. On the driving simulator, the high risk fall group had slower brake response times, responded slower to potential hazards and performed worse on dual (divided attention) tasks. This group also scored significantly lower on the ABC scale indicating poorer balance confidence.

An exploratory study by Crizzle, Myers, Roy & Almeida (under review), found that fallers were more likely to be women and generally drove less at night (trips, distance, duration). For the sample as a whole, lower balance confidence (scores on the ABC scale) was significantly associated with poorer contrast sensitivity, lower driving comfort at night, and greater self-reported avoidance of challenging situations. Although

this sample consisted of older adults with Parkinson's Disease (PD), this is one of the first studies to assess relationships between falls and naturalistic driving practices, as well as the association between balance and driving confidence. Although Bandura's theory states that self-efficacy or confidence is domain specific, both falls and driving fall within the mobility domain.

2.3 Summary and Implications

As evident from the above review, multiple interrelated factors influence mobility choices and patterns, as well as safety issues. As noted in Chapter One, the majority of driving and transportation research in older adults has been conducted with community living seniors. The small body of research on retirement facilities has found that residents who continued to drive had lower levels of perceived disability (Kelly-Moore et al., 2006) and higher levels of activity engagement outside the village and better quality of life (Jenkins et al., 2002). Prior to this project (described in the next chapter), there are no studies we are aware of that have looked at the associations between functional abilities, falls, balance and driving confidence, naturalistic driving practices or other modes of travel in retirement living seniors.

Chapter 3: Project Background

As noted in Chapter One, little is known about driving and transportation use in retirement living seniors or the impacts on resident travel and activity patterns and well-being. Thus, a team of researchers from the University of Waterloo led by Drs. Myers and Crizzle set out to examine these issues working in collaboration with the Schlegel-University of Waterloo Research Institute for Aging (RIA). The RIA approves and oversees all research projects conducted in the Schlegel Villages (SVs).

At the outset of this project, Myers and Crizzle hypothesized that retirement living may reduce the adverse effects (such as depression, isolation and activity reduction) often associated with cessation for seniors who remain in the community. Retirement living may also facilitate the transition to non-driving, particularly if the facility provides shuttle buses. Although there has been little research in this area (e.g., Jenkins et al., 2002), it was expected that residents who still drove would remain more connected to the broader community than those who had stopped driving.

This multi-component research project began in 2011 in four Schlegel Villages (SVs) and subsequently expanded to include Luther Village on the Park. Prior to outlining the present thesis which took place in both settings, this chapter provides a description of these communities, followed by a summary of the work completed to date.

3.1 Description of Schlegel Villages

The SVs are a consortium of several continuing care retirement communities in Southern Ontario ranging from independent living accommodations to supportive and assistive care to long-term or nursing home care. This project focused on the four Villages at the time that offered retirement living accommodations, namely: Winston

Park (WP) in Kitchener; Humber Heights (HH) in Etobicoke; Taunton Mills (TM) in Whitby; and Riverside Glen (RG) in Guelph.

Residents living in the condominiums and apartments have full kitchens or kitchenettes, washing machines, dryers and dishwashers. Those in apartments receive linen and housekeeping services weekly and one meal a day, however they can also purchase other services. Those living in rooms on the main floor, meanwhile, receive three meals a day, as well as medication administration and daily monitoring by the nurses. Residents in intermediate assisted care areas receive the same services as those in the main floor rooms, as well as assistance with activities of daily living such as transfers, bathing and dressing as needed.

All villages have safety features in the apartments and rooms (such as grab bars, high toilets, bathroom doors opening out and call-bells). Additionally, all residents receive annual nursing assessments, monthly blood pressure checks and medication reviews every 6 months by a consulting pharmacist, and have access to foot care specialists, basic optometry and dental services, physiotherapists, kinesiologists and massage therapists. While services and amenities vary, all villages have fitness centres, small convenience stores, cafés, libraries, chapels, barbers and hair salons.

Three of the Villages have both indoor (underground) and outdoor parking for residents; RG has only outdoor parking. Detailed information on walking distance to services and access to public transportation for each village, gathered by Courtney Janssen-Grieve (CJG) and Sarah Sousa (SS), is reported in their respective Master's theses. Briefly, all four SVs have a permanent shuttle bus owned by the village for recreational outings and shopping. Residents typically sign up in advance for posted

outings. Each bus can accommodate ~ 16 people with walkers and two with wheelchairs. Each village also has covered bus shelters close to the entrances. Two villages (WP and TM) are within easy walking distance of stores (Janssen-Grieve, 2013; Sousa, 2013).

3.2 Description of Luther Village on the Park

The retirement community of Luther Village (LV) is located in uptown Waterloo in close proximity to shops and activities (i.e., Westmount Plaza and Waterloo Park). LV offers a model of continuing care known as a “life lease”, allowing residents to 'age in place' as their needs progress from independent living to supportive care to full service to enhanced care. The latter has 15 beds, a separate dining room and 24 hour supervision for residents with dementia, although it is not considered a nursing home.

There are 72 town homes (known as the Garden Villas), each with a private garage, separated from the main building by roadways and sidewalks. There are also 154 suites (known as the Atrium Suites) located in the main building, each with a parking spot (either indoors or outdoors). The Sunshine Centre, meanwhile, consists of main floor rooms (with fridges and stoves or kitchenettes) and provides meals, laundry and cleaning services, 24 hour nursing and assistive care as needed (similar to the main floor retirement living rooms in the Schlegel Villages). The Wellness Centre coordinator estimated that about 10% of the residents in the Sunshine Centre (SC) were still driving.

The Sunshine Centre is attached to the main building of LV which houses the Atrium Suites, Wellness Centre, Great Hall, as well as a cafe, grocery store, fitness centre, hair salon, library, lounge, and a full service restaurant open to the public (Martin's Restaurant). The Wellness Centre, open to all residents, offers weekly blood pressure clinics, nurse (centre coordinator) and physician consultation, as well as

massage therapy. The Great Hall, with a capacity of 225 people, is used for special dinners, events and resident meetings. One of the more popular activities is the 'Coffee Break', held every Monday morning at 10:00 a.m. for residents from the townhomes and suites where they gather for weekly announcements and socialization. Other activities include movie nights, guest speakers and themed social gatherings.

Although activity offerings are not as extensive as the SVs (e.g., fitness classes only twice a week), there are several clubs, groups and activities organized by the residents themselves (e.g., walking, yoga, tai chi, gardening, shuffleboard and horseshoe clubs). While the townhomes have their own individual gardens, there is a large communal gardening area for those living in the Atrium Suites and Sunshine Centre.

Luther Village is located directly between the Westmount Plaza and the Waterloo Memorial Complex. The plaza includes a bank, drugstore and other small shops, while the recreational complex has a walking track, swimming pool and other activities. Waterloo Park and the centre of uptown Waterloo are within walking distance.

Luther Village does not have a permanent on-site shuttle bus for regular trips to grocery stores and restaurants, unlike the SVs. However, when there is sufficient interest for posted events (e.g., theatre, the Toronto Flower Show, Art Gallery and Museum, Niagara Falls) staff will rent a van or bus to provide transport. The nearest public bus stop is located beyond the Westmount Plaza. Although Grand River Transit offered to install a bus stop near the entrance, there was insufficient resident interest (Sousa, 2013).

3.3 Resident Transportation Patterns Survey (RTPS) at the SVs

When the project began, neither the staff at the SVs nor the RIA knew how many of their residents were still driving, although some had parking spaces at the villages.

Thus, the first step was to survey residents to determine the proportion who were still driving, as well as those who had quit driving. An initial one-page survey was conducted in the four SVs between August and October 2011, followed by a more extensive survey in 2012. Details of the initial survey can be found in a report prepared for the RIA (Janssen-Grieve, Myers & Crizzle, 2012).

The second survey, called the Resident Transportation Patterns Survey (RTPS), shown in **Appendix A** asked retirement residents for basic information (age, gender, Village, month and year of move, where they lived before), driving status and use of various types of transport. The RTPS was distributed to 732 residents living in the retirement sections of the four SVs (except for those in memory care) in mid-October, 2012. By the end of February 2013, 407 surveys had been returned for a response rate of 55.6%. As driving status was missing on 8 of the surveys, only 399 were analyzed by the researchers (including the present author). Findings from the RTPS were presented at a poster session at the 66th annual meeting of the Gerontological Society of America (Myers, Janssen-Grieve, Sousa, Gooderham, Crizzle, Brown, & Pfisterer, 2013).

Breakdown of driving status by village (shown in **Table 3.1**) was used to identify residents who were potentially eligible for the in-depth studies on former and current drivers, described below. The sample (N=399) ranged in age from 65 to 100 (mean age 86.8 ± 5.7), comprised 272 women (68.2%) and 127 men (31.8%); these residents had lived in the Schlegel Villages on average for 2.23 ± 2.4 years.

Table 3.1: Driving Status by Village based on the RTPS

	Current	Former	Never	Total
Taunton Mills	35	74	15	**124**
Humber Heights	14	81	16	**111**
Riverside Glen	6	44	5	**55**
Winston Park	27	74	8	**109**
Total	**82 (20.6%)**	**273 (68.4%)**	**44 (11.0%)**	**399**

3.4 In-Depth Study on Former Drivers

The study on former or ex-drivers was conducted by Courtney Janssen-Grieve (CJG) for her Master's thesis. To be eligible for the study residents had to be aged 65+ and stopped driving in the prior two years. Multiple recruitment strategies were employed, which are described fully in her thesis (Janssen-Grieve, 2013) and briefly in Chapter Four. Data was collected from January to March, 2013 on a sample of 20 residents (mean age 86.5 ±4.9, range 75 to 97; 55% women). The methods included: questionnaires (background, driving history, and current transportation use, activities in and outside the Village), scales (depression, balance confidence) and interviews or small group discussions regarding driving cessation, relocation and transportation needs. Seventeen of the 20 subjects also completed real-time, daily travel diaries (number of trips outside the Village, mode of travel and purposes) for two weeks. Permission was obtained to obtain information from their fall incident reports routinely collected by the SVs (the form is shown in **Appendix B**).

The data on former drivers from the RTPS showed that over half had stopped driving within 12 months of relocation, suggesting a temporal association between these transitions. The 20 residents who took part in the in-depth study were comparable to

those who completed the RTPS but chose not to participate further (n=97) with respect age, gender and timing of driving cessation in relation to relocation. The in-depth study indicated that these residents were not depressed and appeared to have adjusted to no longer driving. Despite mobility restrictions (85% used a walker or cane outdoors; 45% reported falling in the past year), they remained active in and outside their Village. Further details can be found in the thesis (Janssen-Grieve, 2013).

3.5 In-Depth Study on Current Drivers

3.5.1 Phase One

The study on current drivers began by Sarah Sousa (SS) for her Master's thesis, assisted by the present author (SG) who did all the functional assessments (described in Chapter Four). The 38 participants in the Sousa thesis (27 from the SVs and 11 from LV) were assessed from February 4, 2013 to July 17, 2013. The 27 participating residents from the SVs were comparable to those who completed the RTPS but chose not to participate further (n=47) with respect to age, gender, level of independence (based on type of accommodation), year of move and how often they reportedly drove per week.

Some of the tools (i.e., part of the background questionnaire, transportation use questionnaire, 14 day travel diaries, activity checklists) and protocols (e.g., permission to access fall incident reports) were comparable to Janssen-Grieve's study to permit comparisons between current and former drivers. However, only the current drivers underwent assessments of cognitive, visual and mobility functioning. These measures and the electronic devices used to examine actual driving practices (exposure and patterns) are fully described in the next chapter. Preliminary findings indicated that seniors living in retirement villages had more restricted driving practices compared to prior findings on

community living seniors. Further details, including an environment scan and detailed examination of qualitative findings from the interviews concerning transportation needs, can be found in her thesis (Sousa, 2013).

3.5.2 Phase Two

As noted above, the present author was involved in the study on current drivers from the outset, and together with Sarah Sousa received training from Drs. Crizzle and Myers on administering the functional assessments and working with the driving data (installing and removing the devices, data cleaning and analyses). Both Sousa and the present author were included as student investigators for ORE ethics approval.

It was recognized from the outset of the project that the magnitude of the study on current drivers which included in-vehicle monitoring of naturalistic driving practices was beyond the scope of an individual Master's thesis. Therefore, in conjunction with the committee, it was agreed that for his Master's thesis, the present author would examine the data on functional assessments and from the fall incident reports, and statistically compare the data that was collected from both former and current drivers. Additionally, phase two would include a more extensive examination of the driving data (e.g., consistency from week one to week two) and weather conditions over the monitoring period. As described next in Chapter Four, a further wave of recruitment and assessment of current drivers was also necessary to increase the sample size.

Chapter 4: Methods

The rationale for the project as a whole and for this study was described in Chapters One and Three. As described in Chapter Three, this thesis constitutes the second phase of the study on current drivers, as well as a comparison of the current and former drivers. This chapter begins by presenting the study objectives. Sample recruitment is described next, followed by processes for obtaining participant consent and ethics approval. Data collection procedures are then outlined, including a description of the instruments, data handling and analyses.

4.1 Objectives

The four **primary study objectives** (the first three of which pertain only to the sample of current drivers) were as follows:

1. To examine actual driving practices and other modes of travel in relation to functional abilities and other characteristics.
2. To examine associations between driving and other modes of travel with community engagement.
3. To examine fall status and compare fallers and non-fallers.
4. To compare current and former drivers with respect to falls, balance confidence, depression, activity levels in and out of Village (engagement) and travel patterns.

The matrix in **Appendix C** shows the primary variables and data sources for each of the objectives. Although not a primary objective, the psychometric properties of the extended 27-item Activities specific Balance Confidence (ABC) Scale were also examined.

4.2 Schlegel Village Recruitment

As described in Chapter Three, a sample of 20 former drivers and 27 current drivers were recruited from the retirement living areas in four Schlegel Villages (SVs). The RTPS was used as a starting point to identify residents who were potentially eligible based on age (65+) and driving status. For the in-depth driving study, residents had to be actively driving (at least once a week), have a vehicle that was 1996 or newer and non-hybrid (for compatibility with the CarChip device), and keep their vehicle at the Village.

Recruitment strategies for the former and current driver studies are detailed in the Janssen-Grieve (2013) and Sousa (2013) theses, respectively. Briefly, subjects for both studies were recruited through pamphlets left in the mailboxes of eligible residents identified through the RTPS and more personalized strategies (i.e., talking to residents in the main areas). As we had only had 15 sets of electronic devices, recruitment and assessment of current drivers was staggered. The first three waves of data collection for current drivers from the SVs and dates of participation are shown in **Table 4.1**.

Table 4.1: **Sample of Driving Residents from the Schlegel Villages**

	# of participants	**Village**	**Dates of participation**
Wave 1	12 (7F, 5M)	Winston Park	February 4 - March 20, 2013
Wave 2	12 (6F, 6M)	Taunton Mills	February 26 - May 15, 2013
Wave 3	2 (1F, 1M)	Humber Heights	May 23 - June 14, 2013
Total	26 (14F, 12M)	All SVs	February 4 - June 14, 2013

Note. One woman from Riverside Glen completed the first session on May 17, 2013 but then withdrew from the study due to personal circumstances.

4.3 Luther Village Recruitment

The first wave of recruitment at Luther Village (LV) began June 17, 2013. The primary method of recruitment consisted of presentations by SS and the present author at the Monday morning coffee club for the residents from the townhomes and Atrium suites.

As noted in Chapter Three, data for 11 drivers (7 from the townhomes, 3 from the condos, and 1 from the Sunshine Centre) were included in Ms. Sousa's thesis (2013). This preliminary data constituted part one of the study as described in Chapter Three. To increase the sample size of current drivers, further recruitment and assessment was conducted at LV by the present author. A number of residents indicated their willingness to participate at a later date (August or September) due to summer vacations.

Additional participants were recruited through the Monday coffee club on September 9, 2013, as well as a table set-up in the Great Hall. The letter of study information tailored for LV residents can be found in **Appendix D**. In an attempt to recruit more participants from the Sunshine Center (SC), the present author worked with the Wellness Centre coordinator. Letters were distributed between August 19 and 23, 2013 to all actively driving residents in the SC, followed up by phone calls the first week of September. Only one additional driver from the SC was willing to participate.

As a final push for recruitment, a table was setup in the centre of the Main Entrance Hall on September 30, from 9am to 4pm. The researcher attended the table for the day, providing study information to residents as they passed by on their way to their mailboxes, the café, store or restaurant. As a result, 10 more residents signed up for participation in October 2013. In summary, an additional 17 participants (6 from the townhomes, 10 from the suite and 1 from the Sunshine Centre) from LV were recruited and assessed by the present author. Together with the 11 drivers included in Sousa's thesis, this brought the total sample of current drivers from the LV to 28 (13 from the townhomes, 13 from the Atrium Suites, and two from the Sunshine Centre).

4.4 Ethics Approval and Consent

Approval for the driving study (which included both Sousa and Gooderham as student investigators) was secured from the ORE prior to recruitment (January 14, 2013) in the SVs. Further ORE approval (form 104) concerning recruitment in LV and associated modifications to materials (i.e., the letter of information, permission forms, wording on questionnaires and checklists) was secured June 3, 2013, prior to approaching residents. As noted in Chapter Three, consent was obtained from participants in both the former and current driver studies to access their fall incident data. The fall/accident report forms used by the Schlegel Villages and Luther Village, respectively, are shown in **Appendix B**. The researchers provided confidential ID numbers and start dates for each of the SV participants to the RIA who then generated an electronic report concerning any falls which had been recorded in the prior two years. For the LV participants, the Wellness Coordinator manually searched the incident reports archives going back two years. Additionally, 25 participants from the SVs and all 28 participants from LV provided permission for future follow-up contact.

4.5 Study Protocol

Figure 4.1 shows the protocol used in the driving study by both SS and the present author. Similar to prior naturalistic driving studies with older adults (Trang, 2010 and Crizzle, 2011) this study consisted of two meetings with participants before and after a two-week driving monitoring period.

In the SVs, sessions took place in quiet meeting rooms, most often the libraries and the Country Kitchens. At LV, the first session took place in their homes or rooms, except for one participant who was assessed in the Great Hall after the Monday morning

Coffee Break. The second sessions at LV were generally held in the Little Hall (a private meeting room), except for three residents who were assessed in the Wellness Centre (semi-private area for functional assessments and fully private for questionnaires). Each component is described below.

Figure 4.1: Study Protocol

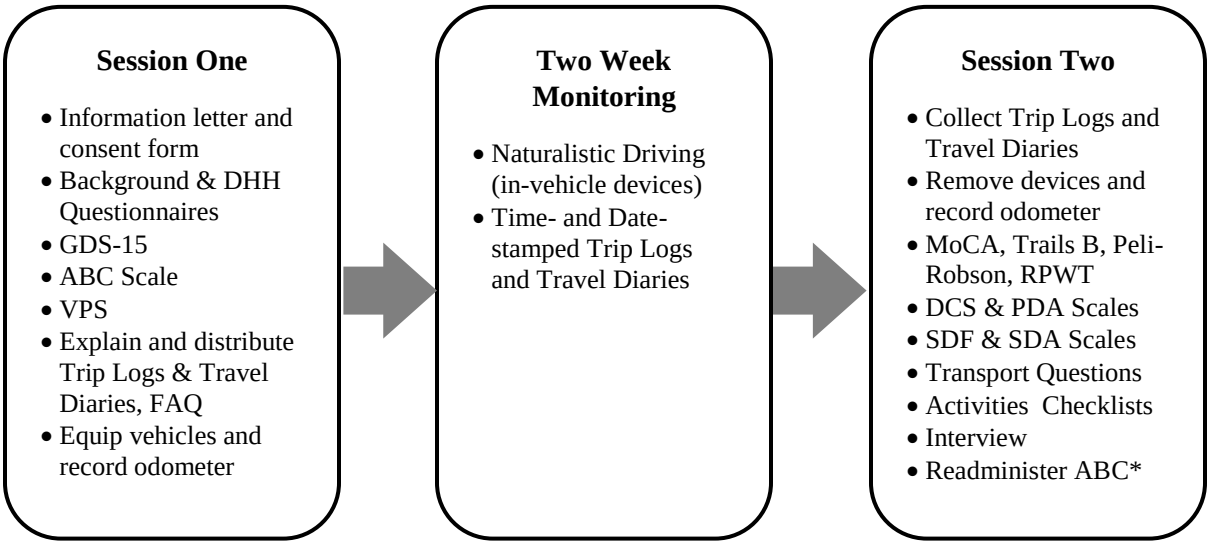

Figure Legend: **DHH** = Driving History & Habits Questionnaire; **GDS** = Geriatric Depression Scale; **ABC** = Activities-specific Balance Confidence Scale; **VPS** = Vitality Plus Scale; **FAQ** = Frequently asked questions regarding the devices; **MoCA** = Montreal Cognitive Assessment; **RPWT** = Rapid Pace Walk Test; **DCS** = Day and Night Driving Comfort Scales; **PDA** = Perceived Driving Abilities Scale; **SDF** = Situational Driving Frequency Scale; **SDA** = Situational Driving Avoidance Scale. *Readministration of the ABC was optional at the SVs.

4.5.1 First Session

Checklists were developed for each session to help ensure consistency. At the first visit the researcher (Sousa or Gooderham) reviewed study information, explained the purpose of the devices, and obtained study consent and consent to access information from the village incident reports**.** Materials for the first session, including the template example for the travel diary, can be found in **Appendix E**.

Participants were asked to complete, in order, the background and driving history questionnaires, followed by the GDS, VPS and ABC scales (described below). Although all these measures were self-completed, the researcher was present to answer questions. Next, the researcher explained the trip logs and travel diaries and provided examples and instructions for both. Infrequent, but potential problems with the devices were reviewed and participants were given a sheet of Frequently Asked Questions developed by Dr. Crizzle as well as the researcher's phone number.

The researcher then accompanied the resident to their vehicle, installed the two electronic devices and recorded the odometer reading as well as device numbers. A set of trip logs attached to a clipboard was left in the person's vehicle and a set of 14 travel diary forms (with examples as shown in **Appendix E**) was given to the resident. Participants were instructed to drive as they usually would for the two-week monitoring period. They were also reminded to try not to take their vehicle in for regular servicing over this period, or if they did to remind the mechanic to replace the CarChip and Otto devices following servicing. They were asked to complete the travel sheets (concerning non-driving trips outside the village) throughout the day or at the end of the day.

The first session, on average, took 45 minutes to complete (including 10 to 15 minutes to accompany the participant to their vehicle and install the devices). Most were assessed individually, however some residents (up to three) were scheduled together.

Background and Driving History & Habits Questionnaire

The background questionnaire was used to collect basic personal information such as age, gender, education, marital status, living arrangements (Part A), information on where they lived before they moved to the village (Part B), as well as general health,

mobility and falls (Part C). The Driving History & Habits Questionnaire (DHHQ) adapted from Crizzle (2011) was used to gather information on driving history, habits and preferences, and intentions concerning future driving reduction and cessation.

The Geriatric Depression Scale - GDS-15

Although the GDS-5 (plus an additional item) was used in Janssen-Grieve's study, this measure only provides a dichotomous score. It was decided to use the GDS-15 for the present study as this version has been used in other naturalistic driving studies (e.g., Crizzle, 2011; Marshall et al., 2013), and can be scored continuously to permit correlational analyses. Comparisons of current and former drivers were limited to the proportions who fell below the cut-off for depression on each version of the GDS.

The Activities-specific Balance Confidence (ABC) Scale

The 16-item ABC Scale, designed for community living seniors, is widely used (Jorstad et al., 2005) and has good test-retest reliability, evidence of construct validity and discriminative properties (Powell & Myers, 1995; Myers et al., 1996; Myers et al., 1998). Based on Rasch analyses with several large samples, a five-point rating scale was used in both the Crizzle (2011) and this project. As previously described by Janssen-Grieve (2013) and Sousa (2013), the wording of a few items were modified to be more relevant to retirement living and 11 new items added to capture activities encountered when walking, crossing streets and using public transit. It is important to note that scale scores can still be compared to prior studies that used the original ABC scores. This extended 27-item ABC scale was administered to all participants and re-administered to four former drivers from the SVs former drivers and 20 current drivers from LV to examine test-retest reliability.

The Vitality Plus Scale (VPS)

The 10-item Vitality Plus Scale (VPS) was used as a measure of general well-being. This scale measures interrelated psychophysical components of well-being such as sleep, appetite and energy level that are influenced by physical activity/inactivity (Myers, Gray, Tudor-Locke, Ecclestone, O'Brien Cousins & Petrella, 1999). The VPS has demonstrated good psychometric properties, including test-retest reliability (ICC= 0.87), associations with measures of physical functioning (e.g., TUG test [r =-.58] and walking speed [r =.43]) and scores on the Vitality (VIT) subscale of the SF-36 (r =-.65, p <0.001) (Myers et al., 1999). Only 8 FDs in CJG's study completed the VPS.

4.5.2 Two-Week Driving Monitoring Period

A two-week monitoring period was chosen to allow for more driving opportunities and to permit comparisons with prior findings (Myers et al., 2011; Crizzle & Myers, 2013). Modeled after previous naturalistic driving studies on older adults (Blanchard & Myers, 2010; Crizzle and Myers, 2013; Myers et al. 2011), driving exposure and patterns were examined using two electronic devices, the CarChip® and the Otto Driving Companion®, installed in participant vehicles for two weeks. Both devices collect similar date and time-stamped information (e.g., distance travelled, duration); while the GPS feature of the Otto permits examination of radius or distance travelled from home. Odometer readings were recorded at the beginning and the end of the period as backup data for total driving distance (km).

Car Trip Logs & Travel Diaries

Over the monitoring period, car trip logs were used to verify who drove the vehicle, as well as to obtain descriptions of trip purposes and general weather conditions

and to cross-check the data. For example, if data was missing from the CarChip or Otto, data from the other device, together with information from the trip logs, was used to reconstruct routes. A copy of the car trip logs can be found in Sousa's thesis (2013), as well as technical details on the CarChip and Otto devices which can be found in Crizzle's thesis (2011) and several publications mentioned above.

All participants were asked to complete daily travel diaries to capture other modes of travel outside the Village (e.g., as a passenger in someone else's vehicle, walking, using taxis, public transit or the Village shuttle), as well as trip purposes. Each day they were asked to indicate how many non-driving trips they made outside their village, where they went or what they did (e.g., shopping), the mode(s) of travel to and from the destination(s) and the approximate times they left and returned home (see **Appendix E).**

4.5.3 Second Session

Following the two week monitoring period, the researchers met with the participants as soon as possible (within 15 to 21 days after the 1st session). However, only the first 14 days of driving data were used for analyses. As shown above in **Figure 4.1**, the session began by collecting the trip logs and removing the devices from the vehicle. The second session took about 60 minutes on average, including 10 to 15 minutes to accompany participants to their vehicles.

If more than one person was scheduled at the same time, two areas were set up at opposite ends of the room. At one end, a small table was set up to administer the MoCA and Trails B, as well as the Pelli-Robson vision charts and an area was marked off for the Rapid Pace Walk test. At the opposite end, a table was set up for questionnaire and scale completion and an interview (described below). Tests were administered in the same

order, regardless which part participants did first. A protocol was developed to ensure consistent administration of the functional assessments (shown in **Appendix F,** together with all other materials for the second session). The instruments are described below.

Montreal Cognitive Assessment

Similar to the studies by Crizzle and Candrive, the Montreal Cognitive Assessment (MoCA) was used to assess cognitive functioning. The MoCA covers a broader range of cognitive domains than the Mini Mental State Exam (MMSE) (Rapoport, et al., 2013) and is less prone to ceiling effects (Zadikoff, Fox, Tang-Wai, Thomsen, de Bie, Wadia et al., 2008). The MoCA is comprised of 12 tests covering multiple domains: executive function/visual spatial, naming, memory, language, attention, abstraction and orientation (Gill et al., 2008; Nazem et al., 2009). The MoCA is usually scored from 0-30, with scores below 26 indicative of mild cognitive impairment (MCI) (Nasreddine, Phillips, Bedirian, Charbonneau, Whitehead, Collin et al., 2005). As education is known to affect MoCA scores, a one-point correction should be given to individuals with 12 years or less education (Nasreddine et al., 2005).

Trailmaking Test, Part B

The Trailmaking Test, Part B (Reitan, 1958), is a reliable, valid and widely used neuropsychological test of processing speed, divided attention and executive function (Rapaport et al., 2013). As the task is timed, participants are required to draw lines between the alternating numbers and letters in order as quickly as they can. Similar to the Candrive study (Rapoport et al., 2013), both time for completion and number of errors were recorded, with poor performance constituting 3 minutes and 3 errors or more (Roy & Molnar, 2013; Dobbs & Shergill, 2013).

Pelli-Robson Contrast Sensitivity Test

Binocular contrast sensitivity was assessed using the Pelli-Robson vision charts (Pelli et al., 1988) expressed log units. Individuals were positioned one meter from the chart (marked by tape) and asked to read out loud the letters as the researcher pointed to each, in order from left-to-right, top-down. Results were scored using a 'letter-by-letter method' (Haymes et al., 2006) in which 0.05 log CS is awarded for each correct letter identified within each triplet. Scores worse than 1.25 indicate impairment (e.g., Crizzle, 2011) and have been related to crash involvement (Owsley et al., 2001). To ensure consistency, a photometer was used to measure the amount of light (LUX) in the assessment area and adjusted as needed (e.g., opening or closing window coverings). With a target of 915 LUX, the test was always administered within the suggested range of 600-1200 LUX (LUX must be kept above the minimum of 200, but with no upper limit specified in the literature).

Rapid Pace Walk Test

The Rapid Pace Walk (RPW) test was used to assess motor speed and function (Staplin et al., 2003), as well as stride length, balance and overall mobility (Crizzle et al., 2013a). Start and end points (as well as a measured distance of 10 feet) were indicated by masking tape and a tape measure (to the side of a clear walking path). Following demonstration, the person was told they could use their cane or walker (if applicable) and asked to walk as quickly as they felt safe and comfortable. The RPW has been found to be strongly associated with driving ability and with more adverse events (accidents) in older adults who take longer than 7 seconds for completion (e.g., Marrottoli et al., 1994).

More recently, Staplin et al. (2003) found > 9 seconds on the RPW test was associated with heightened crash risk.

The Driving Comfort Scales (DCSs)

Driving comfort was assessed using the 13-item Driving Comfort Day (DCS-D) and 16-item Driving Comfort Night (DCS-N) scales. People were asked to rate their level of comfort in various driving situations on a 5-point scale, with higher scores indicating greater comfort (Myers et al., 2008). Both scales were developed with older drivers, and have shown good person (DCS-D, .89; DCS-N, .96), item (DCS-D, .98; DCS-N, .97) and test-retest reliability over 7 to 16 days (ICC= .91 and .86) respectively (Myers et al., 2008). Good test-retest reliability was confirmed with an independent sample of older drivers (Blanchard & Myers, 2010).

The Perceived Driving Abilities (PDA) Scale

To assess participants' perception of their driving abilities, the 15-item Perceived Driving Abilities (PDA) Scale was used. Respondents were instructed to rate their current driving abilities using a four-point scale from *poor* (score = 0) to *very good* (score = 3). Scores range from 0 to 45, with higher scores indicating greater perceived driving abilities (MacDonald et al., 2008). The PDA scale has good item (.96) and person (.92) reliabilities, good internal consistency (α=.94) (MacDonald et al., 2008), and moderate test-retest reliability (ICC = .65) (Blanchard & Myers, 2010).

The Situational Driving Frequency (SDF) and Avoidance (SDA) Scales

The Situational Driving Frequency (SDF) and Avoidance (SDA) scales were used to assess self-reported driving restrictions. The 14-item SDF scale asks people how often they drive in various challenging driving situations and is scored using a five-point scale

(from never to very often, 4-7 days per week); scores can range from 0 to 56. The SDA scale, meanwhile, asks people to check, from a list of 20-items, which driving situations they try and avoid if possible. Scores can range from 0 to 20. The 21st item ("No I don't try of avoid any of these situations") is used to verify that people read through the list. Higher scores on the SDF and lower scores on the SDA indicate fewer driving restrictions. Both the SDF and SDA scales have shown high internal consistency (α = .92, .87) and 7-14 day test-retest reliability (ICC= .89, .86), respectively (MacDonald et al., 2008). Further examination with a separate sample of older drivers, by Blanchard & Myers (2010) also found the SDF and SDA scales to have high internal consistency (α= .92, .87) and good test-retest reliability (ICC=.89, .86).

Transportation Use, Activities and Service Use Questionnaires

The transportation use questionnaire was developed for this project to examine how often residents use various types of transport (apart from driving themselves), including motorized wheelchairs, scooters and walking, to leave their villages.

Questionnaires and checklists were developed to assess activity and group participation in and outside the Village, as shown in **Appendix F**. A checklist was developed to look at the use of Village services and amenities over the prior month, as well as physical activity classes in the past week.

With respect to engagement, we developed three measures: 1) social engagement with family and friends outside the village (Q9); 2) participation in groups and organizations over the past month (Q1), and; 3) community activity engagement (Q2). For our community engagement measure, Marottoli et al.'s (2000) list of nine out-of-home activities (i.e., shopping; going to a movie, restaurant or sporting event; taking day

or overnight trips; performing unpaid community or volunteer work; regularly playing cards, games or bingo; attending religious services; participating in non-religious voluntary organizations; and paid employment) was used as a starting point. We also considered the measure used by Jenkins et al. (2002) to assess activity participation outside retirement communities during the past month: going to a movie theatre; church or synagogue; library; store; home of friend or relative; restaurant; senior centre; or community recreation center (possible range 0 to 8). Similar to Jenkins et al. (2002), we asked people to check the number of activities they did outside their retirement community over the past month.

Interview

The second session concluded with an interview in which participants were asked if they had driven any other vehicles over the two weeks, if they had any problems with the devices and whether the two week monitoring period was typical of their usual driving patterns. Additionally, the researcher inquired about sharing rides with other residents and participants had the opportunity to provide suggestions on how the Village might provide additional support. Finally, they were asked for permission to contact them for possible follow-up, with no obligation.

4.6 Data Handling and Analysis

The student researchers (Janssen-Grieve, Sousa, Gooderham) developed three databases using the Statistical Package for the Social Sciences [SPSS], Version 20, containing only confidential identifiers (no names), stored on password protected computers. One database contained responses on the RTPS, the second data from the

former driver study, while the third contained the data from the current driver study. The latter two databases were merged by the present researcher for statistical comparisons.

All scales were scored according to the developer's instructions. Qualitative data from the open-ended questions and the interview were subjected to content-analysis, categorized and entered into the SPSS database. Descriptive analyses were used for continuous and categorical variables. Continuous variables included calculations of central tendency such as mean, standard deviations, and range. Categorical variables were expressed as frequencies and percentages. In order to determine the appropriate analyses (parametric versus non-parametric), primary variables were assessed for normality, using both visual examination (e.g., normal probability plots) and statistical tests (i.e., Shapiro-Wilks test). Results are shown in **Appendix G**.

Depending on normality, either parametric (e.g., Person r, independent or paired t-tests, chi-square) or non-parametric tests (e.g., Spearman rho, Mann-Whitney U, Wilcoxin, Kruskal-Wallis) were used to examine associations and make comparisons (e.g., by gender and cognitive scores). Analysis of variance (ANOVA) was used for multiple comparisons (e.g., fall status, level of independence), followed by post hoc analyses when the overall F was significant. As described in Chapter Five, regression analyses were conducted to examine predictors of community engagement.

4.6.1 Naturalistic Driving Data

Ms. Sousa cleaned and entered the driving data into the SPSS database for the 38 participants assessed between February 4 and July 18, 2013. Subsequent data was cleaned and entered by the present author, guided by both Dr. Crizzle and Ms. Sousa. Cleaning and verifying the driving data involved the removal of non-participant trips (identified

using the trip logs) and any with 0 km (Blanchard, 2008; Trang, 2010; Crizzle, 2011). Data was cleaned in Excel and uploaded using software for the CarChip and Otto data (Otto Configuration Software, Version 1.03). As mentioned, the Otto device data was used to determine radius (distance from home) and to supply missing CarChip data when required. Trip radius was determined by drawing a line between the village location and the furthest point of the individual's trip using the Otto data and maps from Google Earth. Each trip was defined as leaving and returning to one's home, while each stop made during a trip was considered a segment (returning home was not considered a stop).

Local archives of sunrise, sunset times and amount of daylight (hours/minutes), together with the date and time-stamped CarChip data, was used to classify daytime versus night driving, using the criteria shown in **Table 4.2**.

Table 4.2: Criteria for Daytime versus Night Driving

Daytime Trips	Trips after sunrise but before sunset
Night Trips	Trips after sunset before the next sunrise
Partial Night	Trips that begin in daylight (before sunset) and end in darkness (after sunset)

Environment Canada archives (www.weather office.ec.gc.ca) and participant descriptions from their trip logs were both used to examine the weather conditions over the monitoring period. In cases of disagreement, participant descriptions were used as prior studies have shown that driver perceptions of observable weather conditions appear to have a greater influence on driving practices than weather forecasts (e.g., Kilpelainen & Summala, 2007). Moreover, regional forecasts do not always match local conditions at the time of driving (Blanchard, 2008).

Studies by Langford and colleagues (2006), as well as others, have argued that low mileage drivers may be at greater risk for collisions as they tend to drive in more

congested areas; crashes at intersections are a particular concern. Most studies on the 'low mileage bias' have used self-reported annual mileage to classify people into low (<3,000 km), middle (3,000 to 14,000 km) and high (>14,000 km) mileage drivers. Blanchard (2008) established weekly equivalents of actual mileage using CarChip data. Using these weekly equivalents, this classification system (shown in **Table 4.3**) was used by Trang (2010) and Crizzle (2011) as well as in the present study to compare retirement living drivers to these prior studies with community living older drivers.

Table 4.3 Classifications of Mileage Groups

Low	< 57.7 km per week (< 3000 km annually)
Middle	57.7 to 269.2 km per week (>3,0000 but < 14,000 km annually)
High	>269.2 km per week (> 14,000 km annually)

The matrix shown in **Appendix C** lists the primary variables and associated data sources that were used to examine each of the study objectives. The following Chapter presents the results of the study, using pseudonyms in place of resident names to protect confidentiality.

Chapter 5: Results

5.1 Recruitment

As shown in **Table 5.1**, data collection began on February 4, 2013 at Winston Park and ended on October 25, 2013 at Luther Village. Assessments between February and July 18 (a.m.) were conducted by both SS and the present author, while the present author conducted the remaining assessments at Luther Village beginning the evening of July 18, 2013 onwards. The final sample (N=55), average age 81.9 ± 6.3 (range 66 to 95), consisted of 27 men and 28 women.

Table 5.1: Data Collection at each Site

Location	Start and End Dates	First Session	Second Session
WP	February 4 to March 13, 2013	12(5♂, 7♀)	11(4♂, 7♀)
TM	February 26 to May 15, 2013	12(6♂, 6♀)	12(6♂, 6♀)
RG	May 17 to May 31, 2013	1(1♀)	0
HH	May 23 to June 14, 2013	2(1♂, 1♀)	2(1♂, 1♀)
LV	June 17 to October 25, 2013	28(15♂, 13♀)	26(13♂, 13♀)
Totals		**55**	**51**

5.2 Data Completeness

A synopsis of data completeness is shown in **Table 5.2** and discussed further below.

Table 5.2: Data Completeness

		SVs	LV	Total
Sessions Completed	*Time 1 (T1)*	27	28	**55**
	Time 2 (T2)	24	26	**50**
Functional Assessment	*MoCA*	24	26	**50**
	RPW	24	26	**50**
	Trails B	24	26	**50**
	P-R CS	24	26	**50**
ABC	*T1*	27	28	**55**
	T2	0	20	**20**
Driving Data	*Otto*	11	25	**36**
	CarChip	22	27	**49**

		SVs	LV	Total
Diaries & Logs	*Travel Diaries*	23	27	**50**
	Trip Logs	22	27	**49**
Consent	*General*	27	28	**55**
	Fall reports	27	28	**55**
	Follow-up	24	26	**50**

Study withdrawals: As can be seen from **Table 5.1,** four individuals (one each from WP & RG, and two from LV) did not complete the second assessment. The three withdrawals prior to July 18 are described in Sousa's thesis (2013). The additional withdrawal from LV (GEDA) did not want to do the second session (due to bad cold) nor did he want to reschedule. However, his in-vehicle devices and completed trip logs and travel diaries were collected. Missing components for sessions one and two, respectively, are shown in **Table 5.3**.

Session one data: The background and driving history and habits questionnaire (DHHQ), as well as the ABC scale were completed by all 55 participants. The GDS-15 and the VPS were not completed by one resident (JOSM from TM) who had to end the session early, while another did not rate the required number of items (75%) on the VPS for a total score.

Session two data: In addition to the four withdrawals, JOSM (TM) did not stay for the full second session, thus did not complete the SDF scale, Activities outside the Village questionnaire the functional assessments or the interview. Interviews were not conducted with three others (JOSH, JOPE and KABE) due to participant time constraints.

Table 5.3: Missing Components for Sessions One and Two

Session One					
# missing	**GDS-15**	**VPS**	**ABC-27**	**Background Questionnaire**	**DHHQ**
	1	2	0	0	0

Session Two					
# missing	**SDA**	**SDF**	**PDA**	**DCS-D**	**DCS-N**
	4	5	4	4	4
# missing	**Transportation Questionnaire**	**Services & Amenities**	**Interview**	**Functional Assessments**	**Out of Village Activities Quest.**
	4	4	8	5	5

Note: n=4 withdrew prior to the second session and the number is reflected in the # missing

Driving data: Ten people in the study lived together or shared vehicles, as described in **Table 5.4.** Those who shared vehicles were given a separate set of car trip logs for each driver and were instructed to initial every log to differentiate between drivers. CarChips were installed in the vehicles (or shared vehicles) for 53 of the 55 study participants. One woman (JOSM) did not want the devices installed, while one man's car (JOSH) was not compatible with the device. Otto devices, meanwhile, were only installed in 41 vehicles, primarily due to the maps for the Whitby area not being available in time for 9 of the 12 TM participants (see Sousa, 2013).

Table 5.4: Participants who Shared Vehicles or Lived Together

Location	
SV	Two females shared a vehicle, although only one drove during the two-week period due to the illness of the other female.
SV	A married couple (male and female) shared a vehicle and the driving.
LV	A married couple (male and female) shared a vehicle and the driving.
LV	A married couple (male and female) each had their own vehicle and drove only that vehicle for the study period.
LV	A married couple (male and female) each had their own vehicle and drove only that vehicle for the study period.

Data from the CarChips was not usable in four cases (see **Table 5.5)** either due to people withdrawing, or failure of the device to record data. Otto data was not usable for five of the installed devices, primarily due to problems with active socket in older car

models. All 17 participants assessed after July 18 had complete CarChip and Otto data. One woman (JOTA from LV) had a monitoring period of only 12 days due to vacation.

Table 5.5: CarChip and Otto Data by Location

Data Collection Location	Car Chip		Otto	
	Installed	Useable	Installed	Useable
Winston Park	11	11	10	9
Taunton Mills	10	10	3	1
Riverside Glen	1	0	1	0
Humber Heights	2	2	1	1
Luther Village on the Park	28	26	26	25
Total	53	**49**	41	**36**

Trip logs and travel diaries: Although 49 sets of trip logs were recovered, half of the logs from the SV group and 11% from the LV group had missing information concerning presence of passengers. Thus, passenger information was not analyzed further.

Four people from the SVs (DOHO, OLRO, JOSM, ROKE) did not bring travel diaries to the second session; all of whom said they had not made any non-driving trips outside the village in the last two weeks. Meanwhile, ten participants from LV (KEWI, DOED, MASM, JOKE, EDAP, DASM, JOTA, BALE, DIAL, SHJO) brought blank travel diaries to the second session, three of whom had dated all 14 of their sheets. All confirmed they had not made any non-driving trips. These 14 people were assigned a value of 0 for the analyses on number of non-driving trips.

5.3 Driver Characteristics

5.3.1 General Characteristics

Prior to analysis, demographic and other primary variables (scores on the various scales, driving indicators) were checked for normality and the results are shown in **Appendix G**. Primary characteristics of full sample, as well as the SV and LV groups,

obtained from the background questionnaire are presented in **Table 5.6**. Additional results can be found in **Appendix H.**

Table 5.6: Sample Characteristics by Village and Gender

	SV Group (n=27)	LV Group (n=28)	Full Sample (N=55)		
			Males (n=27)	Females (n=28)	Total (N=55)
Gender	12 (44.4)	15 (53.6)	-	-	27 (49.1)
Male	15 (55.6)	13 (46.4)			28 (50.9)
Female					
Age[a]	84.33±3.9	79.57±7.1	82.74±6.7	81.11±5.6	81.91±6.2
	75 to 91	66 to 95	66 - 95	70 - 91	66 - 95
Education[a]	n=25			n=26	n=53
Some high school	6 (24.0)	3 (10.7)	3 (11.1)	6 (23.1)	9 (17.0)
Completed high school	3 (12.0)	4 (14.3)	4 (14.8)	3 (11.5)	7 (13.2)
Some college	5 (20.0)	3 (10.7)	3 (11.1)	5 (19.2)	8 (15.1)
Completed college	9 (36.0)	5 (17.9)	6 (22.2)	8 (30.8)	14 (26.4)
Graduate/prof. degree	2 (8.0)	13 (46.4)	11 (40.7)	4 (15.4)	15 (28.3)
Employment					
Full or part-time	0 (0)	1 (3.6)	1 (3.7)	0 (0)	1 (1.8)
Retired	26 (96.3)	26 (92.8)	26 (96.3)	26 (92.9)	52 (94.5)
Never worked	1 (3.7)	1 (3.6)	0 (0)	2 (7.1)	2 (3.6)
Accommodation SV			n=12	n=15	n=27
Apartment (full kitchen)	15 (55.6)	N/A	6 (50)	9 (60)	15 (55.6)
Apartment (kitchenette)	5 (18.5)		3 (25)	2 (13.3)	5 (18.5)
Main floor room	7 (25.9)		3 (25)	4 (26.7)	7 (25.9)
Accommodation LV			n=15	n=13	n=28
Townhome		13 (46.4)	7 (46.7)	6 (46.2)	13 (46.4)
Condo/ suites	N/A	13 (46.4)	7 (46.7)	6 (46.2)	13 (46.4)
Rented room		2 (7.2)	1 (6.7)	1 (7.7)	2 (7.1)
Marital Status[a, b]					
Married	8 (29.6)	19 (67.9)	18 (66.7)	9 (32.1)	27 (49.1)
Divorced	0 (0)	2 (7.1)	0 (0)	2 (7.1)	2 (3.6)
Widowed	14 (51.9)	7 (25.0)	9 (33.3)	12 (42.9)	21 (38.2)
Never Married	5 (18.5)	0 (0)	0 (0)	5 (17.9)	5 (9.1)
Gross Annual Income[a]	n=24	n=27	n=25	n=26	n=51
Less than $50 000	11 (45.8)	4 (14.8)	7 (28)	8 (30.8)	15 (29.4)
$50 001 - $74 999	6 (25.0)	15 (55.6)	9 (36)	12 (46.2)	21 (41.2)
$75 000 or over	7 (29.2)	8 (29.6)	9 (36)	6 (23.1)	15 (29.4)

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p), Mann–Whitney U or Chi-Square analysis.
[a] Significant group (SV vs. LV) difference ($p < .05$). [b] Significant gender difference ($p < .05$)

No gender differences emerged between the SV and LV groups. However, the LV group was significantly younger (t=3.05, p=0.004), more likely to be married (X^2=8.04, p=0.005), have professional or graduate degrees (X^2=10.72, p=0.030), and had higher self-reported household incomes (< $50, 000 and ≥$50, 001) than the SV group (X^2=5.89, p=0.017).

Most participants lived in independent units at the villages. The LV group was equally divided between the townhomes and Atrium suites, with no significant age difference. The two residents in the Sunshine Centre were older than those in the independent units, although not significantly. The oldest participant in the study (age 95) lived in the Atrium suites.

For further analyses concerning level of independent living, three categories were created: 1) **highly independent**: those in the townhomes (n=13, all from LV, 23.6% of the sample); 2) **independent**: the 13 people from LV living in the Atrium suites/condos and the 20 people living in apartments with kitchens or kitchenettes in the SVs (n= 33 or 60.0% of the sample); and 3) **less independent**: the two people living in the LV Sunshine Centre (rented rooms) and the 7 in the main floor rooms at the SVs (total 9; 16.4% of the total sample). There was a significant age difference by level of independence (F=3.834, p=0.03). Those in category one (79.00 ± 5.34) were significantly younger than those in category three (86.11 ± 2.21), p=0.021). The middle category (mean age 81.91 ± 6.71) did not differ significantly from the other two. There were no significant gender differences between the three categories.

In the total sample, married participants (n=27) were significantly younger (79.19 ± 6.67 versus 84.54 ± 4.48, t=3.50, p=0.001) and more likely to be male (66.7% versus

32.1%, X^2=6.56, p=0.011) than the 28 who were not married. In the SV group, 29.6% were married, compared to 67.9% of the LV group. Of those married, 75% of the SV sample lived with their spouse, but only 25% (n=2) said their spouse drove. The majority (94.7%) of LV participants lived in the same townhome/condo/room as their spouse and 63% (n=12) said that their spouse still drove.

Luther village participants had lived at their village significantly longer (6.89 ± 4.96 years; range 0 to 16 years) than the SV group (on average 3.23 ± 3.36 years; range 0 to 13 years); t=-3.15, p=0.003. Women had lived in the village longer than men for both the SV (4.07 ± 4.15 versus 2.09 ± 1.30 years) and LV (7.15 ± 4.88 versus 6.67 ± 5.19 years) groups. However, neither difference was significant. For both groups, the most common reason for moving was to be closer to immediate family members (n=21, 38%) or other relatives and friends (n=16, 29%), followed by health issues either theirs or their spouse (n=13, 24%). Several Luther Village residents (9/28, 32%) commented that the move was an anticipatory step as they wanted to 'age in place', while only one person from the SVs mentioned this. Over three quarters (76%) of the SV sample reported having relatives within 15 km, compared to 50% of the Luther Village group.

5.3.2 Health and Well-being

Selected health and well-being characteristics for the sample are depicted in **Table 5.7** and discussed below. Each variable was statistically compared by group and gender. Additional information can be found in **Appendix H.**

Table 5.7: Selected Health and Well-being Characteristics by Village and Gender

	SV Group (n=27)	LV Group (n=28)	Full Sample		
			Males (n=27)	Females (n=28)	Total (N=55)
Self-reported Health	n=26		n=26		n=54
Excellent	4 (15.4)	9 (32.1)	3 (11.5)	10 (35.7)	13 (24.1)
Good	19 (73.1)	16 (57.1)	19 (73.1)	16 (57.1)	35 (64.8)
Fair	3 (11.5)	3 (10.8)	4 (15.4)	2 (7.1)	6 (11.1)
Poor	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Use of Cane/Walker (Indoor) [a, b]	n=25		n=26	n=27	n=53
No	15 (60.0)	25 (89.3)	23 (88.5)	17 (63)	40 (75.5)
Yes	10 (40.0)	3 (10.7)	3 (11.5)	10 (37)	13 (24.5)
Use of Cane/Walker (Outdoor)	n=25		n=26	n=27	n=53
No	15 (60.0)	23 (82.1)	20 (76.9)	18 (66.7)	38 (71.7)
Yes	10 (40.0)	5 (17.9)	6 (23.1)	9 (33.3)	15 (28.3)
Able to walk ¼ mile	n=24		n=25	n=27	n=52
No	4 (14.8)	2 (7.1)	2 (8)	4 (14.8)	6 (11.5)
Yes	20 (74.1)	26 (92.9)	23 (92)	23 (85.2)	46 (88.5)
Diagnosed Conditions 0 to 11 possible	2.74±1.6 0 - 6	2.36±1.0 1 - 5	2.30±1.2 0 - 5	2.79±1.4 0 - 6	2.55±1.3 0 - 6
Eyesight					
Better than most	10 (37.0)	14 (50.0)	11 (40.7)	13 (46.4)	24 (43.6)
About the same	17 (63.0)	14 (50.0)	16 (59.3)	15 (53.6)	31 (56.4)
Worse	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Difficulties Score	0.74±1.2 0 - 5	0.64 ± 0.8 0 - 3	0.52±0.7 0 - 3	0.86 ± 1.2 0 - 5	0.69±1.0 0 - 5
Physical Activity [a] **Frequency Score**	n=12 2.83±2.1 1 - 7	n=26 1.12 ± 1.2 0 - 5	n=18 1.56±1.9 0 - 7	n=20 1.75 ± 1.7 0 - 5	n=38 1.66±1.8 0 - 7
GDS-15 Total Score	n=26 1.31±1.3 0 - 5	1.82±1.4 0 - 5	1.78±1.5 0 - 5	n=27 1.37±1.3 0 - 4	n=54 1.57±1.4 0 to 5
Normal (0-5)	26 (100)	28 (100)	27 (100)	27 (100)	54 (100)
VPS	n=25 38.9±6.9 19 - 49	38.6±5.4 29 - 48	39.2±5.0 29 - 48	n=26 38.4 ± 7.2 19 - 49	n=53 38.8±6.1 19 - 49

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p), Mann–Whitney U or Chi-Square analysis. [a] Significant group (SV vs. LV) difference ($p < .05$). [b] Significant gender difference ($p < .05$)

All but 6 people (3 from SVs and 3 from LV) rated their health as good or excellent. Significantly more women than men (X^2=4.65, p=0.032) and SV versus LV residents (X^2=6.119, p=0.015) reported using a cane or walker. No one reported using a wheelchair or a motorized scooter. Almost all participants from LV reported being able to walk a quarter mile with or without assistance (92.9%), compared 74% of the SV sample (11% were unsure).

The SV sample reported an average of 2.74 ± 1.66 diagnosed health conditions (range 0 to 6), whereas the LV reported slightly fewer conditions (2.36 ± 1.03, range 0 to 4), however the difference was not significant. Of the total sample, males reported fewer diagnosed conditions (2.30 ± 1.24) than females (2.79 ± 1.48) although not significant. As shown in **Appendix H (Table H1),** the three most common conditions were: high blood pressure, cholesterol, heart problems (60%), cataracts (58%) and arthritis (47%). Almost 30% had hearing problems. No significant gender differences emerged. No one in either group reported having worse eyesight than others their age, although four people had glaucoma and five had macular degeneration. A total of 6 people (4 from LV) had had a stroke, while 2 people, both from LV, had Parkinson's disease (PD). Almost all (93% SV and 96% LV) participants were taking prescription medications.

Respondents were also asked whether they experienced various difficulties (staying awake/ remaining alert, maintaining balance, initiating movement, persistent pain, limited movement) that may affect mobility and driving. The SV sample reported more difficulties (0.74 ± 1.20) than the LV group (0.64 ± 0.83), although not significant. Overall men reported slightly fewer difficulties on average (0.52 ± 0.70) than women

(0.86 ± 1.24). Further details on self-reported health can be found in **Table H1** in **Appendix H**.

Five people (2 in the SVs; 3 in LV) reported belonging to sports-related groups outside the village. When asked how often in the past week they had participated in physical activity classes or groups in the village (such as Tai Chi, yoga, strength training or walking groups), the SV group had a significantly higher physical activity frequency score than the LV group (2.83 ± 2.13 versus 1.12 ± 1.42 days per week; Z=-2.65, p=0.008). No gender difference emerged.

As displayed in **Table 5.7** the sample showed few depressive symptoms with all participants scoring within the normal range (≤5) on the GDS-15. Scores on the VPS were also similar for the SV and LV groups and for men and women.

5.4 Functional Performance

As shown in **Table 5.8**, functional assessments, administered during the second session, were completed by 50 participants. Additional results, including the individual sub-scores on the MoCA, are found in **Table H5** in **Appendix H**.

Table 5.8: **Results of Functional Assessments by Village and Gender**

	SV Group (n=24)	**LV Group (n=26)**	**Full Sample**		
			Males (n=24)	**Females (n=26)**	**Total (n=50)**
(MoCA)[a]	23.08 ± 2.7 18 – 28	25.46 ± 2.9 18 - 29	24.04 ± 2.7 19 - 29	24.58 ± 3.3 18-29	24.32 ± 3.0 18 - 29
Normal (≥ 26) [a] MCI (<26) [a]	3 (12.5) 21 (87.5)	17 (65.4) 9 (34.6)	8 (33.3) 16 (66.7)	12 (46.2) 14 (53.8)	20 (40.0) 30 (60.0)
Trails B Time (sec)	2:20±00:53 1:14-04:15	2:09±00:53 0:52-04:57	2:09±00:55 0:55-04:25	2:19±00:51 1:13-04:57	2:14±00:53 0:52-04:57
Normal(<03:00) MCI (≥03:00)	19 (79.2) 5 (20.8)	24 (92.3) 2 (7.7)	21 (87.5) 3 (12.5)	22 (84.6) 4 (15.4)	43 (86.0) 7 (14.0)

	SV Group (n=24)	LV Group (n=26)	Males (n=24)	Females (n=26)	Total (n=50)
Trails B Errors	1.29 ± 1.68 0 - 6	0.65 ± 0.98 0 - 3	0.75 ± 1.19 0 - 4	1.15 ± 1.54 0 - 6	0.96 ± 1.38 0 - 6
Normal(<3errors)	18 (75.0)	24 (92.3)	21 (87.5)	21 (80.8)	42 (84.0)
MCI (≥3 errors)	6 (25.0)	2 (7.7)	3 (12.5)	5 (19.2)	8 (16.0)
Rapid Pace Walk Time (sec) [a]	9.95 ± 2.62 5.40-15.20	7.89 ± 2.53 4.30-15.30	8.28 ± 2.68 4.30-15.20	9.43 ± 2.75 5.20-15.30	8.88 ± 2.75 4.30-15.30
Normal (≤07.00)	6 (25.0)	13 (50.0)	11 (45.8)	8 (30.8)	19 (38.0)
Cut (>07.00)	18 (75.0)	13 (50.0)	13 (54.2)	18 (69.2)	31 (62.0)
Cut (>09.00)[a,b]	15 (62.5)	7 (26.9)	7 (29.2)	15 (57.7)	22 (44.0)
Contrast Sensitivity log units [a]	1.65 ± 0.25 1.15 - 1.95	1.80 ± 0.19 1.35 - 1.95	1.70 ± 0.25 1.20 - 1.95	1.76 ± 0.22 1.15 - 1.95	1.73 ± 0.23 1.15 - 1.95
Normal (≥1.25)	21 (87.5)	26 (100)	22 (91.7)	25 (91.7)	47 (94.0)
Impaired(<1.25)	3 (12.5)	0 (0)	2 (8.3)	1 (3.8)	3 (6.0)

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p), Mann–Whitney U or Chi-Square analysis.
[a] Significant group (SV vs. LV) difference ($p < .05$). [b] Significant gender difference ($p < .05$)

5.4.1 Cognitive Function

Scores on the Montreal Cognitive Assessment (MoCA) can range from 0 to 30, with scores < 26 indicative of possible mild cognitive impairment (MCI). In order to adjust for education, participants who had completed grade 12 or under were given one additional point. Gender differences were not significant. However, the SV group scored significantly worse than the LV sample (t=-2.99, p=0.004). Compared to LV participants, a greater proportion of SV residents were classified as having possible MCI (26-point cut-off: X^2=14.54, p<0.001). Comparisons were also performed on the various MoCA sub-tests (see **Appendix H, Table H5**). Only one difference emerged; the LV group had significantly better visuospatial scores than the SV participants (6.27 ± 1.15 versus 5.42 ± 1.59; t=-2.19, p=0.034).

Generally, the LV group had better times on the Trails B, and fewer (7.7% versus 20.8%) were classified as having possible MCI than the SV group, although not significant. Eight participants (6 from SVs and 2 from LV) made three or more errors, also indicative of possible MCI (Mononita & Molnar, 2013).

5.4.2 Lower Body Mobility

Times on the Rapid Pace Walk Test (RPW) ranged from 05.40 to 15.20 seconds. There were no significant differences between men and women. However, the LV residents performed significantly better than the SV group (Z=-2.89, p=0.004). Two cut-points (7 and 9 seconds) are shown as both have been used in the literature. Using the cut-point of 9.00 seconds (Staplin et al. 2003), a significantly greater proportion of SV compared to LV residents would be considered at-risk for at-fault crashes (X^2=6.67, p=0.036). A greater proportion of women than men (57.7% versus 29.2%) had RPW scores below 9.00 seconds (X^2=4.12, p=0.042).

5.4.3 Contrast Sensitivity

Luminance (LUX) or light levels in the rooms where assessments took place were 831.36±267.89, well within normal limits. As shown in **Table 5.8**, the SV group had significantly lower CS scores compared to the LV sample (Z=-2.38, p=0.017). However, only 3 people (2 males, 1 female; all from the SVs) had CS scores below 1.25, indicative of visual impairment.

5.5 Falls and Balance Confidence

5.5.1 Self-reported Falls and Incident Reports

Questions about falls in the past year were included on the background questionnaire. According to self-reports, 14 people had fallen (25.5%): 8 once (14.5%) and 6 multiple times (10.9%). Only 3 people (5.5%) reportedly were injured as a result.

Incident reports for the SVs included all recorded falls dating back 2 years from the date of each person's first session until December 1, 2013. Unfortunately 10 of the 27 (37%) SV participants were not in the RIA database. Given the dates requested, the incident reports also identified falls subsequent to study participation (up to 9-months for those assessed in the first wave in February 2013). The reports identified 3 subsequent fallers, all from TM: 1) ROEL, assessed February 26, 2013, had one subsequent fall in August 2013; 2) JOSH, assessed February 28, 2013, had two subsequent falls, one in May 2013 and one in August 2013; and 3) JUCO, assessed April 22, 2013, had two subsequent falls both in July 2013.

Overall, there was little agreement between the self- and incident reports. Only one of the seven self-reported fallers from the SVs was identified by the incident reports. This resident (JUCO) who reported a single fall in the past year was identified as having two subsequent falls, thus he was categorized as a recurrent faller.

In the total SV sample (n=27), there were 9 fallers (33.3%), identified through either self or incident reports. The fallers comprised 4 single-time and 5 recurrent fallers (i.e., those who fell more than once). In the LV sample (n=28), there were 7 fallers (25%) according to self-reports: 4 were single-time and 3 recurrent fallers. Incident reports for all the LV study participants (dating back two years) were reviewed by the Wellness

Centre Coordinator and no fallers were identified. The wellness coordinator was asked to double-check the reports for the 7 individuals who reported falls in the questionnaires and confirmed there were no incident reports.

Thus, for the total sample, there were 16 fallers (29.6%), identified either through self-report or incident reports. The group of fallers was comprised of 8 single-time fallers and 8 recurrent fallers. **Table 5.9** displays the basic characteristics of the sample organized by fall status. One woman (EIBU from WP) who did not answer the self-report fall questions and was not identified by the incident report was not included in the analyses.

Table 5.9: Characteristics of Fallers and Non-Fallers

	Single Time Fallers (n=8)	**Recurrent Fallers (n=8)**	**Total Fallers (n=16)**	**Non-Fallers (n=38)**
Age	78.38 ± 6.59 66 - 86	83.25 ± 6.34 70 - 89	80.81 ± 6.74 66 - 89	82.34 ± 6.12 71 - 95
Gender Male Female	 4 (50) 4 (50)	 3 (37.5) 5 (62.5)	 7 (43.8) 9 (56.3)	 20 (52.6) 18 (47.4)
Marital Status Not Married Married	 4 (50) 4 (50)	 5 (62.5) 3 (37.5)	 9 (56.3) 7 (43.8)	 18 (47.4) 20 (52.6)
Education [a] Less than College College or Greater	 1 (12.5) 7 (87.5)	 6 (75.0) 2 (25.0)	 7 (43.8) 9 (56.3)	n=37 17 (45.9) 20 (54.1)
Accommodation Highly Independent Independent Less Independent	 1 (12.5) 5 (62.5) 2 (25.0)	 1 (12.5) 5 (62.5) 2 (25.0)	 2 (12.5) 10 (62.5) 4 (25.0)	 11 (28.9) 23 (60.5) 4 (10.5)
Difficulties Score	1.00 ± 1.69 0 - 5	1.00 ± 1.31 0 - 3	1.00 ± 1.46 0 - 5	0.55 ± 0.76 0 - 5
# of Diagnosed Conditions	2.38 ± 1.06 1 – 4	2.13 ± 1.36 0 – 4	2.25 ± 1.18 0 - 4	2.61 ± 1.41 0 - 6
Use cane/walker No Yes	 5 (62.5) 3 (37.5)	n=6 2 (33.3) 4 (66.7)	n=14 7 (50) 7 (50)	 28 (73.7) 10 (26.3)

	Single Time Fallers (n=8)	Recurrent Fallers (n=8)	Total Fallers (n=16)	Non-Fallers (n=38)
Able walk 1/4 mile	n=7		n=15	n=37
No	0 (0)	3 (37.5)	3 (20.0)	3 (8.1)
Yes	7 (100)	5 (62.5)	12 (80.0)	34 (91.9)
Arthritis	2 (25.0)	5 (62.5)	7 (43.8)	18 (47.4)
Vision Disorders	6 (75.0)	4 (50.0)	10 (62.5)	25 (65.8)
Perceived Eyesight				
Better than Most	4 (50)	4 (50)	8 (50)	16 (42.1)
About the Same	4 (50)	4 (50)	8 (50)	22 (57.9)

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p), Mann–Whitney U or Chi-Square analysis. Vision disorders included cataracts, macular degeneration and glaucoma. [a] Significant group (Single vs. Recurrent fallers) difference ($p < .05$).

As shown in **Table 5.9**, the only significant difference that emerged was education level for the single versus recurrent faller comparison (X^2=6.35, p=0.020). One noteworthy finding is that for the most independent group (the 13 people living in townhomes in LV), 84.5% (11/13) did not report any falls. Differences concerning ability/inability to walk ¼ mile and use/nonuse of assistive devices (walker or cane) may have emerged in a larger sample. Associations with ABC scores (balance confidence) are reported in section 5.12.

5.5.2 Balance Confidence

The expanded 27-item Activities-specific Balance Confidence (ABC) Scale was completed by 54 current drivers in the first session and re-administered to 24 volunteers (20 CDs and 4 FDs) in the second session, 14 to 18 days later (mean 14.6±1.1 days) to examine test-retest reliability. One woman (SV group) answered less than 75% of the items, thus was not included in the analyses. Step-wise Rasch analyses by Drs. Crizzle and Myers were used to identify and remove redundant items and misfits (i.e., those failing to discriminate or producing erratic responses). Items 1, 2, 5, 9 and 10 were

removed, followed by items 6 and 17 (see **Appendix E).** The resulting ABC-20 scale showed good temporal stability (ICC $_{2,1}$ =.93), hierarchiality (ascending order of difficulty) and person (.92) and item (.98) reliabilities. Associations were examined by the present author. Higher scores on the ABC-20 were related to lower (i.e., faster) time on the RPW test (*rho*=-.63, *p*<.001) and a greater number of community activities over the past month (*rho*=.40, *p*<.01). Scores were also able to discriminate according to level of independent living (*F*=6.12, *p*<.01), fall status (non-fallers, single and recurrent fallers), (*F*=4.58, *p*<.05), ability to walk ¼ mile (*p*<.001) and use of walker or cane (*p*<.001) in the expected directions.

Table 5.10 displays the sample and group scores on all versions of the scale. Scores on the ABC scale can range from 0 to 100 percent, with higher scores indicating greater balance confidence. Participants from LV and males scored higher on all versions of the ABC scale, but differences were not significant. Scores on each item are shown in **Appendix H (Table H6)**.

Table 5.10: Balance Confidence Scores by Village and Gender

	SV Group (n=26)	**LV Group (n=28)**	**Full Sample**		
			Males (n=27)	**Females (n=27)**	**Total (N=54)**
ABC -27	81.40±14.39 50.93 - 100	85.95±14.12 37.04-99.07	86.70±12.97 52.78 - 100	80.81±15.19 37.04 - 99.07	83.76±14.30 37.04 - 100
ABC -20	78.43±15.52 45.00 - 100	84.15±16.17 28.75 - 100	84.75±14.00 52.50 - 100	78.04±17.34 28.75 - 98.75	81.39±15.97 28.75 - 100
ABC -16	85.06±12.11 54.69 - 100	86.27±13.36 40.63 - 100	87.19±12.20 54.69 - 100	84.20±13.18 40.63 - 100	85.68±12.67 40.63 - 100

Note: Values are Mean ± SD. Comparisons are Mann–Whitney U

Age was significantly related to lower balance confidence scores for all versions: ABC-27 (*rho*=-0.391, p=0.003), ABC-20 (*rho*=-0.474, *p*<0.01) and ABC-16 (*rho*=-0.410, p=0.002). Greater balance confidence (ABC-20) was also associated with higher

VPS scores (*rho*=0.404, *p*=0.003) and lower depression scores (*rho*=-0.457, *p*<0.001). Residents who were married or had a college education scored significantly better on the ABC-20 than those who were not married (87.15 ± 13.17 versus 75.63 ± 16.6; *Z*=-2.72, *p*=0.006) or those who were less educated (86.61 ± 11.42 versus 75.63 ± 16.66; *Z*=-2.10, *p*=0.035). As shown in **Table 5.11**, participants who used a cane or walker (in or outdoors), as well as those unable to walk ¼ mile, had lower balance confidence scores on all versions of the ABC scale.

Table 5.11: Balance confidence by Walking Ability and Assistive Device Use

	ABC-16	**ABC-20**	**ABC-27**
Able to walk 1/4 mile			
No (n=5)	66.88 ±17.59 40.63 - 84.34	57.00 ± 20.28 28.75 - 76.25	62.41 ± 18.73 37.04 - 80.55
Yes (n=46)	88.09 ± 10.31 54.69 - 100	84.46 ± 12.96 52.50 - 100	86.52 ± 11.54 52.78 - 100
Significance	*Z*=-2.83, *p*=0.003	*Z*=-2.774, *p*=0.003	*Z*=-2.81, *p*=0.003
Cane or Walker Use			
No (n=35)	90.87 ± 8.13 67.19 - 100	88.89 ± 10.07 61.25 - 100	90.24 ± 8.58 67.59 - 100
Yes (n=17)	74.17 ± 13.45 40.63 - 100	65.29 ± 14.99 28.75 - 92.50	69.59 ± 14.21 37.04 - 93.52
Significance	*Z*=-4.47, *p*<0.001	*Z*=-4.76, *p*<0.001	*Z*=-4.73, *p*<0.001

Note: Values are Mean ± SD. Comparisons are Mann–Whitney U

5.6 Driving Experience

Apart from a few residents who obtained their driver's license in their 40s, and one person who obtained his license at 15 using false documents, the majority of the sample obtained their license between the ages of 16 to 22. About one-fifth of the sample (21.8%) had commuted to work over an hour each day.

Before the move to their respective villages, LV residents were significantly more likely to report having other drivers in the household (100% versus 81%; X^2 =11.13,

p<0.001), in all cases their spouse; but less likely (25% versus 67%) than those in the SVs to report others relied on them to drive (X^2=9.63, p=0.002). Prior to moving, only two people (one from the SVs, one from LV) said they had considered giving up their driver's license, however, everyone said they were glad they had kept driving.

All participants said they discussed their driving with someone, most often family members (44% of SV, 43% of LV), eye care professionals (24% of SV, 25% of LV) and friends (20% of SV, 14% of LV). Only two residents (both from SV) reported that someone suggested they limit their driving. About half the sample (49%) were reportedly thinking about giving up driving over the next few years. This is examined further in section **5.13.**

Overall, the sample reported few driving problems over the past year: accidents (n=3); near misses (n=6); getting lost (n=5); or backing into things (n=5). No one reported traffic violations, although some had been asked by the Ministry of Transportation of Ontario (MTO) for an eye or medical exam (n=7), to take a road test (n=7), or undergo a complete driving assessment (n=2).

In Ontario, drivers over 80 are required to complete the Senior Driver Renewal Program (SDRP) every two years. Based on these standards, 85% (n=23) of the SV and 50% (n=14) of the LV samples were eligible for the program and have taken the course in the last two years. The majority of respondents (92%, n=44) felt the SDRP was a good idea, however, when asked if they had any other thoughts on the program, 16 of the 19 who responded commented that the written test is insufficient and/or that a road-test should be required. The oldest driver of the LV sample (95 years) said, "I have the test memorized, I've done it seven times now and the questions are the same each time. They

need a road test, those questions are not sufficient to test my driving". Another individual from LV who had not yet taken the course, said, "I would rather take a road test. I know I am a good driver from experience, but I do not know all the exact road regulations [she used the example of following distance, and described that she knew from experience how far to keep back from a car but didn't know the actual measurement the MTO suggests], although I am a very safe driver, I feel that I won't pass". Other thoughts included: "If they can't do a road test with everyone, at least a driving simulation would be better than a written test"; "we should have a degraduated license process for seniors, the opposite of license acquisition".

5.7 Self-reported Driving Habits and Perceptions

Typical driving habits and preferences were examined using the Driving History and Habits questionnaire (DHHQ). The majority of both groups felt that driving was very or extremely important for multiple reasons, particularly maintaining freedom and present lifestyle (see **Appendix H**, **Table H2, Q28**: asked to rank the importance of seven reasons to drive; most important was coded as 1). Compared to ten years ago, the majority of the sample (89% of SV, 67% of LV) reported driving less often (little less/much less) now. A greater proportion of the LV versus SV group (25% versus 11%) reported driving the same amount, while three people (all from LV) reported driving more now.

As shown in **Table 5.12**, proportionately more of the LV than the SV group (82% versus 59%) reportedly drove on highways (e.g. Hwy 6, 7 and 8); and a slightly higher proportion of the LV group said they drove on rural roads or freeways (e.g., 400 series). A significantly greater proportion of males than females reportedly drove on highways

(X^2=5.24, p=0.022) and at night (X^2=6.63, p=0.010), and significantly fewer males preferred to be a passenger (X^2=5.02, p=0.029).

Table 5.12: Self-Reported Driving Patterns and Preferences

	SV Sample (n=27)	LV Sample (n=28)	Full Sample		
			Males (n=27)	Females (n=28)	Total (N=55)
Roadways*					
Residential	21 (77.8)	26 (92.9)	24 (88.9)	23 (82.1)	47 (85.5)
Main city streets	25 (92.6)	27 (96.4)	25 (92.6)	27 (96.4)	52 (94.5)
Rural roads	12 (44.4)	19 (67.9)	12 (44.4)	19 (67.9)	31 (56.4)
Freeways	15 (55.6)	17 (60.7)	19 (70.4)	13 (46.4)	32 (58.2)
Highways [b]	16 (59.3)	23 (82.1)	23 (85.2)	16 (57.1)	39 (70.9)
Time of day					
Morning	23 (85.2)	27 (96.4)	25 (92.6)	25 (89.3)	50 (90.9)
Afternoon	27 (100.0)	27 (96.4)	27 (100)	27 (96.4)	54 (98.2)
Early evening	17 (63.0)	24 (85.7)	23 (85.2)	18 (64.3)	41 (74.5)
At night [b]	12 (44.4)	11 (39.3)	16 (59.3)	7 (25.0)	23 (41.8)
Preference*					
Drive yourself	24 (88.9)	23 (82.1)	25 (92.6)	22 (78.6)	47 (85.5)
Passenger in car[b]	5 (18.5)	3 (10.7)	1 (3.7)	7 (25.0)	8 (14.5)
Taxis	1 (3.7)	0 (0)	0 (0)	1 (3.6)	1 (1.8)
Bus	0 (0)	1 (3.6)	1 (3.7)	0 (0)	1 (1.8)
Special transit	2 (7.4)	0 (0)	0 (0)	2 (7.1)	2 (3.6)
Walk	1 (3.7)	3 (10.7)	0 (0)	4 (14.3)	4 (7.3)
Village Shuttle	4 (14.8)	0 (0)	0 (0)	4 (14.3)	4 (7.3)
Others rely on drive (current)					
No	20 (74.1)	19 (67.9)	20 (74.1)	19 (67.9)	39 (70.9)
Yes	7 (25.9)	9 (32.1)	7 (25.9)	9 (32.1)	16 (29.1)
In winter, drive					
Much less often	10 (37.0)	3 (10.7)	2 (7.4)	11 (39.3)	13 (23.6)
A little less	11 (40.7)	17 (60.7)	16 (59.3)	12 (42.9)	28 (50.9)
About the same	6 (22.2)	8 (28.6)	9 (33.3)	5 (17.9)	14 (25.5)
More often	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Note: values are frequencies (%), comparisons are Chi-Square; [a] significant group difference (SV vs LV) p<0.05. [b] Significant gender difference (p < .05) * percentage greater than 100 due to multiple responses.

Participants were also asked how often they drove (days per week) in the month before moving to retirement housing and how often they currently drove (days per week). Group and gender comparisons are presented in **Table 5.13** and **Table 5.14** below. While

average driving frequency was similar before the move, SV respondents drove significantly less often after the move (t=-2.73, p=0.009). Of the total sample, females drove significantly less often than males after the move (t=3.06, p=0.003), despite a similar frequency before the move.

Table 5.13: Self-reported Driving Frequency Before and After Move by Village

Month Before Move			After Move		
SV Sample	LV Sample	Total	SV Sample	LV Sample	Total
5.52 ± 1.58 2.0 to 7.0	5.11 ± 2.16 0 to 7.0	5.31 ± 1.89 0 to 7.0	3.33 ± 1.70 1.0 to 7.0	4.68 ± 1.95 1.0 to 7.0	4.02 ± 1.94 1.0 to 7.0

Note: values are mean ± SD and range. Comparisons are independent t-tests t(p) or Mann–Whitney U.

Table 5.14: Self-reported Driving Frequency Before and After Move by Gender

Month Before Move			After Move		
Male	Female	Total	Male	Female	Total
5.48 ± 1.96 0 to 7.0	5.14 ± 1.85 2.0 to 7.0	5.31 ± 1.89 0 to 7.0	4.77 ± 1.79 1.0 to 7.0	3.29 ± 1.82 1.0 to 7.0	4.02±1.94 1.0 to 7.0

Note: values are mean ± SD and range. Comparisons are independent t-tests t(p) or Mann–Whitney U.

5.7.1 Self-reported driving restrictions

Driving restrictions were assessed using the Situational Driving Avoidance (SDA) and Frequency (SDF) scales. Scores on the SDA can range from 0 to 20 with higher scores indicating greater avoidance of challenging situations, while scores on the SDF can range from 0 to 56, with higher scores indicating driving more often in challenging situations. Scores on the SDF and SDA scales were significantly correlated (*rho*=-0.69, p<0.01), as expected. As shown in **Table 5.15**, females scored significantly higher on the SDA (Z=-3.13, p=0.002) and significantly lower on the SDF (t=3.10, p=0.003).

Table 5.15: Scores on the SDA and SDF by Village and Gender

	SV Sample (n=25)	LV Sample (n=26)	Full Sample		
			Males (n=24)	Females (n=27)	Total (N=51)
SDA [b]	7.88 ± 6.34 0 - 18	7.42 ± 5.17 0 - 16	4.96 ± 5.09 0 - 15	10.04 ± 5.24 0 - 18	7.65 ± 5.72 0 - 18

	SV Sample (n=25)	LV Sample (n=26)	Males (n=24)	Females (n=27)	Total (N=51)
SDF [b]	n=24 27.00 ± 11.26 6 - 50	n=26 31.19 ± 8.54 14 - 49	33.42 ± 8.51 14 - 50	n=26 25.27 ± 9.93 6 - 46	n=50 29.18 ± 10.06 6 - 50

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Comparisons are independent t-tests t(p) or Mann–Whitney U [b] Significant gender difference ($p < .05$)

5.7.2 Driver Perceptions

Driver perceptions were assessed using the Day and Night Driving Comfort Scales (DCS-D, DCS-N) and the Perceived Driving Abilities Scale (PDA). Scores on the DCS-D and DCS-N can range from 0 to 100 with higher scores indicating greater comfort. Similarly, higher scores on the PDA scale (possible range 0 to 45), indicate better perceptions of their driving abilities. As expected, scores on the DCS Day and Night Scales were highly correlated (r=0.89, p<0.01). Scores on the PDA scale correlated moderately with the DCS-D and DCS-N scores, respectively (r=.64 and r=.61, p <.01). Sample scores, including ratings on item one of the DCS-N scale (i.e., driving at night even in good weather and traffic conditions), are shown in **Table 5.16**.

Table 5.16: Perception Scores by Village and Gender

	SV Sample (n=25)	LV Sample (n=26)	Full Sample		
			Males (n=24)	Females (n=27)	Total (N=51)
DCS-D [b]	61.64±23.79 13.46 - 100	62.06±17.88 34.62-92.31	69.49±16.79 34.62 - 92.86	55.06±21.88 13.46 - 100	61.85±20.78 13.46 - 100
DCS-N [b]	49.44±28.11 0 - 96.88	51.20±23.72 0 - 92.19	60.09±24.84 0 - 96.88	41.67±23.67 0 - 92.19	50.34±25.72 0 - 96.88
DCS-N item #1	69.00±32.50 0 - 100	77.88±25.81 0 - 100	81.25±26.84 0 - 100	66.67±30.22 0 - 100	73.53±29.33 0 - 100
PDA	31.44±7.44 18 - 43	32.15±6.45 19 - 44	33.21±6.45 19 - 43	30.56±7.15 18 - 44	31.80±6.89 18 - 44

Note: Missing data is indicated by the n's for each variable. Values are Mean ±SD and range. Comparisons are independent t-tests t(p) [b] Significant gender difference ($p < .05$)

Males scored significantly higher on both the DCS-D (t=2.62, p=0.012) and DCS-N (t=2.71, p=0.009). Males also scored higher on the DCS-N item #1 and the PDA scale, but not significantly (p=0.076 and p=0.172, respectively). The LV group was more comfortable driving at night in good weather and traffic conditions (DCS-N item 1), but not significantly.

5.8 Actual Driving Behaviour

As described earlier, usable data was retrieved from 49 Carchips and 36 Otto devices. Driving exposure data from the Carchip recordings were crosschecked with the trip logs for verification and to combine segments into complete trips. Consistent with prior studies, a trip was defined as leaving and returning to one's home, while each stop was considered a segment. Returning home was not considered a stop. GPS data from the Otto devices was used to calculate maximum and average trip radius, which is presented in section 5.8.2. In order to compare the findings to prior community driving studies (specifically Blanchard et al., 2010), driving data was averaged to one week (unless otherwise indicated).

5.8.1 Exposure

Over the two week monitoring period, the sample drove 24.66 ± 15.18 km on average per trip (range 5.50 to 62.39) and made an average of 1.85 ± 0.58 stops per trip (range 1.0 – 4.0). As shown in **Table 5.17**, the LV group had higher mean values for all the indicators averaged to one week, although only number of days (t=-2.65, p=0.011), trips (Z=-2.44, p=0.015) and driving duration (Z=-2.00, p=0.045) were significant. The only significant gender difference was driving duration (Z=-2.18, p=0.029).

Table 5.17: Driving Exposure by Village and Gender

	SV (n=23)	LV (n=26)	Full Sample		
			Males (n=24)	Females (n=25)	Total (n=49)
# of Days [a]	2.83 ± 1.44 0.5 - 6.0	4.00 ± 1.64 0.5 - 7.0	3.85 ± 1.65 1.0 - 7.0	3.06 ± 1.57 0.5 - 5.5	3.45 ± 1.64 0.5 - 7.0
# of Trips [a]	3.13 ± 1.74 0.5 - 6.5	4.94 ± 2.55 0.5 - 9.5	4.60 ± 2.33 1.0 - 9.0	3.60 - 2.35 0.5 - 9.5	4.09 ± 2.37 0.5 - 9.5
# of Stops	6.38 ± 4.19 0.5 - 17.0	8.75 ± 5.50 0.5 - 20.0	8.98 ± 5.38 2.0 - 20.0	6.35 ± 4.38 0.5 - 15.0	7.64 ± 5.02 0.5 - 20.0
Distance (km)	70.9± 67.2 3.1 - 249.6	127.5±122.1 2.8 - 511.5	131.7±122.9 6.7 - 511.5	71.5 ± 70.6 2.8 - 261.3	100.9±103.2 2.8 - 511.5
Duration (hr:min) [a,b]	1:59 ± 1:22 0:11 - 4:54	3:17 ± 2:25 0:08 - 9:46	3:22 ± 2:25 0:20 - 9:46	2:00 ± 1:28 0:08 - 6:08	2:41 ± 2:05 0:08 - 9:46

Note: Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p) or Mann-Whitney U [a] Significant group (SV vs. LV) difference (p<.05). [b] Significant gender difference (p<.05)

Extreme Case: The youngest participant in the study (KEWI, male aged 66 from LV), who was also the only person still working full-time drove substantially more than the other drivers in the study (an average of 511.5 km each week). KEWI is married and living in an independent unit in the Atrium Suite with his wife, BOWI, who also participated in the study (drove her own vehicle). Despite being diagnosed with Parkinson's disease, KEWI drove to Stratford every day during the week (~40 km), where he works as the Safety Director for a commercial transportation company. We suspect KEWI is in a very early stage of PD as he performed quite well on the functional measures. He performed above the cut-points for MCI on the MoCA and Trails B test, and had the fastest time (of the entire sample) on the RPW.

Although he did not drive the most days or trips, KEWI drove substantially more distance and duration (9 hours and 45 minutes each week) than any other participant. If KEWI was removed from the analysis, the average distance (km) per week would drop 8.5 km (100.9±103.2 to 92.42±84.97) and the average duration per week would drop 10

minutes (2:41±2:05 to 2:31±1:50). Night driving, maximum and average radius was similar to other drivers.

5.8.2 Patterns

The following section presents results on when participants drove (weekdays versus weekends, day versus night), where they drove (with respect to radius or distance from home), consistency of driving, why they drove (trip purposes) and weather conditions.

5.8.2.1 When Participants Drove

The sample drove on average 4 hours during the week and 1.4 hours over the week-end. As shown in **Table 5.18** (two week total), LV residents drove significantly more days during the week than SV residents (Z=-2.27, p=0.023), while men drove for a longer duration than women during the week (Z=-2.38, p=0.017) and on the weekend (Z=-2.09, p=0.037).

Table 5.18: Weekday and Weekend Driving by Village and Gender

	SV (n=23)	LV (n=26)	Full Sample		
			Males (n=24)	Females (n=25)	Total (n=49)
Weekdays					
Days Driven [a]	4.26 ± 2.49 0 - 10	6.12 ± 2.72 1 - 10	5.83 ± 2.54 1 - 10	4.68 ± 2.87 0 - 9	5.24 ± 2.75 0 - 10
Trips/day	1.04 ± 0.27 0 - 1.67	1.17 ± 0.21 1 - 1.78	1.17 ± 0.19 1 - 1.67	1.06 ± 0.29 0 - 1.78	1.11 ± 0.25 0 - 1.78
Distance (km)/trip	18.61±12.10 0 - 43.85	23.62±17.92 5.60 - 70.94	26.42±18.33 6.40 - 70.94	16.33±10.37 0 - 36.97	21.27±15.52 0 - 70.94
Total Duration [b]	3:06 ± 2:25 0:00 - 7:59	5:00 ± 3:44 0:16 - 14:31	5:14 ± 3:36 0:26 - 14:31	3:02 ± 2:38 0 - 11:53	4:07 ± 3:18 0:00 - 14:31

	SV (n=23)	LV (n=26)	Males (n=24)	Females (n=25)	Total (n=49)
Weekend					
Days Driven	1.39 ± 1.03 0 - 3	1.92 ± 1.38 0 - 4	1.88 ± 1.30 0 - 4	1.48 ± 1.19 0 - 4	1.67 ± 1.25 0 - 4
Trips/day	0.78 ± 0.42 0 - 1	0.92 ± 0.45 0 - 1.75	0.98 ± 0.35 0 - 1.75	0.74 ± 0.48 0 - 1.50	0.86 ± 0.44 0 - 1.75
Distance (km)/trip	16.49±30.29 0 - 148.33	21.99±27.56 0 - 115.50	22.87±27.09 0 - 115.50	16.09±30.34 0 - 148.33	19.41±28.70 0 - 148.33
Total Duration [b]	1:45 ± 2:17 0:00 - 7:51	1:33 ± 1:36 0:00 - 5:24	2:18 ± 2:15 0 - 7:51	1:01 ± 1:20 0 - 6:05	1:39 ± 1:56 0 - 7:51

Note: Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p) or Mann–Whitney U. [b] Significant sample gender difference ($p < .05$)

As described in Chapter 3, trips made between sunset and sunrise was considered night driving. Complete night trips were those that started and ended in darkness, while partial trips either began or ended in darkness. Overall, the sample made 37 night trips over the two weeks (13 complete and 24 partial). Only 29% or 14/49 participants drove at least once at night over the two week monitoring period. Overall, 35 participants (71%) did not drive at night at all over the monitoring period. Compared to women, men were more likely to drive at night at least once (X^2=6.45, p=0.012). Indicators of night driving by village and gender are shown in **Table 5.19**.

Table 5.19: Night Driving by Village and Gender

	SV (n=23)	LV (n=26)	Full Sample		
			Males (n=24)	Females (n=25)	Total (n=49)
Nights Driven [a]	0.28 ± 0.50 0 - 1.5	0.40 ± 0.65 0 - 2.5	0.52 ± 0.68 0 - 2.5	0.18 ± 0.41 0 - 1.5	0.35 ± 0.58 0 - 2.5
Night Trips [a]	0.33 ± 0.56 0 - 1.5	0.42 ± 0.72 0 - 3	0.58 ± 0.78 0 - 3	0.18 ± 0.41 0 - 1.5	0.38 ± 0.64 0 - 3
Night Km [a]	5.91±12.61 0 - 43.3	7.17±16.79 0 - 71.6	11.05±19.11 0 - 71.6	2.29±7.15 0 - 34.2	6.58±14.84 0 - 71.6

	SV (n=23)	LV (n=26)	Males (n=24)	Females (n=25)	Total (n=49)
Duration (hr:min) [a]	0:11 ± 0:23 0:00 - 1:23	0:12 ± 0:26 0:00 - 2:02	0:19±0:32 0 - 2:02	0:04±0:11 0 - 0:45	11:29±0:25 0 - 2:02

Note: Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p) or Mann–Whitney U. [a] Significant sample gender difference (p < .05)

Compared to women, men drove significantly more nights (Z=-2.23, p=0.026), made more trips at night (Z=-2.27, p=0.023), drove a greater distance (Z=-2.57, p=0.010) and for a longer duration (Z=-2.48, p=0.013). No significant differences emerged between villages.

5.8.2.2 Consistency of Driving Over the Two Weeks

The consistency of driving data between the first and second week of monitoring is shown in **Table 5.20**. While paired t-tests and Wilcoxin analyses showed no significant differences on any of the driving indicators, there was considerably more disparity in night driving over the two weeks. Although the average number of nights driven did not differ significantly between the two weeks, more people drove at night during the first week of monitoring. Of the 14 participants who drove at night at least once over the two weeks: 12 did so during the first week and nine during the second week. Eight individuals drove at least one night during both weeks of monitoring.

Reliability was examined via ICC's, using the two-way mixed average model (3,k). All daytime indicators had ICC values ≥ 0.70, indicative of good reliability (Bédard et al. 2000). Values for the night driving indicators, particularly km (.44) indicated less consistency.

Table 5.20: Comparison of Week 1 and Week 2 Driving Data

Indicator	N	Week 1	Week 2	Paired *t(p)* or Wilcoxin *z(p)*	ICC's (3,k)
# of days	49	3.47 ± 1.89 0 - 7	3.41 ± 1.71 0 - 7	*t*=0.293 (.77)	**0.80**
# of trips	49	4.12 ± 2.73 0 - 11	4.02 ± 2.45 0 - 11	*z*=-0.332 (.74)	**0.78**
# of stops	49	7.61 ± 5.62 0 - 26	7.66 ± 5.83 0 - 29	*z*=-0.170 (.87)	**0.70**
Distance (km)	49	88.4 ± 95.3 0 - 391.4	113.8 ± 134.7 0 - 631.8	*z*=-1.273 (.20)	**0.72**
Duration (hr:min)	49	2:32 ± 2:05 0:00 - 8:28	2:48 ± 2:27 0:00 - 12:33	*z*=-0.472 (.64)	**0.80**
# of nights	49	0.43 ± 0.71 0 - 3	0.29 ± 0.68 0 - 3	*z*=-1.59 (.11)	0.61
Night trips	49	0.47 ± 0.82 0 - 4	0.29 ± 0.68 0 - 3	*z*=-1.803 (.07)	0.63
Night distance (km)	49	8.18 ± 20.75 0 - 106.0	4.98 ± 15.99 0 - 100.2	*z*=-1.633 (.10)	0.44
Night Duration (hr:min)	49	0:14 ± 0:33 0 - 2:53	0:09 ± 0:25 0 - 1:55	*z*=-1.023 (.31)	0.61

Note: Values are Mean ± SD and range or frequencies (%).

5.8.2.3 Where Participants Drove

To assess where participants drove, GPS data was obtained from 36 Otto devices and linked with Google Earth to derive trip radius (the linear distance from destination to the village). As shown in **Table 5.21**, no differences in radius (average or maximum) emerged by village or gender. The farthest trip was 131.3 km by EDAP (from LV town home) who drove himself and his wife to their cottage (Muskoka area) for a weekend.

Table 5.21: Maximum and Average Trip Radius by Village and Gender

	SV (n=11)	LV (n=25)	Full Sample		
			Males (n=18)	Females (n=18)	Total (n=36)
Maximum Radius (km)	14.52±16.03 2.47 - 55.00	43.66±46.69 2.46 - 131.28	46.61±47.95 2.47 - 131.28	22.90±31.82 2.46 - 99.90	34.75±41.87 2.46 - 131.28
Average Radius (km)	6.55±5.47 2.00 - 17.80	11.93±11.91 1.86 - 45.78	13.95±12.37 1.86 - 45.78	6.62±7.01 1.98 - 29.58	10.29±10.59 1.86 - 45.78

5.8.2.4 Why Participants Drove

Trip purposes recorded by participants on their logs for each segment (i.e., start to stop, not including return to home) were categorized, as shown in **Table 5.22**. In total, there were 763 trip segments over the two-weeks; 13% (n=99) were missing information on trip purposes. Shopping and errands account for 55% of all trips (416 of 763), followed by social, entertainment, education and recreation (16%, 125 of 763 trips). Additionally, about 17% of trips (112 of 763 trips) were classified as out of town.

Table 5.22: Number of Segments by Trip Purpose

Categories	LV n=456	SV n=307	Males n=448	Females n=315	Total N=763
Shopping and errands	263(57.7)	153(49.8)	231(51.6)	185(58.7)	416 (54.5)
Social/ entertainment/ education/ recreation	81 (17.8)	44 (14.3)	79 (17.6)	46 (14.6)	125 (16.4)
Helping others	23 (5.0)	7 (2.3)	18 (4.0)	12 (3.8)	30 (3.9)
Physical activities	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Religious activities	16 (3.5)	18 (5.9)	13 (2.9)	21 (6.7)	34 (4.5)
Paid work	10 (2.2)	0 (0)	10 (2.2)	0 (0)	10 (1.3)
Medical appointments	24 (5.3)	16 (5.2)	18 (4.0)	22 (7.0)	40 (5.2)
Volunteer activities	7 (1.5)	0 (0)	6 (1.3)	1 (0.3)	7 (0.9)
Other	1 (0.2)	1 (0.3)	1 (0.2)	1 (0.3)	2 (0.3)
Missing	31 (6.8)	68 (22.1)	72 (16.1)	27 (8.6)	99 (13.0)

Note: Values are frequencies (%). Missing segments were CarChip data with no corresponding log entry for trip purpose. Round trips with no stops (i.e., forgot item at home).

Table 5.23 shows the associations between the number of trip segments for each purpose and the driving indicators. Shopping/errands and social activities were both significantly associated with all the indicators (expect average radius for social activities). Helping others (such as driving friends or grandchildren), medical and out of town trips were significantly associated with the indicators of daytime driving, but not night driving. As expected, out of town trips were strongly associated with maximum and average radius, as well as the number of days driven, trips, distance and duration. No significant associations emerged for volunteer or religious trips. Weekday driving (km) was

associated with shopping/errands (*rho*=0.73, *p*<0.001), social activities (*rho*=0.63, *p*<0.001), helping others (*rho*=0.43, *p*=0.002), medical appointments (*rho*=0.48, *p*=0.001) and out-of-town trips (*rho*=0.40, *p*=0.006). Meanwhile, weekend driving (km) was significantly associated with shopping and errands (*rho*=0.33, *p*=0.02), social (*rho*=0.32, *p*=0.02), religious activities (*rho*=0.42, *p*=0.003) and out-of-town trips (*rho*=0.31, *p*=0.03).

Table 5.23: Associations Between Driving Indicators and Trip Purposes

Driving Indicators	Shopping / Errands	Social	Helping Others	Medical	Out of Town
Days Driven	**0.73*** **	**0.57*** **	**0.40** **	**0.49*** **	**0.41** **
# of Trips	**0.80*** **	**0.67*** **	**0.50*** **	**0.46** **	**0.54*** **
# of Stops	**0.85*** **	**0.69*** **	**0.59*** **	**0.49*** **	**0.61*** **
Distance (km)	**0.65*** **	**0.73*** **	**0.31* **	**0.32* **	**0.78*** **
Duration (hr:min)	**0.75*** **	**0.74*** **	**0.40** **	**0.35* **	**0.69*** **
Nights Driven	**0.32* **	**0.51*** **	0.12	0.02	0.24
Night Trips	**0.34* **	**0.53*** **	0.14	0.04	0.27
Night Distance (km)	**0.29* **	**0.51*** **	0.09	0.02	0.24
Night Duration (hr:min)	**0.29* **	**0.52*** **	0.11	0.03	0.23
Maximum Radius	**0.50** **	**0.65*** **	0.24	0.04	**0.85*** **
Average Radius	0.30	**0.52** **	0.07	-0.02	**0.77*** **

Note: Values are Pearson r for days driven, rest are Spearman rho, *p<0.05, **p<0.01, p<0.001. There were no significant associations with volunteer or religious trips and no recorded trips for physical activity.

5.8.2.5 Weather Conditions

Weather conditions were examined for the 49 people with usable CarChip data (24 males and 25 females). There were a total of 684 opportunities to drive or not drive (48 people had 14 days of data and one person had 12 days). The sample drove on 364/684 days (49%) of the monitoring period. Driving during inclement weather was examined by crosschecking self-reported weather conditions (from trip logs) with Internet archives (climate.weather.gc.ca).

As shown in **Table 5.24**, there were 477 days (70%) of clear weather and 207 days (30%) of inclement weather over the monitoring period. Inclement weather

comprised 169 days with rain and 38 days with snow. Almost a third of the sample (27%) drove on days with inclement weather. No gender differences emerged. Only four weather advisories were issued over the period: one extreme cold (≤ -15oC) and three, consecutive days with extreme heat (≥ 32oC) alerts. Only vehicle was equipped during the heat alert, and the person drove on two of the three days. Six of the 10 people whose vehicles were equipped drove on the extremely cold day (February 17, 2013).

Table 5.24: Days Driven and Not Driven by Weather Conditions

Weather	**Opportunities (684 total)**	**Male Drivers (336 total)**	**Female Drivers (348 total)**
Inclement	207/684 (30.3)	109/336 (32.4)	98/348 (28.2)
Drove	**56/207 (27.1)**	**31/109 (28.4)**	**25/98 (25.5)**
Rain	47/169 (27.8)	27/88 (30.7)	20/81 (24.7)
Snow	9/38 (23.7)	6/21 (28.6)	3/17 (17.6)
Did not drive	**151/207 (72.9)**	**78/109 (71.6)**	**73/98 (74.5)**
Rain	122/169 (72.2)	61/88 (69.3)	61/81 (75.3)
Snow	29/38 (76.3)	15/21 (71.4)	14/17 (82.4)
Favourable	477 / 684 (69.7)	227/336 (67.6)	250/348 (71.8)
Drove	282/477 (59.1)	147/227 (64.8)	135/250 (54.0)
Did not drive	195/477 (40.9)	80/227 (35.2)	115/250 (46.0)

5.8.3 Participant Feedback

Experiences with the monitoring period were discussed during the interview. No one felt that the in-vehicle devices affected their driving in any way, nor did anyone report driving problems over the two weeks. Only one resident reported driving someone else's (husband) car, and only for a short distance.

Over half of the SV sample (57%) reported driving about the same as usual over the two weeks, while 29% reported driving less and 14% reported driving more. Comparatively, 71% (20/28) of the LV sample reported their driving was typical; only 4 people (14%) said they drove more than usual (attributing this to travelling to see family), while two drove less (attributing this to nice weather, i.e., walking versus driving).

One resident (GEDA from LV) had been ill during the second week resulting in much less driving and inability to do the second session. Another male participant (GEFR from LV) reported being ill and not sleeping well. When asked if this affected his driving, he replied that he might have driven a little more had he not been ill, but still preferred to walk in such nice weather.

5.9 Alternate Modes of Transportation and Travel Patterns

This section presents the results from the Transportation Use questionnaire, followed by the daily travel diaries. On the questionnaire, respondents were asked to indicate how often (4-point scale, frequently to never) they used alternate modes of transport. As shown in **Table 5.25**, the most frequent mode was being a passenger in vehicle, followed by the village bus/shuttle and taxi. Although there were no significant gender differences, females reported a higher frequency of being a passenger in a vehicle and taking taxis; a somewhat greater proportion also had never used public transit. The SV group reported using the village shuttle significantly more often than LV respondents (X^2=12.28, p<0.01), however, this difference was likely due to the LV not having a permanent on-site shuttle.

Respondents were also asked how often, if ever, they used paratransit services and motorized scooters or wheelchairs. Only three reported using paratransit (one frequently, two rarely), two used motorized scooter (one sometimes, one rarely) and one used a motorized wheelchair rarely. For those who reported receiving rides from others (90%, 46/51), the source was most often their children (daughter, 43%; son, 41%), followed by adult grandchildren (31%), friends living inside (28%) or outside (28%) the village, son-in-laws (26%), daughter-in-laws (22%), spouse (22%) and other family member (4%).

Participants were also asked if they had any concerns or reservations about taking taxis, public transit or the village bus. Thirteen people (26%) had concerns about taking taxis or using public transit; only five (10%) reported concerns about the village shuttle. Full results from the transportation questionnaire can be found in **Appendix H (Table H7)**.

Table 5.25: Frequency of Use of Alternative Modes of Transportation

	SV Sample (n=27)	LV Sample (n=28)	Full Sample		
			Males (n=27)	Females (n=28)	Total (N=55)
Passenger in a Vehicle	**n=25**	**n=26**	**n=24**	**n=27**	**n=51**
Frequently/Sometimes	10 (40.0)	17 (65.4)	9 (37.5)	18 (66.6)	27 (52.9)
Rarely/Never	15 (60.0)	9 (34.6)	15 (62.5)	9 (33.3)	24 (47.1)
Public Transit	**n=25**	**n=26**	**n=24**	**n=27**	**n=51**
Frequently/Sometimes	2 (8.0)	3 (11.5)	2 (8.3)	3 (11.1)	5 (9.8)
Rarely/Never	23 (92.0)	23 (88.5)	22 (91.7)	24 (88.9)	46 (90.2)
Taxi	**n=25**	**n=26**	**n=24**	**n=27**	**n=51**
Frequently/Sometimes	1 (4.0)	2 (7.7)	1 (4.2)	2 (7.4)	3 (5.9)
Rarely/Never	24 (96.0)	24 (92.3)	23 (95.8)	25 (92.6)	48 (94.1)
Village Bus [a]	**n=25**	**n=26**	**n=24**	**n=27**	**n=51**
Frequently/Sometimes	6 (24.0)	2 (7.7)	4 (16.6)	4 (14.8)	8 (15.7)
Rarely/Never	19 (76.0)	24 (92.3)	20 (83.4)	23 (85.2)	43 (84.3)

[a] significant group difference (SV vs LV) for reported frequency. Values are frequencies (valid %).

Participants were asked to complete travel diaries over the 14 days for each non-driving trip outside of the village which asked for date and time of departure and return, mode(s) of travel to destination and back, as well as the purpose(s) of the trip. **Table 5.26** displays the results for the 50 individuals who completed the diaries or verified that they had not made any non-driving trips outside their village over the two weeks.

Walking was the most frequent mode of travel, accounting for 73% of all trips, followed by being a passenger in a vehicle (24%). Only one participant reported using public transit and a taxi, while four used the village bus/shuttle. No one used paratransit, scooters or wheelchairs. There were no significant village differences, despite the LV

group making more total trips and more walking trips on average. Females were significantly more likely than males to take trips as a passenger in a vehicle (*Z*=-2.51, *p*=0.012).

Table 5.26: Number of Non-driving Trips over Two Weeks

Travel Mode	Village		Gender		Full Sample	
	SV (n=23)	LV (n=27)	Male (n=25)	Female (n=25)	Mean # of Trips	Total # of Trips
Walking	1.61±4.85 0 - 23	3.32±5.76 0 - 19	2.44±4.83 0 - 19	2.84±5.99 0 - 23	2.64±5.39 0 - 23	132 (72.6)
Passenger [b]	0.91±1.47 0 - 5	0.85±1.61 0 - 6	0.36±0.91 0 - 4	1.40±1.85 0 - 6	0.88±1.53 0 - 6	44 (24.2)
Public Bus	0.04±0.21 0 - 1	0 ± 0 0 - 0	0 ± 0 0 - 0	0.04±0.20 0 - 1	0.02±0.14 0 - 1	1 (0.5)
Taxi	0.04±0.21 0 – 1	0 ± 0 0 - 0	0 ± 0 0 - 0	0.04±0.20 0 - 1	0.02±0.14 0 - 1	1 (0.5)
Village Bus	0.17±0.39 0 - 1	0 ± 0 0 - 0	0.12±0.33 0 - 1	0.04±0.20 0 - 1	0.80±0.27 0 - 1	4 (2.2)
Total Trips	2.78±5.98 0 - 29	4.37±6.01 0 - 20	2.92±4.72 0 - 19	4.36±7.06 0 - 29	3.64±5.99 0 - 29	**182**

Note: Values are Mean ± SD and range or frequencies (%). Comparisons are Mann–Whitney U
[b] Significant sample gender difference (p < .05)

Total number of non-driving trips on the travel diaries were compared to some of the driving indicators (distance or km, duration, # days driven and # of trips). Significant and inverse associations emerged with distance (*rho*=-0.31, *p*=0.037) and duration (*rho*=-0.30, *p*=0.038) driven, but not days or trips.

Trip purposes from the diaries are shown in **Table 5.27**. Trips for recreation were most common (70% of all trips), followed by shopping or errands (21.9%). There were no significant village or gender differences. The diaries also asked participants whether they chose not to drive themselves on a particular trip due to bad weather. None of the respondents selected 'Yes'.

Table 5.27: Non-driving Trip Purposes by Village and Gender

Trip Purposes	Completed Travel Diaries (n=50)				
	Village		Gender		Total (182 total trips)
	SV (n=23) (68 trips)	LV (n=27) (114 trips)	Male (n=25) (72 trips)	Female (n=25) (110 trips)	
Shopping	8 (11.8)	9 (7.9)	6 (8.3)	11 (10.0)	17 (9.3)
Errands	5 (7.4)	18 (15.8)	13 (18.1)	10 (9.1)	23 (12.6)
Recreation	51 (75.0)	77 (67.5)	51 (70.8)	77 (70.0)	128 (70.3)
Religious	0 (0)	9 (7.9)	2 (2.8)	7 (6.4)	9 (4.9)
Medical	4 (5.9)	1 (0.9)	0 (0)	5 (4.5)	5 (2.7)

Values are frequencies (valid %).

5.10 Associations with Driving and Travel Indicators

5.10.1 Functional Scores

As shown in **Table 5.28**, few significant associations emerged. Both number of errors on Trails B and time for the RPW had a significant, inverse association with average radius (distance driven from home). Higher CS scores, meanwhile, were positively associated with average radius. Time to complete the Trails B was negatively associated with number of passenger trips.

Table 5.28: Associations Between Driving and Travel indicators and Functional Assessments

	MoCA	Trails B Time	Trails B Errors	RPW Time	CS Score
Driving Indicators					
Days Driven	0.10	0.18	0.13	-0.25	-0.12
# of Trips	0.11	0.14	0.10	-0.29	-0.06
# of stops	0.02	0.12	0.01	-0.17	0.01
Distance (km)	0.15	0.14	-0.14	-0.22	0.18
Duration (hr:min)	0.13	0.17	-0.07	-0.17	0.08
Nights Driven	0.26	0.12	-0.19	-0.18	-0.12
Night Trips	0.26	0.09	-0.21	-0.17	-0.12
Night Distance	0.25	0.07	-0.23	-0.20	-0.11
Night Duration	0.25	0.08	-0.24	-0.18	-0.12
Average Radius	0.18	-0.31	**-0.35***	**-0.39***	**0.38***
Maximum Radius	0.08	-0.23	-0.29	-0.33	0.32

	MoCA	Trails B Time	Trails B Errors	RPW Time	CS Score
Non-driving Indicators					
Total Trips	0.17	-0.26	0.14	-0.13	-0.01
Walking	0.27	-0.04	0.16	-0.10	0.01
Passenger	0.02	**-0.43****	-0.05	0	0.08

Note: Values are Spearman rho, *p<0.05, **p<0.01. n=49 for all variables except average and maximum radius (n=36)

5.10.2 Depression, Vitality and Engagement Scores

As shown in **Table 5.29**, there were no significant associations between the GDS-15 or the VPS and any of the driving or non-driving indicators. Engagement was examined through three composite variables, described below. Frequency of physical activity classes was also examined, however there was no association with any of the driving or travel indicators.

A *Community Engagement (CE) Score* was calculated based on how many activities outside the village they did over the past month (refer to **Appendix H, Table H10)**. Possible scores could range from 0 to 10.The average CE score was 4.78 ± 1.88 (range: 2 - 7). There was no significant gender difference, however the LV sample had significantly higher CE scores than the SV group (5.42 ± 1.98 versus 4.08 ± 1.53, t=3.87, p=0.011). With respect to specific activities, LV residents were more likely to go to movies/theatre (X^2=6.44, p=0.012), on full day outings (X^2=6.21, p=0.014), take overnight trips (X^2=7.23, p=0.008) and do volunteer work in the community (X^2=13.02, p<0.001). Eleven residents from LV (5 men and 6 women), but none from the SVs reported volunteering in the last month. (average of 18.36±20.06 hours), These 11 current drivers volunteered on average 18.36±20.06 hours (range 2 to 60) over the prior month, with females reporting more hours than men (27.0±23.8 versus 8.0±7.3); see **Appendix H, Table H9**).

Community engagement (CE) scores were associated with younger age (*rho*=-0.450, *p*<.01), being married (*t*=-2.62, *p*=0.012), higher incomes (*t*=-2.33, *p*=0.025) and education (college or greater, *p*=0.055), as well as greater balance confidence (ABC-20, *rho*=0.418, *p*<.01) and lower SDA (driving avoidance) scores (*rho*=0.404, *p*<.01). Higher CE scores were also associated with less time to complete the Trails B (*rho*=-0.312, *p*<.05) and RPW tests (*rho*= -0.440, *p*<.01), as well as the ability to walk 1/4 mile (*t*=-2.31, *p*=0.026). Those who did not use a walker or cane had higher CE scores (5.16±1.87 versus 4.06±1.88), approaching significance (p=.06). Non-fallers also had higher CE scores than fallers (5.12 ± 1.90 versus 4.00 ± 1.73), again approaching significance (p=.058).

There was also a significant difference between CE scores and level of independence (*F*=6.27, *p*=0.004). Those living in the highly independent town homes had greater CE scores (6.00 ± 1.81, range: 3 - 9) than those living in apartments or suites (4.70 ± 1.78, range: 2 - 8), and significantly higher scores than those in the less independent rooms (3.25 ± 1.17; *p*=0.003, range: 2-5). CE scores were associated with social engagement scores (*rho*=0.460, *p*<0.01), described next.

A *Social Engagement (SE) Score* was created to reflect how often they kept in touch with family and friends outside the village through various means: a) visits at the village, b) at another's home, c) at a restaurant or other location, d) on the phone or e) by email. Responses to each of these five items on the questionnaire were coded as follows (never=0, rarely=1, few times a month=2, at least once a week=3). Scores could range from 0 to 15 with lower scores indicating less social engagement. The average Social

Engagement Score was 8.86 ± 2.76 (range 2 to 15). There were no significant gender or village differences.

A *Participation in Community Groups/Organization Score* was created to examine level of participation in organized groups outside of the village. Respondents were asked if they belonged to any of the following types of groups or organizations in the broader community and if they attended in the past month: a) sports-related, b) recreation or hobby group, c) cultural or educational, d) service club or fraternal organization, e) religious-affiliated groups, and f) political party. Possible scores ranged from 0 to 6. The average score (number of groups attended in the past month) was 1.10 ± 1.06 (range 0-3). Although the LV group scored higher than the SV sample (1.35 ± 1.09 versus 0.83 ± 0.96) there were no significant group or gender differences.

Lastly, scores were calculated for *number of services and amenities used* in their village (apart from meals) in the past month and *number of organized Village activity groups* they participated in regularly (possible range 0 to 6). See **Appendix H, Table H8,** for the list of services/amenities offered in each village and frequency of reported use. Apart from meals, the average number of services/amenities used was 4.25 ± 2.62 (range 0 to 12). Although not significant, females reported using more services/amenities than males (4.78 ± 2.72 versus 3.67 ± 2.43), as did those from the SVs compared to LV (4.60 ± 2.98 versus 3.92 ± 2.22). On average, current drivers regularly participated in 2.18 ± 1.81 (range 0 to 6) organized group activities in their village. Those who were older took part in more organized village activities (*rho* = 0.327; *p*=.019*)*, as did those who were not married (*p* =.06, approaching significance). The village group activity score was not

associated with gender, use of cane/walker, ability to walk ¼ mile, ABC-20, RPW or CE scores.

Associations between selected driving and travel indicators, engagement scores and number of services used are shown in **Table 5.29**. Higher community engagement scores were significantly associated with greater distance (km) driven, and average and maximum radius. No other significant associations emerged.

Table 5.29: Associations Between Driving and Travel Indicators and Engagement Scores

	VPS	**GDS**	**Community Engagement Score**	**Social Engagement Score**	**Group Attendance**	**Number Services Used**
Driving Indicators						
Days Driven	-0.07	0.06	0.18	0.03	0.19	-0.10
# of Trips	0.02	-0.03	0.22	0.05	0.23	-0.16
# of stops	0.11	-0.08	0.16	0.08	0.11	-0.18
Distance (km)	-0.01	-0.04	**0.33***	0.11	0.19	-0.22
Duration (hr:min)	0.04	-0.03	0.25	0.08	0.22	-0.22
Nights Driven	0.19	0.11	0.02	-0.09	0.23	-0.10
Night Trips	0.21	0.08	0.04	-0.09	0.20	-0.11
Night Distance	0.16	0.12	0.06	-0.11	0.21	-0.11
Night Duration	0.18	0.12	0.05	-0.11	0.27	-0.11
Average Radius	-0.09	-0.27	**0.39***	0.09	0.25	-0.21
Maximum Radius	-0.18	-0.19	**0.42***	0.09	0.24	-0.11
Non-driving Indicators						
# of Trips	0.15	0.02	0.03	-0.04	0.10	-0.09
Walking	0.03	0.12	0.03	-0.09	0.18	-0.07
Passenger	0.10	-0.14	0.13	0.10	0.04	-0.17

Note: Values are Spearman rho, *p<0.05, **p<0.01. n=49 for all variables except average and maximum radius (n=36)

5.10.3 Perceived Driving Comfort, Abilities and Balance Confidence

Associations between selected driving and travel indicators and measures of perceived driving comfort, abilities and balance confidence are shown in **Table 5.30**. First it should be noted that balance confidence scores (on the ABC 20) were significantly correlated with driving comfort scores (DCS-D, *rho*=0.557, *p*<0.01; DCS-N (*rho*=0.589, *p*=0.01).

There were no significant associations with ABC scores, although there were some moderate correlations (.25 to .31) with various driving indicators. Better perceptions of driving abilities (higher PDA scores) were significantly related to making more driving trips, but fewer walking trips and non-driving trips in general. Driving comfort scores (both day and night) were related to multiple driving indicators as shown below, but not to the non-driving travel indicators.

Table 5.30: Associations Between Driving, Travel Indicators and Perception Scores

	ABC Scores			**PDA**	**DCS-D**	**DCS-N**
	27 items	**20 items**	**16 items**			
Driving Indicators						
Days Driven	0.19	0.18	0.14	0.29	0.19	0.23
# of Trips	0.27	0.27	0.22	**0.33***	0.24	0.25
# of stops	0.28	0.28	0.23	0.28	0.28	**0.30***
Distance (km)	0.21	0.24	0.17	0.25	**0.30***	**0.34***
Duration (hr:min)	0.25	0.25	0.21	0.27	**0.33***	**0.34***
Nights Driven	0.15	0.16	0.15	0.28	**0.39****	**0.37***
Night Trips	0.17	0.18	0.18	0.29	**0.40****	**0.38****
Night Distance	0.19	0.18	0.17	0.29	**0.40****	**0.39****
Night Duration	0.17	0.17	0.16	0.28	**0.41****	**0.39****
Average Radius	0.24	0.31	0.17	0.27	0.30	**0.35***
Maximum Radius	0.14	0.20	0.08	0.28	0.26	0.29
Non-driving Indicators						
# of Trips	-0.02	0.02	-0.04	**-0.33***	-0.21	-0.24
Walking	0.03	0.04	0.01	**-0.42***	-0.19	-0.15
Passenger	-0.04	0.03	-0.03	-0.01	-0.16	-0.27

Note: Values are Spearman rho, *p<0.05, **p<0.01. n=49 for all variables except average and maximum radius (n=36)

5.10.4 Self-reported Driving Restrictions

As seen in **Table 5.31,** scores on the SDF (frequency of driving in challenging situations) were positively associated with all the objective driving indicators, while scores on the SDA (higher scores indicate greater avoidance of challenging driving situations) were negatively associated with several of the driving indicators.

Table 5.31: Associations Between Driving and Travel Indicators and SDF and SDA

	SDF	SDA
Days Driven	**0.47****	-0.28
# of Trips	**0.49****	**-0.29***
# of stops	**0.50****	**-0.34***
Distance (km)	**0.61****	**-0.35***
Duration (hr:min)	**0.57****	**-0.37***
Nights Driven	**0.37***	**-0.46****
Night Trips	**0.35***	**-0.47****
Night Distance	**0.38****	**-0.48****
Night Duration	**0.37***	**-0.48****
Average Radius	**0.63****	**-0.39***
Maximum Radius	**0.63****	-0.32

Note: Values are Spearman rho, *p<0.05, **p<0.01. n=49 for all variables except average and maximum radius (n=36)

5.11 Comparisons of Mileage Categories

As noted in Chapter Four, CarChip data was used to categorize drivers into one of three mileage groups low (< 57.7 km per week), middle (57.7 to 269.2 km per week) or high (> 269.2 km per week). Using this classification scheme there were 22 low mileage (LM) drivers (45%), 24 middle mileage (MM) drivers (49%) and only three high mileage (HM) drivers (6%).

All three HM drivers (DASM, DAPA, KEWI) were males from LV. DASM, aged 73, lives in a townhome with his wife whom no longer drives. He worked as a bank executive, has a post-graduate degree, and checked the highest income category (> $75,000 annually). DAPA, aged 77, lives in a townhome with his wife who also drives.

He was employed as a school superintendent, has a post-graduate degree and also checked the highest income category. Higher mileage for DAPA and DASM can be explained in part by both having driven to cottages during the period. As described earlier, the high mileage by KEWI can be explained by commuting to work.

Given the low number of high mileage drivers in the sample, they were combined with the middle group for further analyses as shown in **Table 5.32.** Although differences were not significant, middle/high mileage drivers were more likely to be male, married (approached significance) and live more independently (i.e., in the townhomes at LV).

Table 5.32: Characteristics of Low versus Middle/High Mileage Drivers

	Mileage Category		**Significance**
	Low: <57.7 km/week (n=22)	**Middle/High: >57.7 km/week (n=27)**	
Age	82.59 ± 6.84 70 - 95	80.81 ± 6.44 66 - 92	*p*=0.342
Gender *Male* *Female*	 8 (36.4) 14 (63.6)	 16 (59.3) 11 (40.7)	*p*=0.095
Education *Less than college* *College or greater*	 9 (45.0) 11 (55.0)	 13 (48.1) 14 (51.9)	*p*=0.533
Years since move	5.76 ± 4.54 1 – 14	5.04 ± 4.82 0 - 16	*p*=0.599
Accommodation *Highly independent* *Independent* *Less independent*	 2 (9.1) 15 (68.2) 5 (22.7)	 9 (33.3) 16 (59.3) 2 (7.4)	*p*=0.070
Marital Status *Married* *Not Married*	 8 (36.4) 14 (63.6)	 17 (63.0) 10 (37.0)	*p*=0.058
Income *>$50,000* *<$50,000*	**n=20** 8 (40.0) 12 (60.0)	**n=25** 5 (20.0) 20 (80.0)	*p*=0.127
Self-rated health *Good/Excellent* *Fair*	 20 (90.9) 2 (9.1)	**n=26** 23 (88.5) 3 (11.5)	*p*=0.581

	Low: <57.7 km/week (n=22)	Middle/High: >57.7 km/week (n=27)	Significance
Cane Use *No* *Yes*	**n=21** 15 (71.4) 6 (28.6)	**n=26** 17 (65.4) 9 (34.6)	*p*=0.451
Able to walk 1/4 mile *Yes* *No*	**n=20** 17 (85.0) 3 (15.0)	**n=26** 23 (88.5) 3 (11.5)	*p*=0.532
# of diagnosed conditions	2.64 ± 1.59 0 - 6	2.48 ± 1.34 0 - 6	*p*=0.713
# of reported difficulties	0.86 ± 1.28 0 - 5	0.56 ± 0.84 0 - 3	*p*=0.319

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p), Mann–Whitney U or Chi-Square analysis.

Table 5.33 displays the scores on the functional measures by mileage category.

Low mileage drivers performed more poorly on the RPW test, although not significantly.

Table 5.33: Functional Scores by Mileage Category

	Mileage Category		Significance
	Low: <57.7 km/week (n=22)	**Middle/High: >57.7 km/week (n=27)**	
MoCA score	n=21 24.10 ± 3.08 18 - 29	n=26 24.27 ± 3.08 18 - 29	*p*=0.765
Trails B Time (min:sec)	n=21 02:12 ± 00:59 01:14 - 04:57	n=26 02:16 ± 00:43 00:58 - 04:15	*p*=0.837
# of Trails B errors	n=21 0.86 ± 1.11 0 - 3	n=26 0.88 ± 1.48 0 - 6	*p*=0.944
RPW Time (sec:ms)	n=21 09.19 ± 02.97 05.40 - 15.30	n=26 08.39 ± 02.47 04.30 - 13.80	*p*=0.318
Log CS score	n=21 1.69 ± 0.25 1.20 - 1.95	n=26 1.75 ± 0.22 1.15 - 1.95	*p*=0.405

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Comparisons are independent t-tests t(p), Mann–Whitney U

As shown in **Table 5.34**, vitality (VPS|) and depression scores did not differ. The middle/high mileage drivers appear to be somewhat more engaged in the outside community and used fewer services/amenities in the village, although none of the differences were significant.

Table 5.34: Depression, Vitality and Engagement by Mileage Category

	Mileage Category		
	Low: <57.7 km/week (n=22)	**Middle/High: >57.7 km/week (n=27)**	**Significance**
VPS	39.14 ± 6.19 26 - 49	39.26 ± 4.98 29 - 48	*p*=0.943
GDS	1.45 ± 1.41 0 - 4	1.67 ± 1.57 0 - 5	*p*=0.624
Community Engagement Score	**n=21** 4.33 ± 1.79 2 - 7	**n=26** 5.23 ± 1.97 2 - 9	*p*=0.113
Social Engagement Score	**n=21** 8.71 ± 2.90 2 - 15	**n=26** 9.15 ± 2.77 2 - 15	*p=0.*599
Participation in Community Groups	**n=21** 0.90 ± 0.94 0 - 3	**n=26** 1.31 ± 1.23 0 - 3	*p*=0.196
Number of Services Used	**n=21** 4.52 ± 2.75 1 - 12	**n=26** 3.92 ± 2.47 0 - 9	*p*=0.434

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Comparisons are independent t-tests t(p), Mann–Whitney U

The mileage groups were also compared with respect to other driving indicators, number of non-driving trips (according to the travel diaries) and alternate transport use (questionnaire) as shown in **Table 5.35.** As would be expected, the middle/high mileage group made significantly more driving trips overall and at night. Middle and high mileage drivers reported significantly fewer driving restrictions (i.e., higher SDF and lower SDA scores) than low mileage drivers.

Conversely, the low mileage group made significantly more non-driving trips; the number of walking and passenger trips was higher but not significant. On the

transportation use questionnaire, proportionately more of the low mileage drivers indicated being a passenger in another vehicle, using public buses and the village bus (frequency responses frequently, sometimes and rarely were combined here and compared to never).

Table 5.35: Other Driving Indicators and Alternate Transport by Mileage Category

	Mileage Category		**Significance**
	Low: <57.7 km/week (n=22)	**Middle/High: >57.7 km/week (n=27)**	
Driving Trips	4.95 ± 2.97 1 – 11	10.74 ± 4.26 5 - 19	***Z*=-4.60, *p*<0.01**
Night Driving Trips	0.23 ± 0.61 0 – 2	1.19 ± 1.52 0 - 6	***Z*=-2.82. *p*=0.005**
SDF	**n=21** 23.90 ± 9.17 6 - 44	**n=26** 33.81 ± 7.70 22 - 50	***t*=-4.03 *p*<0.01**
SDA	**n=21** 9.57 ± 5.23 0 - 17	**n=26** 5.38 ± 4.97 0 - 14	***Z*=-2.55, *p*=0.011**
Number of Non-driving Trips	5.09 ± 7.68 0 - 29	**n=25** 2.32 ± 4.09 0 - 15	***Z*=-1.97 *p*=0.049**
Walking Trips	3.38 ± 7.02 0 – 23	**n=25** 1.84 ± 3.74 0 - 15	*p*=0.237
Passenger Trips	1.09 ± 1.69 0 - 6	**n=25** 0.44 ± 0.96 0 - 4	*p*=0.105
Car Passenger *Yes* *No*	**n=21** 20 (95.2) 1 (4.8)	**n=26** 22 (84.6) 4 (15.4)	*p*=0.248
Public Bus *Yes* *No*	**n=21** 7 (33.3) 14 (66.7)	**n=26** 5 (19.2) 21 (80.8)	*p*=0.222
Taxi *Yes* *No*	**n=21** 10 (47.6) 11 (52.4)	**n=26** 11 (42.3) 15 (57.7)	*p*=0.472
Village Bus *Yes* *No*	**n=21** 12 (57.1) 9 (42.9)	**n=26** 12 (46.2) 14 (53.8)	*p*=0.325

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p), Mann–Whitney U or Chi-Square analysis.

As shown in **Table 5.36**, compared to low mileage drivers, the middle/high mileage drivers had significantly greater driving comfort scores concerning both day and night driving. Low mileage drivers had less balance confidence and poorer perceived driving abilities, however differences were not significant.

Table 5.36: Balance Confidence, Driving Comfort and Abilities by Mileage Group

	Mileage Category		**Significance**
	Low: <57.7 km/week (n=22)	**Middle/High: >57.7 km/week (n=27)**	
ABC-16	**n=21** 84.99 ± 13.99 40.63 - 100	87.91 ± 11.09 60.94 - 100	*p*=0.426
ABC-20	**n=21** 79.40 ± 17.17 28.75 - 100	84.97 ± 14.58 45.00 - 100	*p*=0.231
ABC-27	**n=21** 82.32 ± 15.11 37.04 - 100	86.96 ± 12.96 50.93 - 100	*p*=0.258
PDA	**n=21** 30.52 ± 6.71 18 - 43	**n=26** 33.54 ± 6.18 19 - 44	*p*=0.117
DCS-D	**n=21** 55.34 ± 22.38 21.15 - 100	**n=26** 67.75 ± 16.19 40.38 - 92.31	***t*=-2.21, *p*=0.033**
DCS-N	**n=21** 40.03 ± 26.75 0 - 92.19	**n=26** 60.34 ± 20.04 26.56 - 96.88	***t*=-2.98, *p*=0.005**

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Comparisons are independent t-tests t(p) or Mann–Whitney U

5.12 Associations with Fall Status

As discussed earlier, the total sample included 16 fallers (8 one time and 8 recurrent) identified by either self or incident reports. Basic characteristics of fallers and non-fallers were presented earlier in **Table 5.9**. This section looks at further associations with fall status, beginning with scores on the functional measures. The analyses are primarily multiple comparisons (ANOVA) between single, recurrent and non-fallers. For some variables (e.g., frequency of using alternate modes of transport), chi-square was

used to compare single and recurrent fallers, as well as fallers (single and recurrent combined) versus non-fallers.

As shown in **Table 5.37**, there was a significant difference in time to complete the RPW by fall status (F=4.89, p=0.012). Post hoc analyses showed that both non-fallers and one-time fallers walked significantly faster than recurrent fallers (p=0.015 and p=0.027, respectively). No other differences were significant, however it is noteworthy that the mean score on the MoCA for the single fallers was slightly below the mild cognitive impairment cut-off score of 23. Cut-points (more than 3 errors and more than 3 seconds on the Trails B, and more than 9 seconds on the RPW) were also compared for fallers versus non-fallers, with no significant differences.

Table 5.37: Functional Assessments by Fall Status

	Single Time Fallers (n=8)	**Recurrent Fallers (n=8)**	**Total Sample Fallers (n=16)**	**Non-Fallers (n=38)**
MoCA Score	**n=7** 22.86 ± 3.44 18 - 27	 24.38 ± 2.77 21 - 29	**n=15** 23.67 ± 3.09 18 - 29	**n=34** 24.79 ± 2.82 19 - 29
Trails B Time (min:sec)	**n=7** 01:56 ± 0:22 01:17 - 02:21	 02:26 ± 01:12 01:14 - 04:15	**n=15** 02:12 ± 0:55 01:14 - 04:15	**n=34** 02:16 ± 0:53 0:52 - 04:57
Trails B Errors	**n=7** 0.86 ± 1.22 0 - 3	 1.25 ± 1.75 0 - 4	**n=15** 1.07 ± 1.48 0 - 4	**n=34** 0.91 ± 1.38 0 - 6
RPW Time (sec.ms) *	**n=7** 07.42 ± 02.15 04.30 - 10.35	 11.32 ± 03.39 06.30 - 15.30	**n=15** 09.50 ± 03.43 04.30 - 15.30	**n=34** 08.61± 02.45 05.20 - 13.80
Log CS Score	**n=7** 1.75 ± 0.28 1.20 - 1.95	 1.69 ± 0.23 1.15 - 1.95	**n=15** 1.76 ± 0.24 1.20 - 1.95	**n=34** 1.71 ± 0.23 1.15 - 1.95

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Analyses were multiple comparisons (ANOVA) followed by Post Hoc tests for significant differences. *p<0.05, **p<0.01

Compared to single and non-fallers, recurrent fallers drove less as evident by several of the driving indicators, and reported more restrictive practices (lower SDF and higher SDA scores) as shown in **Table 5.38**, although differences were not significant.

With respect to non-driving travel patterns, there was a significant difference in number of trips by fall status (F=3.54, p=0.037). Post hoc analysis revealed that recurrent fallers took significantly more non-driving trips than single fallers (p=0.049). Recurrent fallers also reported the most walking and passenger trips, however these differences were not significant.

Table 5.38: Driving and Travel Patterns by Fall Status

	Single Time Fallers (n=8)	**Recurrent Fallers (n=8)**	**Total Sample Fallers (n=16)**	**Non-Fallers (n=38)**
		Driving		
Days Driven	**n=7** 7.14 ± 3.49 3 - 13	**n=7** 4.57 ± 2.51 1 - 7	**n=14** 5.86 ± 3.21 1 - 13	**n=34** 7.50 ± 3.12 1 - 14
Trips	**n=7** 8.43 ± 5.06 3 - 18	**n=7** 4.71 ± 2.63 1 - 7	**n=14** 6.57 ± 4.32 1 - 18	**n=34** 9.00 ± 4.63 1 - 19
Distance (km)	**n=7** 258.1 ± 340.9 52.0 - 1023.0	**n=7** 111.0 ± 102.8 5.6 - 238.2	**n=14** 184.6 ± 253.7 5.6 - 1023.0	**n=34** 214.5 ± 187.9 6.2 - 664.3
Duration (hr:min)	**n=7** 6:15 ± 5:59 2:16 - 19:33	**n=7** 3:05 ± 2:22 0:16 - 6:32	**n=14** 4:40 ± 4:41 0:16 - 19:33	**n=34** 5:46 ± 3:58 0:23 - 15:29
Night Trips	**n=7** 0.86 ± 1.21 0 - 3	**n=7** 0.14 ± 0.38 0 - 1	**n=14** 0.50 ± 0.94 0 - 3	**n=34** 0.88 ± 1.41 0 - 6
Maximum Radius (km)	**n=4** 32.79 ± 21.92 6.27 - 62.31	**n=5** 17.13 ± 30.98 2.46 - 72.52	**n=9** 24.09 ± 28.99 2.46 - 72.52	**n=27** 38.31 ± 45.27 3.17 - 131.28
Average Radius (km)	**n=4** 13.14 ± 11.01 3.62 - 25.10	**n=5** 7.77 ± 12.19 1.98 - 29.58	**n=9** 10.16 ± 11.31 1.98 - 29.58	**n=27** 10.33 ± 10.56 1.86 - 45.78
SDF	**n=7** 35.14 ± 7.40 23 - 44	28.75 ± 5.20 22 - 38	**n=15** 31.73 ± 6.92 22 - 44	**n=34** 28.38 ± 11.07 6 - 50
SDA	**n=7** 4.00 ± 4.76 0 – 13	9.50 ± 5.13 0 - 16	**n=15** 6.93 ± 5.56 0 - 16	**n=35** 7.77 ± 5.83 0 - 18

	Single Time Fallers (n=8)	Recurrent Fallers (n=8)	Total Sample Fallers (n=16)	Non-Fallers (n=38)
Non-driving				
Car Passenger *Yes* *No*	**n=7** 7 (100) 0 (0)	 6 (75) 2 (25)	**n=15** 13 (86.7) 2 (13.3)	**n=35** 32 (91.4) 3 (8.6)
Public Bus *Yes* *No*	**n=7** 1 (14.3) 6 (85.7)	 3 (37.5) 5 (62.5)	**n=15** 4 (26.7) 11 (73.3)	**n=35** 7 (20.0) 28 (80.0)
Taxi *Yes* *No*	**n=7** 3 (42.9) 4 (57.1)	 3 (37.5) 5 (62.5)	**n=15** 6 (40.0) 9 (60.0)	**n=35** 15 (42.9) 2 (57.1)
Number of Trips *	**n=7** 1.14 ± 1.46 0 – 4	 8.38 ± 11.40 0 - 29	**n=15** 5.00 ± 8.93 0 - 29	**n=34** 3.06 ± 4.23 0 - 19
# of Walking Trips	**n=7** 0.86 ± 1.57 0 - 4	 6.63 ± 9.71 0 - 23	**n=15** 3.93 ± 7.55 0 - 23	**n=34** 2.12 ± 4.22 0 - 19
# of Passenger Trips	**n=7** 0 ± 0 0 - 0	 1.50 ± 1.93 0 - 5	**n=15** 0.80 ± 1.57 0 - 5	**n=34** 0.88 ± 1.55 0 - 6

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Analyses were multiple comparisons (ANOVA) followed by Post Hoc tests for significant differences. *$p<0.05$, or Chi square analysis.

Table 5.39 displays depression, vitality and engagement scores by fall status. There were minimal differences in vitality and depression scores. Compared to recurrent fallers, single fallers had higher community engagement scores, used fewer on-site services and participated in more community groups/organizations, but had higher social engagement scores (not significant). When all fallers (n=16) were compared to the 38 non-fallers on these variables, CE scores were found to be significantly higher for the latter group (t=2.42, p=.018).

Table 5.39: Depression, Vitality and Engagement by Fall Status

	Single Time Fallers (n=8)	Recurrent Fallers (n=8)	Total Sample Fallers (n=16)	Non-Fallers (n=38)
VPS	39.25 ± 5.06 32 - 47	38.75 ± 5.47 30 - 45	39.00 ± 5.10 30 - 47	**n=36** 39.06 ± 6.34 19 - 49
GDS	1.13 ± 1.13 0 - 3	2.00 ± 2.00 0 - 5	1.56 ± 1.63 0 - 5	**n=37** 1.54 ± 1.37 0 - 5
Community Engagement Score *	**n=7** 4.43 ± 1.90 2 - 7	3.63 ± 1.59 2 - 6	**n=15** 4.00 ± 1.73 2 - 7	**n=34** 5.12 ± 1.90 2 - 9
Social Engagement Score	**n=7** 7.00 ± 3.05 2 - 11	9 9.88 ± 2.53 6 - 15	**n=15** 8.53 ± 3.06 2 - 15	**n=34** 8.94 ± 2.67 2 - 15
Participation in Community Groups	**n=7** 0.86 ± 1.22 0 - 3	0.63 ± 0.74 0 - 2	**n=15** 0.73 ± 0.96 0 - 3	**n=34** 1.29 ± 1.06 0 - 3
Number of Services or Amenities Used	**n=7** 3.00 ± 2.45 0 - 6	4.25 ± 2.61 1 - 9	**n=15** 3.67 ± 2.53 0 - 12	**n=35** 4.34 ± 2.52 0 - 12

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Analyses were multiple comparisons (ANOVA). **p*<.05 for fallers versus non-fallers

As shown in **Table 5.40**, the recurrent fallers had considerably lower scores on the PDA and ABC scales, but differences were not significant. There were however, significant differences in driving comfort scores for day (F=3.67, p=0.039) and night driving (F=4.05, p=0.024). Post hoc analyses found that single fallers scored significantly higher than recurrent fallers on the day scale (p=0.048) and (surprisingly) significantly higher than non-fallers on the night scale (p=0.021)

Table 5.40: Perceived Driving Comfort, Abilities and Balance Confidence by Falls

	Single Time Fallers (n=8)	Recurrent Fallers (n=8)	Total Sample Fallers (n=16)	Non-Fallers (n=38)
ABC-16	89.65 ± 7.83 76.56 - 100	78.13 ± 22.93 40.63 - 100	83.89 ± 17.59 40.63 - 100	**n=37** 87.01 ± 9.64 67.18 - 100
ABC-20	86.56 ± 11.76 68.75 - 100	71.46 ± 9.25 28.75 - 98.75	79.01 ± 21.09 28.75 - 100	**n=37** 83.21 ± 12.69 60.0 - 100

	Single Time Fallers (n=8)	Recurrent Fallers (n=8)	Total Sample Fallers (n=16)	Non-Fallers (n=38)
ABC-27	88.31 ± 9.82 72.22 - 100	74.84 ± 24.60 37.04 - 99.07	81.58 ± 19.39 37.04 - 100	**n=37** 85.43 ± 10.90 63.89 - 100
PDA	**n=7** 36.57 ± 5.19 28 - 42	30.25 ± 5.52 24 - 41	**n=15** 33.20 ± 6.12 24-42	**n=35** 31.49 ± 7.11 18 - 44
DCS-D *	**n=7** 79.74 ± 20.94 42.31 - 100	55.29 ± 17.22 30.76 - 82.69	**n=15** 66.70 ± 22.26 30.77 - 100	**n=35** 60.82 ± 19.47 13.46 - 90.38
DCS-N *	**n=7** 75.00 ± 19.34 40.63 - 92.19	46.29 ± 22.59 25.00 - 96.88	**n=15** 59.69 ± 25.21 25.00 - 96.88	**n=35** 47.28 ± 25.11 0 - 84.38

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Analyses were multiple comparisons (ANOVA) followed by Post Hoc tests for significant differences. *$p<0.05$

5.13 Considering the Transition from Driving

Current drivers were asked if they considered or anyone suggested giving up their license or car prior to moving to the village (Q6 on the DHHQ). With respect to current driving habits, Q20 asked: "Have you yourself thought about giving up driving in the next few years?" (yes/no). Only two residents had thought about driving cessation prior to moving to the village (3.6%) and 100% of the sample said that regardless they were glad they had kept driving. Half the sample (27/55 or 49%) reported that they were now considering quitting in the next few years. Of those who were considering driving retirement, 40.7% (11/27) provided a reason, most often vision problems (4/11, 36.4%), declining health (3/11, 27.3%), followed by age (2/11, 18.2%), , no need to drive (1/11, 9.0%) or lack of confidence in driving skills (1/11, 9.0%).

As can be seen in **Table 5.41,** residents considering driving cessation were significantly older, less likely to be married, more likely to live in less independent accommodations, use a cane or walker and had a fall in the past two years than those who were not. There was no difference by Village (SVs versus LV, p=0.113). Of those who

were married and thinking of cessation, 50% (4/8, one did not respond) had a spouse who still drove compared to 56% (10/18) of married participants not considering driving retirement. Participants who intended to continue driving had higher vitality (VPS) scores, approaching significance, and slightly lower depression scores (1.36±1.45, range 0 - 5 versus 1.81±1.42, range 0 -5).

Table 5.41: Selected Characteristics of Participants Thinking about Driving Cessation

	Thinking about Driving Cessation		**Significance**
	No (n=28)	**Yes (n=27)**	
Age *	79.1 ± 5.63 66-91	84.8 ± 5.51 70-95	***t*=-3.80, p<0.01**
Gender *Male* *Female*	 15 (53.6) 13 (46.4)	 12 (44.4) 15 (55.6)	*p*=0.342
Martial Status * *Married* *Not Married*	 18 (64.3%) 10 (35.7%)	 9 (33.3%) 18 (66.7%)	**X^2=5.27,** ***p*=0.021**
Accommodation type* *Highly independent* *Independent* *Less independent*	 10 (35.7) 16 (57.1) 2 (7.1)	 3 (11.1) 17 (63.0) 7 (25.9)	**X^2=6.56,** ***p*=0.038**
Cane Use * *No* *Yes*	 23 (82.1) 5 (17.9)	**n=25** 12 (48.0) 13 (52.0)	**X^2=6.87,** ***p*=0.009**
Able to Walk 1/4 Mile *No* *Yes*	**n=27** 3 (11.1) 24 (88.9)	**n=25** 3 (12.0) 22 (88.0)	*p*=0.628
Fall History *Faller* *Non-faller*	 5 (17.8) 23 (82.1)	**n=26** 11 (42.3) 15 (57.7)	**X^2=3.87,** ***p*=0.047**
VPS	**n=27** 40.30 ± 5.28 29 - 48	**n=26** 37.23 ± 6.67 19 - 49	*p*=0.064

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p), Mann–Whitney U or Chi-Square analysis.*Significant difference (No vs. Yes)

Participants considering cessation performed more poorly on all functional assessments, with significantly lower scores on the RPW (see **Table 5.42**).

Table 5.42: Functional Performance by Intention to Stop Driving

	Thinking about Driving Cessation		**Significance**
	No (n=28)	**Yes (n=27)**	
MoCA	**n=25** 24.52 ± 3.18 19 - 29	**n=25** 24.12 ± 2.92 18 - 29	*p*=0.496
Time to Complete Trails B (min:sec)	**n=25** 01:59 ± 00:29 00:58 - 02:55	**n=25** 02:30 ± 01:06 00:52 - 04:57	*p*=0.140
Trails B Errors	**n=25** 0.88 ± 1.24 0 - 4	**n=25** 1.04 ± 1.54 0 - 6	*p*=0.687
RPW Time (sec:ms) *	**n=25** 07.40 ± 01.96 04.30-11.30	**n=25** 10.36 ± 02.65 04.30 - 15.30	***Z*=-3.77, *p*<0.01**
Log CS Score	**n=25** 1.75 ± 0.23 1.20 - 1.95	**n=25** 1.70 ± 0.24 1.15 - 1.95	*p*=0.528

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Comparisons are independent t-tests t(p) or Mann–Whitney U. *Significant difference (No vs. Yes)

As shown in **Table 5.43**, those who were considering the transition scored significantly lower on all the objective driving indicators over the monitoring period, expect for average radius (which was close to significance). They also reported significantly more driving restrictions in terms of lower SDF and higher SDA scores.

Non-driving trips were also examined. Those considering driving cessation reported more non-driving trips outside of the village in total (4.96 ± 7.77 versus 2.43 ± 3.38) and through walking (3.91 ± 7.13 versus 1.46 ± 2.69) than residents who intended on continuing to drive, although the differences were not significant.

Table 5.43: Driving Practices by Intention to Quit Driving

	Thinking about Driving Cessation		Significance
	No (n=28)	Yes (n=27)	
Days Driven *	**n=27** 7.85 ± 3.06 3 - 13	**n=22** 5.73 ± 3.22 1 - 14	***t*=2.36, *p*=0.022**
Trips *	**n=27** 9.63 ± 4.88 3 - 19	**n=22** 6.32 ± 3.85 1 - 17	***Z*=-2.42, *p*=0.016**
Distance (km) *	**n=27** 260.87 ± 241.44 22.0 - 1023.0	**n=22** 129.61 ± 123.60 5.6 - 499.1	***Z*=-2.22, *p*=0.026**
Duration (hr:min) *	**n=27** 6:36 ± 4:47 1:03 - 19:33	**n=22** 3:49 ± 2:38 0:16 - 10:52	***Z*=-2.05, *p*=0.040**
Nights Driven *	**n=27** 1.04 ± 1.34 0 - 5	**n=22** 0.27 ± 0.70 0 – 3	***Z*=-2.34, *p*=0.019**
Night Trips *	**n=27** 1.15 ± 1.51 0 - 6	**n=22** 0.27 ± 0.70 0 - 3	***Z*=-2.38, *p*=0.017**
Night Distance (km)*	**n=27** 22.22 ± 37.56 0 - 143.2	**n=22** 2.04 ± 5.56 0 - 19.5	***Z*=-2.68, *p*=0.007**
Night Duration (hr:him) *	**n=27** 0:38 ± 1:01 0:00 - 4:04	**n=22** 0:04 ± 0:11 0:00 - 0:48	***Z*=-2.65, *p*=0.008**
Maximum Radius (km) *	**n=19** 48.74 ± 46.16 3.17 - 131.28	**n=17** 19.12 ± 30.77 2.46 - 121.77	***Z*=-2.08, *p*=0.038**
Average Radius (km)	**n=19** 13.10 ± 11.63 1.86 - 45.78	**n=17** 7.14 ± 8.55 1.98 - 32.53	*p*=0.052
SDA *	**n=25** 5.12 ± 5.09 0 - 14	**n=26** 10.08 ± 5.30 0 - 18	***Z*=-3.15, *p*<0.01**
SDF *	**n=25** 33.32 ± 9.33 10 - 50	**n=25** 25.04 ± 9.16 6 - 42	***t*=3.17, *p*<0.01**

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Comparisons are independent t-tests t(p) or Mann–Whitney U. *Significant difference (No vs. Yes)

Table 5.44 shows that those who were considering giving up driving in the next few years had significantly lower balance confidence scores than those who were not. Meanwhile, those who intend to continue driving scored significantly better on the PDA and the DCS day and night scales. Although not significant, those considering cessation scored considerably lower on DCS-N item #1 (driving in good conditions at night).

Table 5.44: Perceived Driving Comfort, Abilities and Balance Confidence by Intention to Stop Driving

	Thinking about Driving Cessation		**Significance**
	No (n=28)	**Yes (n=27)**	
ABC - 16 *	**n=27** 90.54 ± 10.44 60.94 - 100	80.83 ± 13.01 40.63 - 98.44	***Z*=-3.28, *p*<0.01**
ABC - 20 *	**n=27** 88.48 ± 13.65 45.0 - 100	74.31 ± 15.15 28.75 - 97.50	***Z*=-3.66, *p*<0.01**
ABC - 27 *	**n=27** 88.14 ± 14.84 41.66 - 100	77.65 ± 14.03 37.04 - 98.75	***Z*=-3.64, *p*<0.01**
PDA *	**n=25** 34.84 ± 6.24 19 - 44	**n=26** 28.88 ± 6.23 18 - 42	***t*=3.40, *p*<0.01**
DCS-D *	**n=25** 69.94 ± 17.80 34.61 - 100	**n=26** 54.07 ± 20.75 13.46 - 88.46	***t*=2.93, *p*<0.01**
DCS-N *	**n=25** 59.38 ± 24.45 0 - 92.19	**n=26** 24.46 ± 24.25 0 - 96.89	***t*=2.60, *p*=0.012**
DCS-N Item #1	**n=25** 80.00 ± 28.89 0 - 100	**n=26** 67.31 ± 28.96 0 - 100	*p*=0.124

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Comparisons are independent t-tests t(p) or Mann–Whitney U. *Significant difference (No vs. Yes)

Lastly, engagement was examined by intention to stop driving as shown in **Table 5.45**. Those considering driving retirement had significantly lower community engagement scores. Additionally, they had lower rates of participation in community groups or organizations and reported using more on-site services and

amenities, although not significant. Social engagement scores, on the other hand were slightly higher for residents thinking about driving cessation.

Table 5.45: Engagement Scores by Intention to Stop Driving

	Thinking about Driving Cessation		Significance
	No (n=28)	**Yes (n=27)**	
Community Engagement *	**n=25** 5.32 ± 2.14 2 - 9	**n=25** 4.24 ± 1.45 2 - 7	***t*=2.09, p=0.042**
Social Engagement	**n=25** 8.60 ± 3.01 2 - 15	**n=25** 9.12 ± 2.52 4 - 15	*p*=0.511
Participation in Community groups / Organizations	**n=25** 1.32 ± 1.07 0 - 3	**n=25** 0.88 ± 1.01 0 - 3	*p*=0.142
Number of Services & Amenities Used	**n=25** 3.68 ± 2.95 0 - 12	**n=26** 4.81 ± 2.17 1 - 10	*p*=0.126

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range. Comparisons are independent t-tests t(p) or Mann–Whitney U. *Significant difference (No vs. Yes)

5.14 Selected Comparisons between Current and Former Drivers

The following section presents selected comparisons between the current drivers (CDs) in the present study and the former drivers (FDs) recruited and assessed by Janssen-Grieve, as reported in her 2013 thesis. Raw data retrieved from Janssen-Grieve was merged with the database on CDs for this comparison. General characteristics are compared first, followed by falls and balance confidence, perceptions of driving (retrospectively in the case of FDs), in-village activity, travel modes and patterns (non-driving), and engagement.

5.14.1 General Characteristics

Compared to CDs, the FDs were significantly older, more likely to use a cane or walker, less likely to be able to walk one quarter mile, had more diagnosed conditions, and reported more mobility difficulties, as shown in **Table 5.46**. On average, the current

drivers had lived in their retirement village significantly longer than the former drivers. With respect to type of accommodation (i.e., level of independence), it is important to keep in mind that all the former drivers were recruited from the SVs. Only Luther Village has the highly independent townhomes. When this category which contained only current drivers from LV was moved, the comparison was no longer significant (p=0.202).

A greater proportion of current drivers (20/53, 38%) had relatives living close to their village (within 15km) compared to former drivers (3/20, 15%); approaching significance (p=0.053). There were minimal differences in well-being scores. While no current drivers showed depressive symptoms, two former drivers did. It is important to note, however, that the CDs completed the full 15-item GDS, while the FDs completed a shortened 6-item scale.

Table 5.46: General Characteristics of Current and Former Drivers

	Current Drivers (n=55)	**Former Drivers (n=20)**	**Significance**
Age*	81.91 ± 6.23 66 - 95	86.45 ± 5.16 75-97	***t*=-2.92, *p*=0.005**
Gender *Male* *Female*	 27 (49.1) 28 (50.9)	 9 (45.0) 11 (55.0)	p=0.480
Education *Less than college* *College or greater*	**n=53** 24 (45.3) 29 (54.7)	 9 (45.0) 11 (55.0)	p=0.597
Years since move*	**n=54** 5.13 ± 4.61 0 - 16	**n=19** 2.74 ± 1.56 0 - 6	***t*=2.21, *p*=0.030**
Accommodation type* *Highly independent* *Independent* *Less independent*	 13 (23.6) 33 (60.0) 9 (16.4)	 0 (0) 13 (65.0) 7 (35.0)	**X^2=7.18, *p*=0.028**
Marital Status *Married* *Not Married*	 28 (50.9) 27 (49.1)	 15 (75.0) 5 (25.0)	p=0.053
Self-rated health *Good/Excellent* *Fair*	**n=54** 48 (88.9) 6 (11.1)	**n=19** 15 (78.9) 4 (21.1)	p=0.236

	Current Drivers (n=55)	Former Drivers (n=20)	Significance
Walker/Cane Use*	**n=53**		X^2**=15.16,**
No	35 (66.0)	3 (15.0)	***p*<0.01**
Yes	18 (34.0)	17 (85.0)	
Able to walk 1/4 mile*	**n=52**	**n=19**	X^2**=5.96,**
No	6 (11.5)	7 (36.8)	***p*=0.022**
Yes	46 (88.5)	12 (63.2)	
# of diagnosed conditions *	2.55 ± 1.37 0 - 6	3.45 ± 1.67 1 - 6	***Z*=-2.23,** ***p*=0.026**
# of reported difficulties *	0.69 ± 1.02 0 - 5	1.25 ± 1.07 0 - 4	***Z*=-2.53,** ***p*=0.011**
VPS	**n=53** 38.79 ± 6.14 19 - 49	**n=8** 38.88 ± 4.52 31 - 44	*p*=0.971

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p), Mann–Whitney U or Chi-Square analysis.*Significant difference (CD vs. FD)

5.14.2 Falls and Balance Confidence

Both current and former drivers were administered the ABC scale and were asked to report any falls (single or multiple) over the prior year. The author also had access to the SV fall incident reports for the former drivers. As noted above, the reports included all recorded falls dating back two years from the date of the first session until December 1, 2013.The SV reports identified two additional FDs with subsequent falls who did not self-report a fall. Agreement between self- and incident reports was somewhat better than for the current drivers, as described previously. Four of nine self-reported fallers in the FD group were also identified by incident reports. Overall, there were 11 fallers (six single and five recurrent) in the FD group.

As can be seen in **Table 5.47**, there was no significant difference in the distribution of single, recurrent and non-fallers between CDs and FDs. However, when the single and recurrent fallers were combined into one 'faller' group, there was a significantly greater proportion of fallers in the FD group (11/20 or 55.0%) versus the CD

group (16/54 or 29.7%; X^2=4.05, p=0.042). The former drivers scored significantly lower on all versions of the ABC balance confidence scale.

Table 5.47: Falls and Balance Confidence of Current and Former Drivers

	Current Drivers (n=55)	Former Drivers (n=20)	Significance
Falls	**n=54**		
Single	8 (14.8)	6 (30.0)	p=0.127
Recurrent	8 (14.8)	5 (25.0)	
Non-faller	38 (70.4)	9 (45.0)	
ABC-16 *	**n=54**		**Z=-3.89, p<0.01**
	85.68 ± 12.67	62.11 ± 22.89	
	40.63 - 100	23.44 - 100	
ABC-20 *	**n=54**		**Z=-4.18, p<0.01**
	81.39 ± 15.97	51.25 ± 26.29	
	28.75 - 100	13.75 - 100	
ABC-27 *	**n=54**		**Z=-3.76, p<0.01**
	83.76 ± 14.30	61.38 ± 22.84	
	37.04 - 100	18.52 - 100	

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent Mann–Whitney U or Chi-Square analysis. *Significant difference (CD vs. FD)

5.14.3 In-village Activity

As shown in **Table 5.48**, compared to CDs, FDs used significantly more on-site village services and amenities over the past month and were more likely to participate in games or computer classes. A greater proportion of FDs took part in other village activities and special events outside the village, however differences were not significant. Although a smaller proportion of CDs reported doing physical activity classes (47.1% versus 65%), frequency of participation in the past week was higher (but not significant). Regular participation in village group activities (summary of the six types of activities shown below), was higher for former drivers (mean 3.00±1.34, range 1 to 6) compared to current drivers (mean 2.18±1.81, range 0 to 6), approaching significance (Z =-1.95, p=.051). Both groups reported a strong sense of belonging to their village.

Table 5.48: In-village Activity of Current and Former Drivers

	Current Drivers (n=55)	Former Drivers (n=20)	Significance
Number of Services & Amenities Used *	**n=51** 4.25 ± 2.62 0 - 12	7.35 ± 2.43 2 - 11	***Z*=-4.04, *p*<0.01**
Participate in Religious Services *No* *Yes*	**n=51** 35 (68.6) 16 (31.4)	10 (50) 10 (50)	*p*=0.117
Arts and Crafts Classes *No* *Yes*	**n=51** 41 (80.4) 10 (19.6)	17 (85.0) 3 (15.0)	*p*=0.469
Games or Computer Classes * *No* *Yes*	**n=51** 38 (74.5) 13 (25.5)	9 (45.0) 11 (55.0)	**X^2=5.59, *p*=0.020**
Music, Theatre or Concert *No* *Yes*	**n=51** 20 (39.2) 31 (60.8)	4 (20.0) 16 (80.0)	*p*=0.102
Special Events *No* *Yes*	**n=51** 34 (66.7) 17 (33.3)	13 (65.0) 7 (35.0)	*p*=0.552
Physical Activity Classes *No* *Yes*	**n=51** 27 (52.9) 24 (47.1)	7 (35.0) 13 (65.0)	*p*=0.136
Frequency of Physical Activity Score	**n=38** 1.66 ± 1.84 0 - 7	1.35 ± 1.27 0 - 4	*p*=0.506
Sense of Belonging to the Village *Strong / very strong* *Weak / very weak*	**n=51** 44 (86.3) 7 (13.7)	19 (95.0) 1 (5.0)	*p*=0.277

Note: Missing data is indicated by the n's for each variable. Values are Mean ±SD and range or frequencies (%). Comparisons are Mann–Whitney U or Chi-Square analysis.*Significant difference (CD vs. FD)

5.14.4 Travel Modes and Patterns

Table 5.49 displays results from the alternate transportation questionnaire and findings from the 14 day travel diaries for CDs and FDs. There were significant differences between CDs and FDs in reported frequency of use of taxis, paratransit and the village shuttle. When frequencies were collapsed to examine if the mode of travel was used or not used (frequently, sometimes or rarely versus never), FDs were significantly

more likely than CDs to report using public transit (50% versus 24%; X^2=4.71, p=0.032), taxis (70% versus 43%; X^2=4.15, p=0.037) and the village bus (80% versus 51%; X^2=5.01, p=0.022).

Based on their travel diaries, FDs made an average of 6.5 non-driving trips outside of the village over the two-week period, while the CDs made an average of 3.6 trips. Comparatively, FDs made significantly more trips as a passenger, by taxi, paratransit or the village bus. CDs, on the other hand, made more walking trips over the period, approaching significance (p=0.052).

Table 5.49: Non-driving Travel Modes and Patterns of Current and Former Drivers

	Current Drivers (n=55)	**Former Drivers (n=20)**	**Significance**
Passenger in a Vehicle	**n=51**		
Frequently	9 (17.6)	6 (30.0)	
Sometimes	18 (35.3)	11 (55.0)	p=0.052
Rarely	19 (37.3)	1 (5.0)	
Never	5 (9.8)	2 (10.0)	
Public Transit	**n=51**		
Frequently	0 (0)	1 (5.0)	
Sometimes	5 (9.8)	4 (20.0)	p=0.099
Rarely	7 (13.7)	5 (25.0)	
Never	39 (76.5)	10 (50.0)	
Taxi *	**n=51**		
Frequently	0 (0)	3 (15.0)	**X^2=16.98,**
Sometimes	3 (5.9)	6 (30.0)	**p<0.01**
Rarely	19 (37.3)	5 (25.0)	
Never	29 (56.9)	6 (30.0)	
Paratransit *	**n=51**	**n=19)**	
Frequently	1 (2.0)	2 (10.5)	**X^2=14.71,**
Sometimes	0 (0)	4 (21.1)	**p<0.01**
Rarely	2 (3.9)	1 (5.3)	
Never	48 (94.1)	12 (63.2)	
Motorized Scooter	**n=51**		
Frequently	0 (0)	2 (10.0)	
Sometimes	1 (2.0)	0 (0)	p=0.115
Rarely	1 (2.0)	0 (0)	
Never	49 (96.1)	18 (90.0)	

	Current Drivers (n=55)	Former Drivers (n=20)	Significance
Village Bus *	**n=51**		
Frequently	2 (3.9)	1 (5.0)	**X^2=15.30, p<0.01**
Sometimes	6 (11.8)	11 (55.0)	
Rarely	18 (35.3)	4 (20.0)	
Never	25 (49.0)	4 (20.0)	
Number of Trips	**n=50** 3.64 ± 5.99 0 - 29	**n=17** 6.47 ± 6.48 0 - 19	p=0.066
Walking Trips	**n=50** 2.64 ± 5.39 0 - 23	**n=17** 0.53 ± 1.50 0 - 6	p=0.052
Passenger Trips *	**n=50** 0.88 ± 1.53 0 - 6	**n=17** 3.82 ± 4.41 0 - 18	**Z=-3.53, p<0.01**
Public Bus Trips	**n=50** 0.02 ± 0.14 0 - 1	**n=17** 0.15 ± 0.61 0 - 2.5	p=0.168
Taxi Trips *	**n=50** 0.02 ± 0.14 0 - 1	**n=17** 0.50 ± 1.00 0 - 3	**Z=-2.94, p<0.01**
Paratransit Trips *	**n=50** 0 ± 0 0 - 0	**n=17** 0.77 ± 1.60 0 - 6	**Z=-3.95, p<0.01**
Village Bus Trips *	**n=50** 0.08 ± 0.27 0 - 1	**n=17** 0.59 ± 1.12 0 - 4	**Z=-2.36, p=0.018**

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p), Mann–Whitney U or Chi-Square analysis.*Significant difference (CD vs. FD)

5.14.5 Engagement

Although a similar proportion of current (74%) and former drivers (70%) perceived themselves to be well connected (moderately or very well) to the outside community, the CDs had significantly higher community engagement (CE) scores than the FDs as shown in **Table 5.50**. While the FDs reported a lower rate of participation in community groups or organizations, they had slightly higher social engagement scores

than CDs, although not significant. The former drivers were involved in more village group activities than the current drivers, approaching significance (p=0.051).

Table 5.50: Community Engagement of Current and Former Drivers

	Current Drivers (n=50)	Former Drivers (n=20)	Significance
Perceived Connection to the Outside Community *Very well connected* *Moderately connected* *Not well connected*	 12 (24.0) 25 (50.0) 13 (26.0)	 2 (10.0) 12 (60.0) 6 (30.0)	p=0.416
Community Engagement Score*	4.78 ± 1.89 2 - 9	3.30 ± 1.95 0 - 7	**t=2.94, p=0.005**
Social Engagement Score	8.86 ± 2.76 2 - 15	9.05 ± 2.50 4 - 13	p=0.790
Participation in Community Groups / Organizations	1.10 ± 1.06 0 - 3	0.85 ± 1.04 0 - 4	p=0.372
Village Group Activity Score	n=51 2.18 ± 1.81 0 - 6	n=20 3.00 ± 1.34 1 - 6	Z=-1.95, p=0.051

Note: Missing data is indicated by the n's for each variable. Values are Mean ± SD and range or frequencies (%). Comparisons are independent t-tests t(p) or Chi-Square analysis.*Significant difference (CD vs. FD)

Similar to the CD sample, (refer back to section 5.10.2), higher community engagement (CE) scores in the FDs were associated with the ability to walk 1/4 mile (t=-2.15, p=0.046). FDs living in the independent apartments had higher CE scores than those living less independently in the main floor rooms (t=2.12, p=0.048). Furthermore, when the sample was combined (N=70), CE scores differed significantly by level of independence (F=11.80, p<0.001). Post hoc analysis found significantly greater CE scores for highly independent residents (n=13; 6.00 ± 1.81) compared to those living independently (n=43; 4.47 ± 1.82; p=0.025) and less independently (n=15; 2.73 ± 1.49; p<0.01), as well as between independent and less independent (p=0.004). Given these findings, as well as other significant associations with community engagement scores, we proceeded to multivariate analyses.

5.14.6 Predictors of Community Engagement

A linear regression was performed to identify the best predictors of community engagement (CE) scores. Variables showing significant associations with CE scores were entered into the model. As level of independent living was a categorical variable with three response options, two dummy variables were created (highly and moderately independent) using less_independent as the reference point. The model with 6 variables shown below accounted for 62% of the variance in CE scores (F=6.136, R^2=0.623, p<0.001). As can be seen in **Table 5.51**, both independence variables were significant predictors of CE scores. To determine whether level of independent living was an important mediator, a hierarchical regression was then performed.

Table 5.51: Linear Regression of Factors Related to Community Engagement

Variables	*B*	Std. Error	*t*	Significance
Age	-.068	0.38	-1.775	0.081
Driving Status	.195	0.572	.340	0.735
Walk 1/4 mile	1.098	0.656	1.675	0.099
ABC-20	0.005	0.012	0.398	0.692
Highly Independent	2.061	0.764	2.698	**0.009**
Moderately Independent	1.159	0.569	2.035	**0.046**

As shown in **Table 5.52**, when controlling for level of independent living, greater community engagement was associated with younger age (p=0.015), ability to walk 1/4 mile (p=0.007) and higher ABC-20 scores (p=0.030). Driving status (currently driving being associated with CE scores) approached significance (p=0.074).

Table 5.52: Hierarchical Regression: Associations with community engagement, controlling for level of independence

Independent Variables	Model	R	R^2 Square	R^2 Change	F Change	Df (1,2)	P-Value
Age	1	.510	.261	.238	11.801	2 (67)	p<.001
	2	.569	.324	.293	6.182	1 (66)	p=.015
Driving Status	1	.510	.261	.238	11.801	2 (67)	p<.001
	2	.544	.296	.264	3.290	1 (66)	p=.074
Able to walk ¼ mile	1	.509	.259	.236	11.023	2 (63)	p<.001
	2	.584	.341	.309	7.666	1 (62)	p=.007
ABC-20	1	.513	.241	.263	11.804	2 (66)	p<.001
	2	.562	.284	.052	4.924	1 (65)	p=.030

Note: Model 1 includes only level of independence. Model 2 includes level of independence and each of the other variables in turn (age; non-driver/driver; unable/able to walk ¼ mile and ABC-20 score)

Chapter 6: Discussion

6.1 Introduction

This chapter begins by discussing the driving practices and other modes of travel by retirement living seniors, in relation to sample characteristics, functional performance and level of engagement with the broader community. Findings regarding changes in driving before and after relocation and possible transitions to non-driving are discussed next. This is followed by associations with fall status and comparisons between current and former drivers. The chapter concludes with study challenges and limitations, as well as implications and suggestions for future research.

Throughout the discussion, findings are compared to previous studies that examined naturalistic driving in community-dwelling samples, namely those by Blanchard (2008), Trang (2010), and Crizzle (2011). It should be noted that while Blanchard and Trang required participants to drive at least once a week, Crizzle required all participants (including those with PD) to drive at least three times per week. Key comparisons to these studies are displayed in **Appendix I**. Additionally, results are compared to the Candrive II cohort (N=928) (Langford et al., 2013; Marshall et al. 2013; Porter et al., 2014; Rapoport et al. 2013; Tuokko et al. 2013). This project specified that all participants must drive a minimum of four days per week at entry (Marshall et al. 2013), which led to a sample of highly active drivers and likely contributed to the high level of functioning found at baseline (Rapoport et al. 2013).

6.2 Driving

Consistent with prior studies, the devices did not appear to affect driving behaviour (Blanchard & Myers, 2010; Blanchard et al., 2010; Crizzle & Myers, 2013;

Myers, Trang & Crizzle, 2011) and for the most part people said their driving practices over the two weeks were fairly typical. Only one resident reported driving someone else's car (spouse), and only once for a short distance.

6.2.1 Self-reported Driving Practices and Perceptions

As shown in **Appendix I**, our sample reported more restrictions (i.e., lower average driving frequency (SDF) scores than the Blanchard, Trang and Crizzle studies on community drivers. The present sample also had higher mean avoidance (SDA) scores than the Trang sample and Crizzle's control group, but lower scores than Blanchard's sample (mean age 80) and Crizzle's group with Parkinson's disease (PD). Compared to the Candrive cohort at baseline (Rapoport et al. 2013), the current sample had substantially lower SDF scores (29.2 ± 10.1 versus 35.27 ± 7.34) and higher SDA scores (7.7 ± 5.7 versus 5.32 ± 4.12). Except for the Blanchard study, our sample was considerably older than the community samples (as shown in **Appendix I)** and the Candrive cohort (76.2 ± 4.9)

Driving comfort scores (DCS-D and DCS-N) were somewhat lower than for the samples of community drivers, except for Crizzle's PD group. Similarly, the Candrive cohort had higher scores on the DCS-D (76.21 ± 15.97) and DCS-N (68.15 ± 20.73) (Tuokko et al, 2013; Rapoport et al. 2013). Perceived driving abilities of the sample were slightly lower but comparable to Blanchard's, Trang's and Crizzle's PD samples (see **Appendix I**). However, PDA scores were considerably lower than for Crizzle's control group and the Candrive sample (35.89 ± 6.10; Tuokko et al., 2013; Rapoport et al., 2013), which were both considerably younger. Consistent with previous findings (Blanchard &

Myers, 2010; Myers et al., 2011; Tuokko et al. 2013), the females in our retirement sample scored significantly lower than males on both the DCS-D and the DCS-N scales.

Driver perceptions, particularly driving comfort is considered a key factor concerning restricted driving practices by older drivers (Baldock et al. 2006; Charlton et al. 2006; MacDonald et al. 2008; Marottoli & Richardson, 1998; Molnar & Eby, 2008; Myers et al. 2008). Prior research has found that older drivers who are less comfortable and have poorer perceptions of their driving abilities drive less overall and restrict their driving patterns (Blanchard & Myers, 2010; Myers et al., 2011; Molnar et al. 2013). Findings from the current study suggest that seniors residing in retirement communities (particularly women) may have somewhat lower day and night driving comfort compared to older drivers living in the community.

6.2.2 Exposure

In order to compare the current findings to the Blanchard, Trang and Crizzle studies, driving data was averaged to one week. Similar to the findings by Myers, Trang & Crizzle (2011), driving indicators were fairly consistent from week 1 to 2, except for night driving. Two weeks of driving monitoring are useful for capturing more instances of night driving in older drivers (Myers et al., 2011).

As shown in **Appendix I**, the sample drove on average only 3.5 days per week, considerably less than the community samples. Distance (km) and duration (overall and at night) were also lower, however radius (distance from home) was not. Although driving distance has not yet been reported for the total Candrive cohort, Porter et al. (2014) reported that a subsample of the cohort (n=159, mean age 77 ± 5, 50.9% male) drove 10,145 ± 5,889 km over one year (average of 195.1 km per week).

Residents made an average of 1.19 driving trips outside the village per day, determined by the number of trips per days driven (4.09 trips/3.45 days). This average was lower in comparison to the Blanchard (1.37 trips/day), Trang (1.50 trips/day) and Crizzle (PD: 1.37 trips/day, control: 1.62 trips/day) studies. This difference cannot be explained by trip chaining (making multiple stops per trip), as the current sample averaged 1.85 stops per trip, also lower than the Blanchard (2.08 stops/trip), Trang (2.26 stops/trip) and Crizzle (PD: 2.45 stops/trip, control: 2.41 stops/trip) studies. Meanwhile, distance per trip (22.16 km/trip) was similar to the Blanchard (23.11 km/trip) and Trang (21.4 km/trip) samples, but considerably lower than Crizzle's groups (PD: 28.47 km/trip, control: 28.89 km/trip).

These differences in driving exposure may be explained by retirement living (i.e., less need to go into the community for groceries and other necessities), however it is also important to consider functional abilities. Scores on the MoCA were much lower than anticipated. Only 20 respondents (40%) scored in the normal range (≥ 26 out of 30), while 60% scored below 26, which has been used as a screening indicator for possible mild cognitive impairment ([MCI] Nasreddine et al., 2005).

Overall, the average MoCA score (24.32 ± 3) was slightly lower than in the Candrive cohort (25.95 ± 2.49; Rapoport et al., 2013) and Crizzle's control group (see **Appendix I**). Neither Blanchard nor Trang assessed cognitive function. It is noteworthy that the mean score for the LV group (25.46±2.9) was similar to the Candrive and Crizzle control groups, however, the SV group scored substantially lower (23.08 ± 2.7), comparable to the average score of Crizzle's PD group (22.78 ± 3.12). This difference

may be due to the 5-year age gap between the SV and LV samples, with the LV group being closer in age (79.57 ± 7.14) to the Candrive sample (76.2 ± 4.9).

Unlike findings from the MoCA, only a small proportion (14%) of the sample had problems on the Trails B. The majority of the sample (86%) completed the task in less than three minutes, suggesting normal executive functioning. However, when compared to prior studies, participants performed more poorly as average time to completion (02:14 ± 00:53) was higher than both the Trang sample (01:42 ± 00:30) and the Candrive cohort (01:38 ± 00:44; Rapoport et al., 2013). Eight participants (16%) made three or more errors on the task, which may indicate possible MCI (Mononita & Molnar, 2013) or at least potential problems with fitness to drive (Roy & Molnar, 2013). The average number of errors by the sample (0.96) was greater than found in the Candrive cohort (0.76; Rapoport et al. 2013).

Furthermore, the average time to complete the RPW test was substantially higher than for both the Blanchard (06.60 seconds) and Candrive (06.47 second) samples, suggesting that the retirement sample had diminished motor speed, stride length, balance and overall mobility (Staplin et al., 2003; Crizzle et al., 2013a). A high proportion of our sample (22/50 or 44%) took longer than 9 seconds to complete the RPW, which Staplin et al. (2003) found was associated with greater crash risk. While there was little variability in binocular contrast sensitivity (CS), the average LOG score (1.73 ± 0.23) was considerably lower than both Crizzle's PD (1.85 ± 0.15) and control (1.92 ± 0.09) groups, as well as the Candrive cohort (1.92 ± 0.11; Rapoport et al., 2013). Only three participants scored under LOG 1.25, indicative of contrast sensitivity impairment, while 94% of the sample scored within the normal range. Despite scoring within the normal

range, these findings suggest that the current sample may have more difficulty with contrast sensitivity compared to community drivers.

Despite prior research suggesting that attention, visuospatial and memory aspects of cognition (all of which are assessed by the MoCA) are strongly associated with driving exposure (Anstey et al., 2004), there were no associations found with MoCA scores in the current sample. However, this is consistent with Crizzle's (2011) study, which similarly found no associations between MoCA scores and driving indicators. In addition, Crizzle found no associations between driving exposure and binocular contrast sensitivity scores, similar to the present results. Although Blanchard (2008) found that poorer performance on the RPW was significantly related to decreased night driving (distance and duration), these associations did not emerge in the present study.

6.2.3 Comparisons of Mileage Groups

Based on actual distance driven (km), averaged to one week, a considerably large proportion of the current sample (45%) was classified as low mileage drivers, compared to the prior community studies (see **Appendix I**). Prior research has found that low mileage drivers tend to do most of their driving in congested urban areas and thus are at greater risk of collisions (Langford et al. 2006).

Although not significant, there were some notable differences between our mileage groups. Compared to middle/high mileage drivers, low mileage drivers were older, more likely to be female and less likely to be married. Low mileage drivers also performed more poorly on the MoCA, and took more time to complete the Trails B and RPW tasks. Similarly, Langford et al. (2013) found that high mileage drivers were

younger, more likely to be male and performed worse on the RPW, Trails B and MoCA, although they used self-estimates versus objective measures of distance driven.

The lower mileage group also had lower PDA and DCS scores, consistent with the findings by Langford et al. (2013) for the Candrive cohort, although they examined only 15 items from the PDA scale and 13 items from the DCS-D scale. There was a trend toward lower balance confidence scores in the low mileage group, however the difference was not significant. Additionally, our low mileage group had a lower (but not significant) community engagement score than the middle/high mileage drivers (4.33 ± 1.79 versus 5.23 ± 1.97). There were minimal differences in social engagement or the number of services and amenities used at the village.

6.2.4 Patterns

Although the current sample drove fewer trips, kilometers and shorter durations, they drove further away from home than prior studies with community drivers. As shown in **Appendix I**, average radius was considerably higher than all previous studies, as was maximum radius; except for Crizzle's younger control group. This was likely due to a high number of out of town trips made by the sample over the monitoring period. About 15% of all trips (112 trips in total) were classified as out of town compared to only 4.4% (20 trips) in Trang's study, 0.8% (7 trips) in Crizzle's PD group and 1.7% (16 trips) in Crizzle's control group.

Interestingly, number of errors on the Trails B and time on the RPW test were moderately and inversely associated with average trip radius, while CS scores showed a moderate, positive association. These findings suggest diminished abilities in these areas may be related to driving closer to home. Consistent with prior research (Keall & Frith,

2004), the current sample did more of their driving on weekdays versus weekends. Weekday driving was most strongly associated with shopping/errands, while weekend driving was associated with trips for religious purposes (church) and out-of-town trips.

Compared to prior studies with community drivers, the present sample drove considerably less at night. As seen in **Appendix I,** residents drove fewer nights and shorter distances (km) than the Blanchard, Trang and Crizzle studies. Of particular interest, only 29% of the current sample drove at night compared to 90% of the Trang and Crizzle samples. Although only 28% of Blanchard's sample drove at night, her sample was only monitored for one week. Consistent with the prior community studies, females drove significantly less at night (nights driven, trips, distance and duration) than males. The current sample had an almost equal gender distribution (50.9% female, 49.1% male), similar to the Trang sample (51% male). Meanwhile, the Blanchard study had a lower percentage of men (41%), and the Crizzle and Candrive samples had a substantially higher proportion of male participants (79% and 62%, respectively).

When discussing night driving in the current sample, it is necessary to consider seasonal differences in data collection. The bulk of the SV group (n=21) was assessed in February and early March, with a few (n=6) in the spring (April and May), while the LV group (n=28) was assessed from June to early October when there was considerably more daylight. Notwithstanding, the LV group drove more at night than the SV group, although not significant.

6.2.5 Weather Conditions

Weather over the study period was fairly good considering the length of the monitoring period (February to October). Of the total number of driving opportunities

(days when at least one participant vehicle was equipped), 70% (477 opportunities) of the days had favourable conditions; only 30% (207 opportunities) had inclement weather, primarily rain (82%).

Compared to prior studies with community drivers, the current sample drove less during inclement weather. Only 19% of Blanchard's participants did not drive during inclement weather (23% of one week monitoring period), compared to 72.9% of the current sample. While there were substantially more days with inclement weather in the winter study by Trang (56%); only 31% of her sample did not drive on these days. Trang found women in her sample drove significantly fewer days during inclement weather, however a gender difference did not emerge in the present study.

Although the Crizzle study (2011) had the fewest days with inclement weather (20.5%), a greater proportion of his sample drove on these days (75.8% compared to 27% of current participants). The above findings are consistent with comments from participants in the interview. Several residents mentioned that they had no issues cancelling or postponing a driving trip during bad weather, unless it was an emergency. Compared to community drivers, retirement residents may have less reason to drive outside of the villages during inclement weather, particularly given the fact that even those who did not have meal plans could access grocery stores and cafes at all the villages, and a restaurant in Luther Village.

6.2.6 Trip Purposes

Consistent with previous studies with community drivers (Blanchard, 2008; Trang, 2010; Crizzle, 2011) the most commonly reported reasons for driving trips (on the trip logs) were for shopping and errands (55%), followed by social and entertainment

(16%). Shopping and errands, social and entertainment, helping others, medical and out-of-town trips were all positively associated with daytime driving indicators. Meanwhile, shopping and social trips were the only ones associated with nighttime driving indicators. Of these, social trips maintained a stronger association, suggesting the sample was most likely to drive at night for social reasons. As expected, out-of-town trips were associated with maximum and average radius, as were social trips.

6.2.7 Other Factors Associated with Driving Restrictions

As expected, scores on the SDF and SDA were highly correlated with both day and night driving indicators. Lower self-reported frequency and greater reported avoidance was associated with less driving during the day and at night, and shorter distances driven from home (average radius). Similarly, lower SDF and higher SDA scores were associated with decreased daytime indicators (distance and duration) and maximum radius in Crizzle's (2011) PD group, but not the younger control group.

Interestingly, scores on the PDA were associated only with the total number of driving trips, with poorer perceived abilities associated with driving fewer days. In comparison, higher PDA scores in the Blanchard (2008) and Trang (2010) study were positively associated with daytime driving indicators (distance in both studies) and distance from home. Conversely, PDA scores were negatively associated with days and trips driven in Crizzle's (2011) younger, control group. None of these previous studies found any association between PDA scores and night driving.

As anticipated, scores on the driving comfort scales were associated with several driving indicators. Lower scores on both the DCS-D and DCS-N were similarly related to restricted day and night driving (total distance and duration; night trips, distance and

duration). In addition, the DCS-N was positively associated with average trip radius. Findings are consistent with previous community driver studies by Blanchard (2008) and Trang (2010). Overall, the DCS-N had stronger associations with both day and night driving indicators than the DCS-D.

Overall, the low mileage drivers drove less during the day and at night as anticipated. Interestingly, the low mileage drivers made significantly more non-driving trips outside of the village compared to the middle/high mileage drivers. In particular, the low mileage drivers made more walking and passenger trips over the two weeks. Together, these findings suggest that while the low mileage sample of retirement living seniors are restricting their driving, they are actively engaging in other forms of transport to leave the village. However, despite making considerably more non-driving trips outside of the villages than the higher mileage drivers, the low mileage drivers are still not as actively engaged in the outside community.

6.3 Other Modes of Travel

Consistent with prior studies, the majority (89%) of the sample preferred to drive themselves, however over half (53%) reported being a passenger in a vehicle at least a few times a month (sometimes/frequently). Examining other modes of travel (beyond driving oneself) was a key component of the study. Alternate transportation use was examined subjectively through a questionnaire and objectively by date- and time-stamped travel diaries. As expected, the use of alternate transportation was fairly low overall.

The most commonly reported alternate mode of travel was being a passenger in a vehicle. A greater proportion of females than males said they preferred to be a passenger. These rides were typically provided by adult children (42%) and grandchildren (31%)

followed by friends (28%) and a spouse (22%). Consistent with prior research on community drivers (e.g., Dahan-Oliel et al. 2010; Dickerson et al. 2007; Turcotte, 2012), reported use of public transportation was low. Over three-quarters (77%) of the sample reported having never used public transit, with only five residents in the total sample reporting using it sometimes (few times a month) despite having bus stops near all facilities. Only 26% reported concerns or reservations using public transport; most noted that they simply did not need to use public transport as they were still driving.

As discussed in Turcotte's (2012) profile of older adults, before the age of 85, few Canadian seniors use accessible transit (paratransit) or taxis for transportation, often considering these modes a last resort. While 22/51 drivers reported using taxis, 19/22 only rarely (e.g., when their car was being serviced). Only three participants reported using paratransit services.

Although the SVs had permanent buses with regular shopping trips, Luther Village only rented buses for outings. Not surprisingly, the SV group reported more use of village buses, although some mentioned that as they could still drive themselves they felt they should leave the bus seats for other residents who did not drive.

Over half the sample reported having given rides in their vehicles to other residents. Prior research (Choi et al. 2012; Choi, 2010) has suggested that ridesharing plays an important role in meeting the transportation needs of older adults. As reported by Sousa (2013), although residents felt positive about helping others, most were hesitant about implementing organized or formal ridesharing programs, preferring to arrange this themselves on an informal basis.

An objective look at alternative transportation use over the monitoring period was possible with the date- and time-stamped travel diaries. Of those who returned the travel diaries, 72% made non-driving trips outside of the village over the two weeks. There was considerable variation for those who did (36/50), ranging from two to 29 round trips over the two weeks. As noted by Sousa (2013), there was one SV resident who walked her dog more than once per day, accounting for 23/29 of her trips. However, even after removing this participant from the analysis, walking was still the most popular means of travel.

Walking accounted for 73% of all non-driving trips, followed by being a passenger in a vehicle. Together, these represented 97% of all non-driving trips. Four residents (all from SVs) reported using the village shuttle service, while only one participant reported using a public bus or a taxi. No participants from LV took a trip on the village bus over the two weeks.

Again, it is important consider seasonal differences over the study period. The LV sample was assessed over the summer and early fall, increasingly the likelihood of walking trips outside of the village. Many LV residents mentioned they went for walks to get some exercise and enjoy the nice weather. In fact, one resident said we should have framed the question about not using their car for a particular trip due to bad weather on the Travel Diary differently (refer to **Appendix E**), saying that he would not avoid driving because of *bad* weather, but that *good* weather would lead him to walk instead of drive. As expected, use of other modes of travel increased as the amount of driving decreased. Non-driving trips were most frequently for recreational purposes (70%) followed by errands (13%) and shopping (9%). Trips were also made for religious services or volunteering and medical appointments.

6.4 Engagement

As discussed in Chapters One and Two, having a valid driver's license and access to a private vehicle are strongly associated with the probability of leaving one's home on a given day and engaging with the outside community (Turcotte, 2006). Marotolli et al. (2000) found that driving cessation was prospectively associated with decreased out-of-home activity after adjusting for socio-demographic and health-related factors. Curl et al. (2013), meanwhile, found that not being able to drive negatively affected productive community engagement (formal and informal volunteering, paid work), but not social engagement (how often they get together with neighbors or people nearby for a visit).

The study by Jenkins et al. (2002) is the only one we are aware of that examined these issues in retirement living seniors. Jenkins et al. surveyed residents of two CCRCs and found that those living in independent apartments (n=112, mean age 83; 71% female) had significantly higher (p>.05) community activity scores (mean 4.6±1.5 versus 2.6±1.4; out of a possible range of 0 to 8) than assisted living residents (n=55; mean age 87; 86% female). Jenkins et al. noted that a greater proportion of those in independent apartments retained their driver's license, however results were not reported in their article. They further noted that transportation vans and shuttles were offered in both CCRCs.

At the outset of this project we speculated that continuing to drive after relocation would facilitate broader engagement with the outside community. Three composite variables were used to examine staying engaged with the broader community: 1) community engagement (number of activities they did outside of the village in the past month); 2) participation in community groups and organizations in the past month, and; 3) social engagement (frequency and type of interaction with family and friends). As

detailed in the Methods Chapter, our measure of community engagement examined several of the same activities as Marotolli et al. (2000), however similar to Jenkins et al. (2002) we asked whether they did these activities over the past month.

Our findings revealed that greater community engagement (CE) was associated with younger age, greater balance confidence, the ability to walk 1/4 mile, as well as better performance on the Trails B (time to complete) and RPW tests. While the LV sample had significantly higher CE scores than the SV group this may have been mediated by the level of independence. Recall that the highly independent category was comprised of residents living in the LV townhomes, while the less independent category (assisted living) was comprised of mostly SV residents (7/9). Similar to the findings by Jenkins et al. (2002), we found that those living in the highly independent townhomes had significantly higher CE scores than participants from the less independent rooms.

The LV group also participated in more community groups and organizations and were the only ones (11/28) who did volunteer work in the community, on average 18.36±20.06 hours over the past month. Similar findings emerged from the Jenkins et al. (2002) study as noted above. They found that assisted living residents were less likely than those in the independent apartments to spend time outside the retirement communities (going to the movie theater, church or synagogue, library, store, home of a friend or relative, restaurant, senior center, community recreation center) in the past month, but also less likely to participate in active pursuits (recreational activities, hobbies, socializing with friends, and taking walks or other exercise). Greater engagement outside the retirement communities was associated with better quality-of-

life, particularly higher levels of role-emotional and physical functioning on the SF-36 (Jenkins et al., 2002).

While we found no associations between driving and *social* engagement (frequency of interaction with friends and family inside and out of village in the past month), higher community engagement was significantly related to total driving distance (km) and driving further away from the villages (average and maximum radius). These findings indicate that residents who drive more and further destinations (including out-of-town trips) might be more actively engaged in the outside community. Meanwhile, there were no associations between community engagement and non-driving trips.

6.5 Possible Transitions to Non-driving

As described in Chapter One, the transition from driving is often a gradual process that can take several years, and is typically preceded by reductions in driving frequency and changes in driving patterns (e.g., Baldock et al. 2006; Dellinger et al. 2001; Dickerson et al., 2007; Donorfio et al. 2009). Only two residents in this study had reportedly thought about giving up their keys before the move, while all participants (including these two) said they were glad they kept driving.

Overall, the sample reported driving less often after moving to the villages. The SV sample showed a greater decrease (5.52 to 3.33 days/week) than the LV group (5.11 to 4.68), and females showed a larger decrease (5.14 to 3.29) than males (5.48 to 4.77), which may be explained in part by village differences as noted in Ms. Sousa's thesis (2013). The SVs are more contained; all the rooms and buildings are physically attached, with a greater selection and availability of services, amenities and meal plans. In

comparison, the highly independent LV town homes are physically separated from the other buildings and apart from the Sunshine Centre, residents do not have meal plans.

The majority of the sample felt that driving was moderately or extremely important for several reasons, particularly maintaining freedom and their present lifestyle. Almost one third (30%) said others relied on them for rides. While everyone said they had discussed their driving with someone, only two residents (both from SVs) had been told they should limit their driving.

Despite the perceived importance of driving, almost half the sample (n=27, 49%) was reportedly thinking about giving up driving in the next few years. This proportion is much higher than found in prior studies with community drivers. Specifically, only 6/61 (10%) of the Blanchard (2008) study, 1/46 (2%) of the Trang study, none of the controls and 4/27 (15%) in Crizzle's (2011) PD group had reported thinking of reducing or stopping driving. As originally hypothesized, retirement living may make it easier for people to make the transition to no longer driving.

We found that drivers who were considering cessation were substantially older, less likely to be married, less likely to live independently, and more likely to use a cane or walker. The primary reasons reported by those considering cessation were vision and health problems. Those considering giving up their keys had significantly lower community engagement scores and reported lower rates of participation in community groups/ organizations than residents who intended to continue to drive. The former group also used considerably more on-site services and amenities. Meanwhile, well-being, depression scores and level of social engagement were similar for the two groups. Thus it

may be that their social needs are being met within the village and contact with family and friends outside the village.

Diminished functional abilities of older drivers may play a role in the decision to retire from driving. A recent study by Berg-Weger, Meuser and Stowe (2013) found that community seniors (N=135, mean age=74, 76% female) who scored lower on the ARMT (Assessment of Readiness for Mobility Transition) had poorer balance confidence and self-reported vision. In the current study, residents who were thinking about the transition from driving performed worse on all functional assessments, particularly the RPW. A greater proportion of those thinking of quitting (42%) were fallers compared to those who were not (18%), and had significantly lower balance confidence. Together, these findings suggest that residents considering driving retirement had poorer functional abilities, were more likely to fall and had lower balance confidence, but nevertheless remained socially connected.

Those who were considering driving cessation had more restricted driving practices according to both objective measures (drove significantly less overall and at night, as well as closer to home) and self-report (lower SDF and higher SDA scores). They also rated their driving abilities lower (PDA scores) and had lower levels of driving comfort (particularly at night) compared to those who intended to keep driving. One indication that this group may be planning for the transition is that over two weeks, they made more trips outside the village using other modes of travel, particularly walking (despite lower balance confidence).

In addition, those considering driving retirement were using more of the on-site services and amenities. Prior research has argued that for older adults who still drive,

familiarizing themselves with alternate transportation is beneficial in the planning process for driving cessation (Oxley & Fidles, 2004). The authors suggest that substituting some driving trips with alternate methods can help older adults transition more easily when the time comes. It appears from these findings, intentional or not, that several of the residents are doing just that. As noted in Sousa's thesis (2013), one couple from LV reported taking the public bus from time to time to familiarize themselves with the process, should they ever need to take it.

As suggested by previous research (Oxley & Fildes, 2004; Harrison & Ragland, 2003; Dickerson et al. 2007), proper planning may ease the transition to non-driving, making it less stressful and ensuring mobility is not completely compromised. These researchers suggest that part of this planning process should include ensuring adequate transportation options are available, which for some community seniors may mean relocation. Therefore, it is possible that retirement communities may help facilitate the transition from driving by providing alternate transportation options and on-site services and amenities.

6.6 Comparison of Fallers and Non-fallers

As detailed in Chapter Five, fall history was ascertained by a combination of self-report and incident reports retrieved from the retirement villages. The data was limited at LV as no incident reports were uncovered despite seven participants self-reporting a fall. There are important differences between the SV and LV reporting processes that could account for this lack of data. First and foremost, the SVs have a fall-specific incident report form, whereas LV has a general incident report form that is to be filled out for a number of incidents beyond falling, including: theft, spills, fires, aggressive behaviour,

suicide concerns, wandering, choking, abuse and 'other' incidents. It is possible that with a number of other severe incidents on this form, falls may go under- or unreported. There is no formal, electronic record keeping as there is in the SVs. The LV forms go un-digitized; they are simply filed in the original copy once filled out. Without electronic copies of these records there is a greater likelihood that files go missing.

Of the total sample, 29% were identified by either self-report or incident reports, a much higher proportion than Blanchard's community sample (13%) and Crizzle's control group (25%), but lower than Crizzle's PD group (41%). The group of fallers was comprised of 8 single-time fallers and 8 recurrent fallers. The recurrent fallers were approximately five years older and more likely to be female than the current drivers. Recurrent fallers were less likely to be married or have a college education, and more likely to live in the less independent rooms. Non-fallers were less likely to report mobility difficulties or using a cane or walker. Scores of balance confidence were in the expected direction, recurrent fallers scored lower than single fallers on the ABC, and fallers, in general, scored lower than non-fallers.

The functional abilities of recurrent fallers were notably worse than single fallers and non-fallers. Recurrent fallers performed worse on the Trails B (time and errors) and contrast sensitivity tasks, while differences in MoCA scores were minimal. The largest disparity, however, was time to complete the RPW test. The recurrent fallers walked significantly slower than both the single and non-fallers, almost four seconds longer than the single fallers (3.9 second difference). In comparison, Crizzle et al. (under review) found no difference between 11 fallers and 16 non-fallers in a sample of community

drivers diagnosed with PD with respect to contrast sensitivity or cognition. Unfortunately comparisons are limited as their study did not administer the RPW or Trails B tests.

Overall, our recurrent fallers drove less during the day and at night (trips, distance, duration) and drove shorter distances from home than the single and non-fallers. In agreement with the driving indicators, recurrent fallers reported more restricted driving practices (lower SDF and higher SDA scores) than the single fallers. Conversely, the recurrent fallers made substantially more non-driving trips, particularly walking trips. This is surprising considering the recurrent fallers clearly have diminished lower body mobility as measured by the RPW test. Although Crizzle et al. (under review) did not examine non-driving trips, their sample also drove less at night (trips, distance, duration).

As expected, recurrent fallers had significantly lower balance confidence than the single and non-fallers. Crizzle et al.'s faller group (78.8 ± 11.6) also scored significantly lower than the non-faller group (90.3±9.3) on the 16-point ABC scale. A driving simulator study by Gaspar et al. (2013), found that a high falls risk group of older adults had lower scores on the ABC-16 than a low falls risk group. It is interesting that despite poorer balance confidence and performance on the RPW test, the recurrent fallers in our study still made more walking trips than the single or non-fallers.

No associations emerged between balance confidence and driving exposure or with non-driving indicators including number of walking trips outside of the village, possibly due to the sample's relatively high level of balance confidence overall. Although similar in age to a sample of older adults from five different retirement homes (N=63, mean age 80.4±8, 89% female) examined by Myers et al. (1998), our participants scored substantially higher on the ABC-16 (85.68±12.67 versus 63.6±24.6). It is possible

that our sample of retirement seniors were higher functioning as they were still driving. The Myers et al. (1998) sample also had a higher proportion of women than the present study (51%). However, our findings are consistent with Crizzle's (2011) study that found no significant associations between ABC scores and driving indicators.

Similar to the Crizzle et al. (2011) study, balance confidence (ABC-20) was associated with DCS-D (*rho*=0.56, $p<0.01$) and DCS-N (*rho*=0.59, $p<0.01$) scores. Both day and night driving comfort scores were significantly lower for recurrent faller compared to single fallers in the present sample. These findings align with the reduced driving exposure seen in the recurrent faller group. Interestingly, recurrent fallers appear to have greater social engagement with family and friends, but less community engagement than single and non-fallers.

6.7 Comparison of Current and Former Drivers

The former driver (FD) sample contained a greater proportion of fallers than the sample of current drivers (55% versus 30%). The FDs also had significantly lower balance confidence scores. Using the ABC 20-item scale, CDs scored 30% higher on average. This preliminary evidence might suggest that residents who stop driving may be at higher risk for falls. However, it must be kept in mind that the sample of FDs was small (N=20) and FDs differed from the CDs in several important respects. The former drivers were considerably older, more likely to use a cane or walker (either inside or outdoors), less likely to be able to walk 1/4 mile, and reported more diagnosed conditions and mobility difficulties.

Although driving cessation has been associated with a number of adverse effects, such as increased depression, reduction in social networks, reduced out-of-home activity,

and even early mortality (Fonda, Wallace & Herzog, 2001; Marotolli, de Leon, Glass, Williams, Cooney, Berkman & Tinetti, 1997; Mezuk & Rebok, 2008; Marotolli, de Leon, Glass, Williams, Cooney & Berkman, 2000; Edwards, Lunsman, Perkins, Rebok & Roth, 2009); Janssen-Grieve's (2013) in-depth study suggested that driving retirees living in a retirement village may not experience these adverse effects to the same extent as older adults who quit driving while they are still living in the community. CJG suggested that village-life might act as a buffer, with the onsite activities, services and amenities making it easier to adjust to the transition. The majority of both current and former drivers perceived their health as excellent or good and few showed depressive symptoms.

As expected from a prior study (Rudman et al., 2006), FDs relied more on alternate forms of transportation, particularly rides from family and friends. A greater proportion of FDs (85%) than CDs (53%) reportedly received rides from others (frequently or sometimes), despite the fact that only 15% of FDS (versus 38% of CDs) had relatives living within 15 km of their village.), a Results from the travel diaries also showed that FDs made significantly more passenger trips outside their villages.

Overall, the FDs made almost twice as many (non-driving) trips outside of the village over the two weeks by various modes. Interestingly, the CDs made considerably more walking trips outside of the village over the two weeks. However, this might be attributed to the lower balance confidence exhibited by the FDs. A greater proportion of FDs reported using taxis, paratransit and the village shuttle, however, 75% reporting rarely or never riding a bus.

As anticipated, the FDs used significantly more in-village services and amenities and regularly participated in more organized village group activities (close to

significance) than the CDs. These findings support Janssen-Greive's (2013) conclusion that the services and amenities available at the villages may act a buffer when transitioning from driving, reducing the need to travel outside of the village. Both current and former drivers reported a strong sense of belonging to the village.

Numerous studies with community seniors have shown that driving cessation adversely affects activity levels and social connections (Burkhardt, Berger, Creedon & Gavock, 1998; Marotolli et al. 2000; Mollenkopf et al. 1997). In contrast, we found that a similar proportion of FDs (70%) and CDs (74%) in retirement villages perceived themselves as very well or moderately connected to the outside community, although former drivers had significantly lower community engagement scores over the past month than current drivers. Consistent with findings by Curl et al. (2013) in the large Health and Retirement study that social engagement is not compromised by driving retirement, social engagement scores (contact with family and friends outside the villages in the past month) were similar for our samples of current and former drivers. With respect to productive engagement, only the current drivers from the Luther Villages continued to do formal volunteer work in the community; while only one resident (also from the LV) continued to work. This is also consistent with the findings by Curl et al. (2013) that driving cessation has a negative impact on volunteerism and paid employment for community living seniors.

6.7.1 Predictors of Community Engagement

As noted in Chapter Three, at the outset of the project we were interested in learning not only about driving and travel patterns in retirement living seniors, but equally important whether continuing to drive helped residents remain more connected to

the broader community, thereby possibly enhancing their quality of life. As several significant associations with the CE score emerged, including significant differences between current and former drivers, we conducted regression analyses with the full sample (N=70) of CDs and FDs.

A linear regression found that level of independence was a significant predictor of community engagement (CE) scores (either the highly independent town homes or the independent condos/suites, compared to less independent Sunshine Centre or main floor rooms) for the combined sample of current and former drivers. As level of independence may be a mediator of community engagement, a hierarchical regression was performed. When controlling for level of independence, greater community engagement was significantly associated with younger age, being able to walk 1/4 mile and better balance confidence scores. Driving status approached significance (p=0.074) with higher CE scores associated with being a current (versus former) driver. These findings are consistent with the Jenkins et al. (2002) study that found lower activity levels were associated with both driving cessation and assisted living (compared to independent living). Together, our findings suggest that remaining a driver, along with good walking ability and balance confidence appear to facilitate continued community engagement after relocation to a retirement community.

6.8 Challenges and Limitations

As detailed in Sousa's thesis (2013), a major challenge in this study was sample recruitment, particularly at the SVs. In the case of additional recruitment at LV beyond Sousa's sample, personal contact was most successful. Targeted recruitment by letter and phone calls to the Sunshine Centre drivers only yielded one additional participant, and

large-audience presentations during the Monday Coffee Break only led to four additional participants. Whereas setting up an informal information table, talking with passersby, and making contacts with those out and about on a quiet Thursday afternoon led to an additional 10 participants, well exceeding our target of 50.

It is possible that residents were intimidated by formal research presentations and letters of information and consent. A lesson learned for recruitment at retirement villages is that providing information to residents informally and face-to-face in a common area may be the most effective method to recruit participants.

Nonetheless, our sample is not representative of retirement residents who drive less than once a week who may also have poorer functional abilities and less confidence. The author recalls speaking with one resident who wasn't eligible as she drove only once or twice a month when necessary, and another male resident who shared a car with his adult daughter and similarly drove only once or twice a month. As mentioned above, only two residents were recruited from the Sunshine Centre.

Prior naturalistic driving studies have made it apparent that some missing driving data is to be expected. However, the current study lost a significant amount of Otto data from a specific subset of the sample. Out of 13 participants missing Otto data, 9 were from TM. Unfortunately the digital maps for Whitby were not loaded prior to the first session. In a few other cases, live sockets in the vehicles were an issue. In such cases, participants were instructed to plug and unplug the Otto before and after each driving trip, which understandably did not always occur.

There were considerable limitations to the fall data as discussed above. Incident reports from the SVs were incomplete, with files missing for 37% of the sample (10/27).

More importantly at LV there were no incident reports filed, despite 7/28 residents reporting a fall in the past year. We initially thought that village reports would be highly informative and potentially more accurate than participant recall. In reality, they only provided supplementary data.

As a consequence of reducing the protocol for the in-depth study on former drivers to reduce participant burden (Janssen-Grieve, 2013), only the GDS-5 was administered versus the GDS-15, and VPS scales were only administered to 8 FDs. Other information not collected from FDs (e.g., income) precluded comparisons with the CDs. As discussed in Chapter Two, high incomes make driving expenses less of a burden for older drivers, and may reduce the risk of mobility disability (Kulikov, 2011; Shumway-Cook et al. 2005). In the present sample over 70% of the CDs reporting gross annual incomes over $50,000 (29% over $75,000). Comparatively, Baker and Milligan (2009) report that the average annual retirement income in Canada is approximately $32,000. It is possible that higher incomes may be linked with continued driving and should be investigated in future studies.

More importantly, functional assessments were not included in the study on FDs, precluding comparisons with the CDs. There were also some missing dates, times or trip purposes on the travel diaries, and some participants did not answer all items on the questionnaires and scales. For the current drivers, some did not provide odometer readings or passenger information on their trip logs. The advantage of collecting such a wealth of information is that minor gaps in data did not substantially alter our overall results and findings.

6.9 Implications and Future Research

Some of the data collected in this ambitious project fell beyond the scope of the individual Master's theses but can be examined prior to publications. For instance, time of day for trips recorded in the travel diaries has not yet been analyzed, nor has all of the qualitative data collected in the interviews from the last 16 current drivers. This data could be added to that reported in Sousa's (2013) thesis to further inform some of her recommendations, such as: not encouraging applicants to give up their driver's license and sell their vehicles before moving to the village; disseminating knowledge about alternate transportation methods on entry and periodically; gathering more feedback on a potential ridesharing program; and keep track of usage and satisfaction of services. Additionally, the naturalistic driving data could be further examined with respect to type of roadways, speed and force of braking, similar to the Crizzle study (2011).

One of the most interesting results from the present thesis concerned the differences between residents who were thinking about driving retirement and those who were not. Those considering cessation were not only restricting their driving, but had diminished functional abilities, were more likely to fall, had worse balance and driving confidence, and were less engaged with the community.

Prospective studies are needed to assess seniors who are still driving before and after they move to retirement communities. Prior research has suggested that mobility transitions can be normalized by sufficient planning prior to the mobility situation reaching a crisis (e.g., involuntary loss of a license or a bad accident), with interventions emphasizing a person-centered approach (Silverstein, 2008; Berg-Weger et al. 2013; Curl et al. 2013). Berg-Weger et al. 2013 found that low balance confidence, poor vision, and

worse self-rated health was related to lower readiness to manage a mobility transition. Choi, Lohman &Mezuk (2013), meanwhile, found that older adults without driving mobility had poorer cognitive functioning (measures of memory, working memory, speed of mental processing, knowledge, and language) at baseline and experienced an accelerated cognitive decline relative to active drivers at follow-up.

The present study only looked at a few components of functional abilities in current drivers. Future studies should include objective measures of balance (i.e., postural sway) and additional measures of vision such as glare recovery as used by Brabyn et al. (2005).Further work is required concerning the extended ABC scale, beginning with feedback from older adults themselves (concerning item wording and relevance) followed by gathering additional psychometric evidence with new samples from both retirement facilities and the general community.

6.10 Conclusions

Although the sample was confined to five retirement communities in Southern Ontario (all located in urban or suburban areas), in collaboration with Sarah Sousa, this study was the first to examine the naturalistic driving practices and other modes of travel (using real time travel diaries) in retirement living seniors. The present thesis took this examination a step further by looking at resident functional abilities and falls, as well as comparing the sample of current drivers with the sample of former drivers recruited and assessed by Janssen-Grieve (2013). The findings from this work should encourage staff at retirement communities to consider the importance of driving in the lives of residents who relocate from the community and help facilitate the transition to non-driving. Alternate modes of transportation are critical as older adults retire from driving to ensure

ongoing mobility and independence, as well as maintaining productive community and social engagement.

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Appendix A: Resident Transportation Patterns Survey

RIA Research Institute for Aging
Schlegel • UWaterloo • Conestoga

UNIVERSITY OF WATERLOO

SCHLEGEL VILLAGES

Resident Transportation Patterns Survey

This survey is meant for you! By completing this survey you will help the RIA and the Schlegel Villages to better understand the transportation needs of all retirement living residents.

SECTION 1: To be completed by ALL residents

1. Room #_____ ?

2. Gender ☐ Female ☐ Male

3. When is your birthday (dd/mm/yyyy)? _____/_____/_____

4. Which Village are you from?

☐ Winston Park ☐ Riverside Glen ☐ Humber Heights ☐ Taunton Mills

5. When did you move to this Village (if you recall)?

Year:_____ Month: _____

6. Where did you live before moving to the Village? (Name of city, town or village)

_____

7. Do you participate in outings that use the Village's bus? ☐ YES ☐ NO

If Yes, approximately how often?
☐ less than once a month
☐ about once a month
☐ more than once a month

8. Do you get rides from other people? ☐ YES ☐ NO

If YES, who drives you the **most**?
☐ spouse ☐ friend
☐ child ☐ volunteer
☐ other relative

How often do they drive you? # times per week: _____
OR
times per month: _____

Do they live in the Village? ☐ YES ☐ NO

Please continue on next page…

9. Do you use any of the following forms of transportation? (check all that apply)

☐ public buses ☐ taxis ☐ paratransit services ☐ motorized scooter

10. Do you currently drive? ☐ YES ☐ NO

If **YES**, please complete Section 2.
If **NO**, please complete Section 3.

SECTION 2: To be completed <u>only</u> by residents who CURRENTLY drive.

11. How many days a week do you usually drive?

☐ 5 days or more
☐ 3 to 4 days
☐ 1 to 2 days
☐ Less than once a week

12. Do you have a car? ☐ YES ☐ NO

If Yes, where do you keep it?

☐ At the Village
☐ Elsewhere

SECTION 3: To be completed only by residents who do <u>NOT</u> currently drive.

13. Did you used to drive? ☐ YES ☐ NO, I have never driven

If YES, **when** did you stop driving (if you recall)?
Year:_____ Month:_____

Did you stop driving:

☐ Before you moved to the Village?
☐ After you moved to the Village?
☐ At the same time you moved to the Village?

Do you still have a **valid** driver's license? ☐ YES ☐ NO

Thank you for completing this short survey.
Please return it to the main office by XXXXXXXXXX in the envelope provided.

Appendix B: Incident Reports

SCHLEGEL VILLAGES

Program for Active Living

FALLS INCIDENT REPORT

The Village of _____

Modified: November 2011

RIA Research Institute for Aging

DNC/GM initials: _____ ❒ CIS required and completed KIN initials: _____

THIS SECTION TO BE COMPLETED BY THE INDIVIDUAL WHO DISCOVERED THE FALL

Name of resident: _____

Date of fall (DD/MM/YY): _____

Time of fall (24-hr clock): _____

Time of discovery (24-hr clock): _____

LOCATION

Where does the resident live?

LTC ❒ Riverside ❒ Weston ❒ Brighton
❒ Islington ❒ Oaklands ❒ Carrington
RH ❒ Main (West) ❒ Main (East) ❒ Main (ACF)
❒ ACF ❒ SCF ❒ Apartments

Where did the resident fall?

❒ Unknown ❒ Lounge ❒ Hall ❒ Activity room
❒ Bedroom ❒ Bathroom ❒ Dining Room ❒ Tub Room
❒ On Leave of Absence ❒ Other *(Specify)*: _____

MOBILITY

What is the resident's usual ambulatory status?

❒ Independent (no assistance) ❒ Walker ❒ Electric wheelchair
❒ Cane ❒ Manual wheelchair ❒ Scooter

Was the resident using the appropriate assistive device at the time of the fall?

❒ Yes ❒ No

If **NO**, explain: _____

ACTIVITY

What was the resident doing at the time of the fall?

❒ Unknown ❒ Walking ❒ Transfer (Sit ←→ Stand) ❒ Reaching ❒ Turning ❒ Sitting
❒ Standing ❒ Lying down ❒ Other: _____

Was the fall witnessed?

❒ Yes Names of witnesses: _____
❒ No

What did you see or find? What did the resident or witness say happened?

_____

_____

Was the activity performed...

❒ Independently (i.e., resident fell on his/her own)? ❒ Assisted (i.e., resident fell with the assistance of another person)? ❒ Unknown (i.e., no one can tell you how the fall happened)?

EMOTION

What was the resident's emotional state *BEFORE* the fall? (check *ALL* that apply)

❒ Unknown ❒ Aggressive ❒ Agitated
❒ Alert ❒ Angry ❒ Anxious
❒ Calm ❒ Confused ❒ Depressed
❒ Sleepy ❒ Other: _____

Section completed by: _____ Date and time: _____

PLEASE GIVE THIS COMPLETED SECTION TO A REGISTERED TEAM MEMBER ASAP TO COMPLETE THE REMAINDER OF THE INCIDENT REPORT

THIS SECTION TO BE COMPLETED BY A REGISTERED TEAM MEMBER

INTERVENTIONS

Which of the following interventions have been implemented?

If Bed Rails *(Specify)*
- ❒ 1 Rail ❒ 2 Rails
- ❒ Partial ❒ ¾ or

- ❒ Bed/Chair Alarm *(activated)*
- ❒ Lap Belt
- ❒ Transfer Pole
- ❒ Other *(Specify)*: _____
- ❒ Floor Mat
- ❒ Tray Table
- ❒ Unknown
- ❒ High/Low Bed
- ❒ Hip Protector
- ❒ None

Was the appropriate intervention being used at the time of the fall?

❒ Yes ❒ No ❒ N/A

If **NO,** explain *(e.g., bed alarm not working, hip protector lost, etc.)*: _____

CAUSE

What was the cause of the fall?

- ❒ The resident was attempting to **escape** from a safety device *Explain:* _____
- ❒ The resident was wearing inappropriate **footwear** *Explain:* _____
- ❒ A pre-existing **medical** condition (e.g., Parkinson's) contributed to the fall *Explain:* _____
- ❒ The resident was **pushed** or bumped by another person *Explain:* _____
- ❒ The resident was exhibiting **responsive** behaviours *Explain:* _____
- ❒ The resident **slipped** in or on something (e.g., spill, pant leg, etc.) *Explain:* _____
- ❒ The resident **tripped** over an obstacle *Explain:* _____
- ❒ An **unsafe** practice (e.g., sitting on walker, etc.) caused the fall *Explain:* _____
- ❒ The resident's unsteady **walking** pattern contributed to the fall *Explain:* _____
- ❒ The resident exhibited **pain** prior to the fall *Explain:* _____
- ❒ **Other** (What led to the loss of balance) *Explain:* _____
- ❒ Cause of fall unknown

Did acute illness (e.g., UTI), or alcohol appear to contribute to this fall?

- ❒ Acute illness contributed: _____ UTI → ❒ Suspected ❒ Confirmed
- ❒ Alcohol contributed ❒ Neither one contributed

Did the effects of a medication contribute to the fall? (Check *ALL* that apply)

- ❒ The resident is receiving psychotropic medications *(e.g., anti-anxiety, anti-depressant, anti-psychotic)*
- ❒ The resident had a medication **change** in the past 5 days
- ❒ The resident was given a **PRN** medication in the past 24 hours
- ❒ The resident appeared to be **sedated**
- ❒ Other: _____

INJURY

Indicate the type (and location) of injury sustained by the resident as a result of the fall. (Check *ALL* that apply)

- ❒ No injury upon examination
- ❒ Bruising/bumps Location *(be specific – right, left, etc.)*: _____
- ❒ Skin tear/cut Location *(be specific – right, left, etc.)*: _____
- ❒ Soft tissue injury Location *(be specific – right, left, etc.)*: _____
- ❒ Fracture/break Location *(be specific – right, left, etc.)*: _____
- ❒ Complaints of aches & pains Location *(be specific – right, left, etc.)*: _____

POST FALL ASSESSMENT

Please indicate which of the follow-up measures were taken (check *ALL* that apply):

- ❒ **Standard first aid** completed *(e.g., dressings, cold packs, etc.)* Explain: _____
- ❒ **Vital signs** completed and documented
- ❒ A **head injury routine** was completed
- ❒ The resident was sent to the **hospital** because of his/her injuries
- ❒ The **family** was notified of the fall
  Name: _____ Date: _____ Time: _____
- ❒ The **physician** was notified of the fall
  Name: _____ Date: _____ Time: _____
- ❒ **Care Plan** reviewed and updated as necessary; Team member **education** completed regarding changes
- ❒ **Skin Assessment Concern Form** completed and sent to QI
- ❒ Follow-up documentation was completed

Section Completed By: _____ Date: _____ Time: _____

24-HOUR FOLLOW UP

Resident Status: _____ ❒ F/U Documentation Complete Initials: _____

LVP - INCIDENT REPORT FORM
(For incidents involving residents, volunteers, students or visitors)

INDIVIDUAL: DATE:

TIME OF INCIDENT(if known): TIME AT POINT OF RESPONSE:

EXACT LOCATION: DEPARTMENT:

LIFE LEASE ( ) ( ) ASSISTED LIVING ( ) ( ) ( ) ( )

REPORTING STAFF: SUPPORTING STAFF:

(full name) (full name)
(Multiple names separate by ;)

OTHER NON-STAFF INVOLVED:

TYPE OF INCIDENT:

- ( ) 1. Verbal Aggression
- ( ) 2. Physical Aggression
- ( ) 3. Resident Fall
- ( ) 4. Suicidal concern/attempt
- ( ) 5. Allegations against staff
- ( ) 6. Wandering
- ( ) 7. Choking
- ( ) 8. Elder Abuse allegations, financial, sexual, physical, emotional, domestic
- ( ) 9. Accident/Injury
- ( ) 10. Security/Theft
- ( ) 11. Fire
- ( ) 12. Medical Emergency
- ( ) 13. Other

PRECIPITATING FACTORS:

DESCRIPTION OF INCIDENT:

ACTION TAKEN:

FOLLOW-UP:

INTERVENTION & RESOLUTION:

- ☐ 1. 911 called
- ☐ 2. First aid administered
- ☐ 3. Nursing assistance provided
- ☐ 4. Family Notified
  - Name:
  - Date:
- ☐ 5. Maintenance request submitted
- ☐ 6. Assessment (☐ recommended ☐ completed)
- ☐ 7. Referral made to:
- ☐ 8. Other:

REPORTING STAFF, PLEASE COMPLETE THE FOLLOWING:

Reporting Staff: Supporting Staff:

Step 1: Type the name of your immediate supervisor below:

Supervisor's Full Name:

Step 2: If applicable, click the button to email this form to the supporting staff so they can fill out their portion

Step 3: Reporting or Supporting Staff, click this button to email this form to your immediate Supervisor, as named above.

SUPERVISOR / MANAGER, PLEASE COMPLETE THE FOLLOWING:

Step 4: Please fill out the following section:

Recommendations / Action taken to prevent recurrence:

Is this incident considered a Near Miss? ☐ Yes ☐ No

Risk Debrief ☐ Recommended ☐ Occurred

Step 5: Type your Manager's name below:

Manager's Full Name:

Step 6: Click this button to send this form to your manager:

MANAGER, PLEASE COMPLETE THE FOLLOWING:

Step 7: If applicable, add your comments to the previous section.

Step 8: Sign/Type in name below.

Manager Signature:

Step 9: Click the button below to send to Risk Manager.

Step 10: Print this form.

Step 11: File the printed form according to program requirements.

Appendix C: Matrix

	Primary Variables	Data Source(s)
Objective 1: To examine actual driving practices and other modes of travel in relation to functional abilities and other characteristics.		
Driving Exposure	Number of days, trips & stops; trips per day Distance (km); distance per day Duration (hr: min)	CarChip and trip logs (2 week monitoring) CarChip CarChip
Driving Patterns	Weekday versus weekend driving Night driving (complete and partial trips) • number of nights, trips, km & duration Radius from home (average and maximum) Number of out of town trips (as driver)	CarChip and trip logs CarChip, trip logs and archives (times sunrise/sunset) Otto and Goggle Earth Trip logs
	General weather conditions over monitoring period • # days driven versus not driven Trip purposes	Environment Canada archives & trip logs CarChip & trip logs Trip logs
Other Modes of Travel	Number & type of trips outside the village over 2 wks General transportation use	Travel diaries for 14 days Transport Questionnaire
Functional Abilities	Cognition (possible mild cognitive impairment) Low contrast vision (contrast sensitivity) Executive function & visual scanning Motor speed & function	MoCA total and subscores Pelli-Robson Chart (binocular) Trails B (time and errors) Rapid Pace Walk Test (RPWT)
Driver Characteristics	Demographics: age, gender, etc. Driving habits and preferences Depression & Vitality Scores	Background Questionnaire Driving History & Habits Questionnaire GDS-15; VPS scale

Level of independent living	Type of accomodation (categorized as highly independent, independent and less independent)	Background Questionnaire and information from the villages
Perceptions	Driving comfort scores (daytime and nighttime) Driving abilities Balance confidence	DCS-D and DCS-N scales PDA scale ABCscale (16, 20 & 27 item scores)
Self-reported Restrictions	Frequency of Driving in Challenging Situations Avoidance of Challenging Situations	SDF Scores SDA Scores
Objective 2: To examine associations between driving and other modes of travel with community engagement.		
Driving Exposure and Patterns	See above	See above
Other Modes of Travel	See above	See above
Activities outside the village	Community Engagement Score Social Engagement Score Participation in community groups/organizations	Number of activities outside Village in the past month (0 - 10) Frequency and modes of staying connected with family/friends (0 - 15) Number of groups attended past month (0 - 6)
Objective 3: To examine fall status and compare fallers and non-fallers.		
Falls Data	Self-reported falls (past year) Objective measure of falls (past two years)	Background Questionnaire Village Incident Reports
Driver Characteristics	Demographics: age, gender, etc. Level of Independent Living Depression & Vitality Scores Balance confidence	Background Questionnaire See above GDS-15; VPS scale ABC scale
Functional Abilities	Cognition (possible mild cognitive impairment) Low contrast vision (contrast sensitivity) Executive function & visual scanning Motor speed & function	MoCA total and subscores Pelli-Robson Chart (binocular) Trails B (time and errors) Rapid Pace Walk Test (RPWT)

Driving Exposure and Patterns	See above	See above
Other Modes Travel	See above	See above
Self-reported Restrictions	Frequency of Driving in Challenging Situations Avoidance of Challenging Situations	SDF Scores SDA Scores
Activities outside the Village	Community engagement & Group participation Social engagement	See above
Objective 4: To compare current and former drivers with respect to falls, balance confidence, depression, vitality, activity levels in and out of Village (engagement), and travel patterns.		
Falls Data	Self-reported falls (past year) Objective measure of falls (past two years)	Background Questionnaire Village Incident Reports
Resident Characteristics	Demographics: age, gender, etc. Depression & Vitality Scores Level of Independent Living Balance confidence	Background Questionnaire GDS-6 FDs; GDS-15 CDs; VPS scale See above ABC Scale
Travel Patterns	Number and type of trips outside village over two weeks General transportaion use	Travel Diaries Transportation Questionnaire
In-Village Activity & Service Use	Number of activities/events participated in (past month) Frequency of physical activity score Number of serives/amenities used in past month	Village Services & Amenities Checklist
Activities outside the village	Community Engagement Score (see above) Social Engagement Score (see above) Participation in community groups/orgs (see above)	Activities Outside the Village Questionnaire

Appendix D: Information and Consent Form

UNIVERSITY OF WATERLOO

UNIVERSITY OF WATERLOO | SCHOOL OF PUBLIC HEALTH AND HEALTH SYSTEMS

RESIDENT DRIVING & TRANSPORTATION STUDY (Current Drivers)

INFORMATION LETTER

Primary Investigator: Professor Anita Myers, School of Public Health and Health Systems.
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Student Researchers:

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Spencer Gooderham (MSc Candidate)
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You are invited to participate in a research study! Sarah Sousa and Spencer Gooderham, under the supervision of Anita Myers, PhD, are conducting a research study on residents who currently drive. To decide whether or not you want to participate, you should be aware of what is involved. This letter gives detailed information about the study.

This study has been reviewed and received ethics clearance from the University of Waterloo, Office of Research Ethics. If you have questions regarding your rights as a research participant, contact: Director of the Office of Research Ethics, Dr. Maureen Nummelin by phone at 519-888-4567 ext 36005 or EMAIL: maureen.nummelin@uwaterloo.ca

If you have any questions about this project please contact

Sarah Sousa or **Spencer Gooderham**.

A NOTE FROM SARAH and SPENCER

My name is Spencer Gooderham, and both Sarah Sousa and I are graduate students at the University of Waterloo. For our Master's theses we are trying to learn more about the travel and activity patterns of seniors aged 65 and over living in retirement villages who drive at least once a week.

SIGNIFICANCE OF THE WORK AND THE NEED FOR THE STUDIES

The information gathered in this study will help us complete our Master's theses. From a research perspective, this will be the first study on driving patterns and transportation use by older adults living in retirement facilities, as opposed to the general community. We believe that where people live may have a significant influence on their transportation patterns and needs and this study will allow us to examine such factors. You and others who participate in this study will have the opportunity to provide feedback on available transportation services (example, the Village bus) as well as suggestions for additional programs and services. Your input is important in helping Luther Village on the Park plan to better meet the needs of all residents. It is important to note that we are also conducting this study in other retirement Villages to determine if factors such as services provided and proximity to shopping areas influence travel patterns.

WHO IS ELIGIBLE TO PARTICIPATE IN THE STUDY?

This project is open to anyone **aged 65 and over** who lives in retirement villages (in this case, Luther Village), and drives **at least once a week**. Participant vehicles must also be 1996 or newer, gasoline powered (not electric cars or hybrids) and kept at the Village.

If you live with another current driver, they are also welcome to participate in this study, whether you share a vehicle or both have your own vehicle.

ARE THERE ANY RISKS ASSOCIATED WITH MY PARTICIPATION?

Participants may worry that information collected from the questionnaires or interviews about their driving (e.g., if they had crashes) or from their vehicles (e.g., speeding) may be reported to the police or licensing authorities. Rest assured that all of the information provided to the researchers or collected from participant vehicles will be kept strictly confidential; names will not be used in any reports or publications, and will never be reported to any outside parties.

Another possible concern is that the electronic devices we install in your vehicle (described below) may harm your vehicle or affect your driving. Rest assured that this is not the case. We have conducted such studies many times with older drivers and the devices did not affect their driving or vehicle in any way. In fact most said they barely noticed the devices.

WHAT WILL I BE ASKED TO DO?

The total time commitment for this project is approximately 2 1/2 hours spread over 2 weeks.

If you choose to be involved you will be asked to:

1. Meet with the researcher for about an hour (possibly with a few other residents) to:

    a. Complete a consent form, questionnaires to gather background and driving history information, as well as three short questionnaires on mood, confidence and general well-being.

    b. Show you the devices and you can decide then whether you are okay with putting these in your vehicle for two weeks. I will be sure to explain how these will be installed in your vehicle, as well as how to complete the car trip logs and travel diaries. I will also go over some commonly asked questions about the devices. These will <u>not harm your vehicle</u> in any way nor will you have to do anything with these devices (just drive normally).

    c. If you agree, I or Spencer will accompany you to your vehicle to record your odometer reading, install the electronic devices and leave the trip logs on a clipboard. The first device (the CarChip) plugs into a slot under your steering wheel (the same one your mechanic uses for diagnostic tests). The other (a Global Positioning Device), which is also small (fits in the palm of your hand), will be placed on your dashboard on a removable non-slip pad. As you will see, this device will not block your view. Both devices record information from your vehicle's computer (e.g., how far the vehicle travelled and for how long).

2. Over the next two weeks you will simply drive as usual. However you will be asked to complete a simple checklist (or log) for each driving trip (such as who drove and what the weather was like). This should only take a few minutes. For trips you make where you do not drive (e.g., take a taxi), we will ask you to note this on a travel diary. Again, this should only take a few minutes. On the days you do not leave the village you will not have to do anything.

3. We will arrange to meet again after the two weeks for less than 90 minutes so that I can collect your trip logs and travel diaries, remove the devices, and gather some further information. Also, you will be asked to:

    a. Complete a few checklists on transportation use and activities you regularly do in and outside the Village.

    b. Complete some short questionnaires concerning how often you drive in various situations, your comfort level, as well as a puzzle, walking and vision task.

    c. And finally a short interview or small group discussion with other residents concerning experiences over the past two weeks and to get feedback on transportation available in your Village (e.g., Village bus)) and nearby (e.g., bus routes). We are also interested in your suggestions for how services could be improved.

If you agree to participate, you will also be asked for your permission for the research team to access the data that the Village routinely collects regarding the number of falls and/or accidents you and other residents may have had over the last few years.

WHAT ARE THE POTENTIAL BENEFITS ASSOCIATED WITH MY PARTICIPATION?

Participants will have an opportunity to provide feedback on existing services and programs, and make suggestions for additional services to better meet the needs of all residents.

WHAT HAPPENS IF I WANT TO WITHDRAW FROM THE STUDY?

You decide which aspects of the study you want to do (e.g. completing questionnaires, checklists, travel diaries), having the electronic devices installed in your vehicle, as well as how much you want to share in the interview or small group discussion. We encourage you to participate in all the study components if possible so that we can get a complete and accurate picture of your experiences and needs, as well as, those of other residents.

If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You can request that your results be removed from the study. You may also refuse to answer any questions and still continue in the study. A decision to participate or withdraw will have no effect on the care or services you receive from the Village. This study will in no way affect your license renewal now or in the future.

WHAT PROCEDURES ARE IN PLACE TO ENSURE CONFIDENTIALITY?

All of the information you provide (e.g., on questionnaires, trip logs, or interviews) will be kept completely confidential. Names will not be used in Sarah's or Spencer's theses or in any reports or publications based on this study. Instead, data will be summarized across all participants from several retirement Village locations. The researchers **will not report** speeding or any other driving infractions. None of the electronic data recorded by the devices will be shared with any authorities.

Although your name will appear on the consent form, these forms will be kept in a locked cabinet and participants will be given a confidential identification code (ID) in place of their name. The master list (names and IDs) will be kept by the primary investigator (Anita Myers, PhD) on a password protected computer. Data entered into a computer for analysis will not contain ANY names. Illustrative quotes from discussions will also be anonymous. All paper, electronic, and audio data will be kept secure and destroyed 5 years after data collection.

WILL I BE PAID FOR PARTICIPATING IN THE PROJECT?

Participants will not be paid for their participation in the project.

HOW WILL I LEARN ABOUT THE RESULTS OF THE PROJECT?

A summary of the results will be made available to you and all other study participants shortly after the completion of the study.

HAS THE PROJECT RECEIVED CLEARANCE FROM A RESEARCH ETHICS BOARD?

You are not waiving any legal claims or rights by taking part in this research study. This study has been reviewed and received ethics clearance from the University of Waterloo, Office of Research Ethics. If you have questions regarding your rights as a research participant, contact: Director of the Office of Research Ethics, Dr. Maureen Nummelin by phone at 519-888-4567 ext 36005 or EMAIL: maureen.nummelin@uwaterloo.ca

UNIVERSITY OF
WATERLOO
School of Public Health and Health Systems

RESIDENT DRIVING & TRANSPORTATION STUDY

Consent Form

RESIDENT NAME: _____ **SUITE #:** _____

I have read the information letter about a study being conducted by **Sarah Sousa, Spencer Gooderham** and **Anita Myers**, PhD, from the School of Public Health and Health Systems at the **University of Waterloo**. This study has been explained to my satisfaction and I have had the opportunity to ask questions. I was informed that my participation in this study (including completing materials or contributing to discussions) is voluntary and will in no way affect the services provided to me by Luther Village on the Park and the University of Waterloo. In addition, I was informed that:

- I may withdraw from the study at any time
- All identifying information collected will be kept totally confidential
- The study results will be summarized across all study participants
- Consent forms will be kept in a locked cabinet and will be destroyed after five years

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 Dr. Maureen Nummelin, Director, Office of Research Ethics at (519) 888-4567 ext. 36005 or maureen.nummelin@uwaterloo.ca.

I understand that in order to gain a complete understanding of functional independence and mobility associated with transportation use, the research team would like to access data routinely collected by the Village on the number of falls and accidents residents may have had over the last few years.

I agree to allow the researchers to access information routinely collected by the Village on the number of falls and accidents I have had over the last few years. ☐ YES ☐ NO

(...OVER...)

By signing this consent form, I am not waiving my legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study. ☐ YES ☐ NO

Resident Name: _____
(please print)

Signature: _____

Date: _____

Name of Witness: _____
(please print)

Signature: _____

Date: _____

Appendix E: Session One Materials

Participant ID: _____ Date:_____

Background Questionnaire

Part A: Please tell us about yourself.

1. Age? _____ 2. Gender? ☐ Male ☐ Female

3. Highest level of education:
☐ some high school
☐ completed high school
☐ some college or university
☐ completed college or university
☐ graduate or professional degree

4. Are you still employed:
☐ full-time ☐ part-time
☐ retired ☐ did not work out of home

5a) If you are retired, how long ago did you retire? _____ (# years)

b) Primary occupation: _____

6. When did you move to this Village? __ __ __ __ year; __ __ month (if recall)

7. Do you live in:
☐ townhome (Garden Villa Suites)
☐ condo (indoor) Atrium Suites
☐ a rented room (assisted care)

8. Are you currently:
☐ married ☐ divorced ☐ widowed ☐ never married

9)a. If **married**, where does your spouse live? (if not married go to **Question 10**)
☐ in the same room, apartment or condo as me
☐ in another part of this village
☐ in a house, apartment/condo in the same city
☐ in a house, apartment/condo in another city or town:_____ (name)
☐ in another type of housing, specify:_____

Please continue to the next page…

Participant ID: _____ Date:_____

b) If married, does your spouse still drive? ☐ No ☐ Yes

10. Do you have relatives in the area (within about 15 kilometers or 10 miles)?
☐ No ☐ Yes

11. Please estimate your gross annual income from all sources, before taxes :
☐ less than $50,000 ☐ $50,001 – $74, 999 ☐ $75, 000 or over

Part B: Now a few questions on where you lived before you moved to the Village.

1. Name of the city, town, or country: _____

2. Before you moved to the Village, did you live in a:

☐ house or townhouse If so, was it? ☐ single level OR ☐ multi-level
☐ apartment or condo
☐ another retirement complex

3. Please describe the main reason(s) you moved to the Village? _____
_____
_____

Part C: Now a few questions about your health and activities

1. Overall, would you say your health is:
☐ Excellent ☐ Good ☐ Fair ☐ Poor

2. Do you ever use a cane or walker outdoors? ☐ No ☐ Yes
indoors? ☐ No ☐ Yes

3. Do you ever use a motorized wheelchair? ☐ No ☐ Yes
scooter? ☐ No ☐ Yes

4. Are you able to walk a quarter mile (or 400 meters) with or without assistance?
☐ No ☐ Yes ☐ Not sure

Participant ID: _____ Date:_____

5. In the **past year**, have you fallen (ended up on the ground or floor)? (If no, go to **Question 6**) ☐ No ☐ Yes

If yes, please answer the following questions:

Have you fallen more than once? ☐ No ☐ Yes

Were you injured as a result of the fall(s)? ☐ No ☐ Yes

Did you have trouble getting up? ☐ No ☐ Yes

6. Have you been **diagnosed** with any of the following? Check all that apply.

☐ arthritis ☐ osteoporosis ☐ diabetes

☐ Parkinson's ☐ stroke ☐ hearing problems

☐ Multiple Sclerosis ☐ high blood pressure, cholesterol, heart problems

☐ glaucoma ☐ macular degeneration ☐ cataracts (even if repaired)

7. Do you wear **prescription** glasses or contacts for driving?

☐ All the time ☐ Sometimes ☐ Never

8. Compared to others your age, would you say your **eyesight** is:

☐ Better than most ☐ About the same ☐ Worse than most

9. Are you currently taking any **prescription medications**? ☐ No ☐ Yes

10. Do you experience any of the following **difficulties**? Check all that apply.

☐ staying awake or remaining alert

☐ keeping your balance

☐ initiating movement (e.g., walking after standing still)

☐ persistent pain

☐ limited strength or movement

Thank you for completing this.

Please let us know if any of the questions were not clear.

Participant ID: _____ Date: _____

Driving History and Habits Questionnaire

Part A: Please tell us about your driving history.

1. How old were you when you got your driver's license? _____

2. Did you drive to work (more than 1 hour each way)? ☐ No ☐ Yes

Before you moved to the Village:

3. Were there any **other drivers** in your household? ☐ No ☐ Yes

   If yes, who? ☐ spouse ☐ other

   If yes, who was the primary driver? ☐ me ☐ my spouse ☐ other

4. Did anyone rely on you to drive them? ☐ No ☐ Yes

5. In the **month before** you moved, how often did you drive? _____ (~ days/week)

6. Did you consider or did anyone suggest giving up your license or car (thinking you might not need to drive anymore once you moved to the Village)?

   ☐ No ☐ Yes Regardless, are you glad you kept driving? ☐ Yes ☐ No

Part B: Now, please tell us about your **current** driving habits.

7. How many **days a week** do you **normally** drive now? _____

8. Compared to other seasons, in the **winter** do you tend to drive:

   ☐ much less often ☐ a little less ☐ about the same ☐ more often

9. What **types of roads** do you typically drive on? Check all that apply.

   ☐ residential streets ☐ main city streets ☐ rural roads

   ☐ freeways (e.g., 400 series) ☐ highways (e.g., Hwy 6,7, and 8)

10. What **time(s) of the day** do you usually drive? Check all that apply.

   ☐ morning ☐ afternoon ☐early evening (before dark) ☐ at night (after dark)

Please continue on next page…

Participant ID: _____ Date: _____

11. Overall, **compared to 10 years ago**, do you drive:

☐ much less often ☐ a little less ☐ the same ☐ more often

12. How do you **prefer** to get around?

☐ drive yourself ☐ have someone drive you ☐ taxis ☐ bus

☐ special transit services ☐ walk ☐ Village Shuttle

13. Do you prefer to drive alone or with a passenger? ☐ alone ☐ with passenger

14. Does anyone **rely on you** to drive them? ☐ No ☐ Yes
(Note: this person may or may not live with you)

15. To what extent **do you worry about car related expenses**? (such as gas, maintenance, repairs, licensing and insurance costs)

☐ Often ☐ Sometime ☐ Rarely ☐ Never

16. Who takes your household vehicle in for **regular servicing**?

☐ Myself ☐ Other: (relation, e.g., son) _____

17. Do you change your tires in the winter? ☐ No ☐ Yes

18. Have you **discussed your driving** with any of the following people?

a. An eye care professional ☐ No ☐ Yes

b. A physician ☐ No ☐ Yes

c. Family members ☐ No ☐ Yes

c. Friends ☐ No ☐ Yes

19. Has anyone **suggested** that you **limit** or **stop driving**? ☐ No ☐ Yes
If yes, who? Check all that apply.

☐ Family ☐ Friends ☐ Your physician ☐ An eye care professional

Please continue on next page…

Participant ID: _____ Date: _____

20. Have you yourself thought about **giving up driving** in the next few years?

☐ No ☐ Yes If so, why? _____

_____

21. Do you ever have difficulty staying awake or alert when driving?

☐ Often ☐ Sometimes ☐ Never

22. Have you recently (past few years) taken **any driving courses**? ☐ No ☐ Yes

If yes, with whom? (e.g., CAA) _____

23. All Ontario drivers aged 80 and over are required to take the Ministry's Senior Driver Renewal Course. If you are over 80, when did you last take this course?

__ __ __ __ (year) ☐ Not applicable, I am not 80 yet

Regardless, how do you feel about this mandatory renewal process for seniors?

☐ I think it is a good idea ☐ Personally, I don't want to go through this

Other thoughts?_____

_____

24. In the past year, have you had any of these **problems when driving**?

a. Accidents involving another vehicle ☐ No ☐ Yes
   If yes, how many accidents? _____
b. Were you at fault in any of these accidents? ☐ No ☐ Yes
c. Near misses (almost an accident) ☐ No ☐ Yes
d. Backing into things besides other cars ☐ No ☐ Yes
e. Getting lost ☐ No ☐ Yes
f. Traffic violations with loss of demerit points ☐ No ☐ Yes

Please continue on next page…

Participant ID: _____ Date: _____

25. Have you even been asked by the Ministry of Transportation:

a. To have a vision or medical examination? ☐ No ☐ Yes
b. To take a road test ☐ No ☐ Yes
c. To do a comprehensive or rehabilitation driving assessment ☐ No ☐ Yes

26. What are the **main reasons** that you continue drive? (Check all that apply)

☐ to do shopping, banking and other errands
☐ to get to appointments (e.g., with doctor, dentist, lawyer)
☐ to visit family and friends
☐ to attend religious services
☐ to get to recreational facilities, social, cultural or sports events
☐ other (volunteer, employment), specify: _____

27. How **important** is it for you, personally, to **continue** to drive? (circle **one**).

1	2	3	4	5
Extremely	Very	Moderately	Somewhat	Not that Important

28. Using the scale above, please rate **how important** (1 to 5) it is for you to **keep driving** for each of the following reasons:

a. To maintain my present lifestyle (go when & where I want) _____
b. To maintain my freedom and independence _____
c. To meet commitments such as volunteer work _____
d. Public transportation is inconvenient _____
e. Other people count on me to drive them _____
f. I don't want to bother others for rides _____
g. I have physical difficulty walking or using public transport _____

Thank you for completing the questionnaire.

Geriatric Depression Scale

Participant ID: _____

Mood Scale

Choose the best answer for how you have felt over the **past week**:

1. Are you basically satisfied with your life? YES / NO

2. Have you dropped many of your activities and interests? YES / NO

3. Do you feel that your life is empty? YES / NO

4. Do you often get bored? YES / NO

5. Are you in good spirits most of the time? YES / NO

6. Are you afraid that something bad is going to happen to you? YES / NO

7. Do you feel happy most of the time? YES / NO

8. Do you often feel helpless? YES / NO

9. Do you prefer to stay at home, rather than going out and doing new things? YES / NO

10. Do you feel you have more problems with memory than most? YES / NO

11. Do you think it is wonderful to be alive now? YES / NO

12. Do you feel pretty worthless the way you are now? YES / NO

13. Do you feel full of energy? YES / NO

14. Do you feel that your situation is hopeless? YES / NO

15. Do you think that most people are better off than you are? YES / NO

Vitality Plus Scale

Participant ID: _____

This scale looks at how you are **currently feeling**. For each statement, circle a number from 1 to 5 that best describes you. For example, if you usually fall asleep quickly then you want to circle (5). Otherwise, circle a number from 1 to 4, depending on how much difficulty you usually have falling asleep.

Takes a long time to fall asleep	1	2	3	4	5	Fall asleep quickly
Sleep poorly	1	2	3	4	5	Sleep well
Tired or drowsy during the day	1	2	3	4	5	Feel rested
Rarely hungry	1	2	3	4	5	Excellent appetite
Often constipated	1	2	3	4	5	Do not get constipated
Often have aches & pains	1	2	3	4	5	Have no aches & pains
Low energy level	1	2	3	4	5	Full of pep & energy
Often stiff in the morning	1	2	3	4	5	Not stiff in the morning
Often restless or agitated	1	2	3	4	5	Feel relaxed
Often do not feel good	1	2	3	4	5	Feel good

The Activities-specific Balance Confidence (ABC) Scale

For each of the following activities, please indicate your level of self-confidence from 0 (no confidence) to 100% (completely confident).
If you normally do not do an activity, try and imagine yourself in the situation.

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

	No confidence 0%	25%	Moderately 50%	75%	Completely 100%
1. walk around inside your apartment & the Village?	☐	☐	☐	☐	☐
2. walk around outside (on the Village grounds)?	☐	☐	☐	☐	☐
3. walk outside at night?	☐	☐	☐	☐	☐
4. bend over and pick up a slipper from the front of a closet floor?	☐	☐	☐	☐	☐
5. walk up or down stairs?	☐	☐	☐	☐	☐
6. reach for a small can off a shelf at eye level?	☐	☐	☐	☐	☐
7. stand on your tip toes and reach for something above your head?	☐	☐	☐	☐	☐
8. stand on a chair and reach for something?	☐	☐	☐	☐	☐
9. get in or out of a shower or bathtub?	☐	☐	☐	☐	☐
10. sweep or vacuum the floor or carpet?	☐	☐	☐	☐	☐

~Please continue on next page~

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

	No confidence		Moderately		Completely
	0%	**25%**	**50%**	**75%**	**100%**
11. walk outside to a car parked in the driveway?	☐	☐	☐	☐	☐
12. get into or out of a car, van or taxi?	☐	☐	☐	☐	☐
13. walk across a busy parking lot?	☐	☐	☐	☐	☐
14. walk up or down a ramp?	☐	☐	☐	☐	☐
15. walk in a crowded mall, where people rapidly walk past you?	☐	☐	☐	☐	☐
16. are bumped into by other people as you walk through the mall?	☐	☐	☐	☐	☐
17. step onto or off of an escalator while holding onto a railing?	☐	☐	☐	☐	☐
18. walk down stairs or ramps when carrying something in one hand?	☐	☐	☐	☐	☐
19. walk outside on icy or slippery sidewalks?	☐	☐	☐	☐	☐
20. walk outside when it is very windy?	☐	☐	☐	☐	☐
21. walk in heavy rain while holding an umbrella?	☐	☐	☐	☐	☐
22. walk on uneven paths or sidewalks?	☐	☐	☐	☐	☐
23. step on or off a sidewalk curb or median?	☐	☐	☐	☐	☐

~Please continue on next page~

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

	No confidence		Moderately		Completely
	0%	**25%**	**50%**	**75%**	**100%**
24. get on and off a bus?	☐	☐	☐	☐	☐
25. stand on a bus or train when it starts or stops?	☐	☐	☐	☐	☐
26. cross a busy street at a timed or signaled pedestrian crosswalk?	☐	☐	☐	☐	☐
27. cross a busy street with no pedestrian crosswalk?	☐	☐	☐	☐	☐

Thank You! Let us know if you have any questions.

Participant ID: _____ (leave blank) **Driver Initials:** _____

Car Trip Log Example

Date: November 2nd 2012 **Departure time:** 10:15 ☒ a.m. ☐ p.m.

Odometer reading at the **start** of the trip: 92 245 km

☐ **I drove** the entire trip ☒ we **shared** the driving

☐ **someone else drove** the entire trip (**I was a passenger**)

☐ **someone else drove** my vehicle and **I was not in the car***

*do not need to complete the rest. Please ask that person to fill out the blue trip log.

If **someone else** drove and **you were in the vehicle**, who was this person?

☒ Partner ☐ Friend ☐ Son/Daughter ☐ Other: _____

☐ Not applicable, I drove the entire trip

Did you have any passengers? ☐ No ☒ Yes If yes, how many? 1

What is your relationship to the passenger(s)? Check **all** that apply.

☒ Partner ☐ Friend ☐ Son/Daughter ☐ Other: _____

What was the **weather** like?

Light snow when we left, but sunny on the way home

Odometer reading at the **end of the trip**: 92 291 km

Stops	Time	Purpose	Town/City	I drove
1	10:15 a.m.	Got Gas	Kitchener	☒
2	10:30 a.m.	Shopping	Waterloo	☒
3	Noon	Met friends for lunch	Waterloo	☒
4	2:00 p.m.	Partner drove home	Kitchener	☐
5				☐
6				☐

Participant ID: _____ (leave blank) Initials: T.S Date: December 12 2012 # of Trips Today: 3

TIME LEFT	MODE OF TRAVEL TO DESTINATION	TRIP PURPOSE(S)	MODE OF TRAVEL BACK HOME	RETURN TIME
TRIP 1				
9:00 ☒ am ☐ pm	☐ Walked ☒ Car: son in-law (J.M) drove ☐ Public bus ☐ Taxi ☐ Village bus ☐ Paratransit Service	Went shopping, to the post office, and back to my apartment at the Village.	☒ same ☐ different (specify):	10:30 ☒ am ☐ pm
Was the reason why you chose not to drive on this trip due to bad weather? ☒ Yes ☐ No				
TRIP 2				
11:45 ☒ am ☐ pm	☐ Walked ☒ Car: son in-law (J.M) drove ☐ Public bus ☐ Taxi ☐ Village bus ☐ Paratransit Service	Went with my son in-law to have lunch at a local restaurant.	☐ same ☒ different (specify): I took a taxi home; my son in-law had to go back to work.	1:00 ☐ am ☒ pm
Was the reason why you chose not to drive on this trip due to bad weather? ☒ Yes ☐ No				
TRIP 3				
2:10 ☐ am ☒ pm	☐ Walked ☐ Car: _____ drove ☐ Public bus ☐ Taxi ☒ Village bus ☐ Paratransit Service	I went on the trip to the local recreation centre to go swimming.	☒ same ☐ different (specify):	3:15 ☐ am ☒ pm
Was the reason why you chose not to drive on this trip due to bad weather? ☐ Yes ☒ No				

Appendix F: Session Two Materials

Functional Assessment Protocol

Examiner Initials: _____ Date: _____/_____/_____

Participant ID: _____ Time: _____

Note: remind participants to bring distance and reading glasses.

MoCA

- Administer the visuospatial & naming portion - *Instructions on back*
- Retrieve the participant clipboard and score section - *Scoring on back*
- Administer the oral section - *Instructions & Scoring on back*
- Return the clipboard to participant (flip-page) and proceed with **Trails B**

Trails B

Administer Trails B - Instructions: *"Similar to the last section, on this page are more numbers and letters. Begin at 1 and draw a line from 1 to A, A to 2, 2 to B, and so forth until you reach the end. Remember first you have a number, then a letter, then a number, and so on. Draw the lines as fast as you can."*

Start timer when participant touches pen to paper. Be alert for mistakes. If the person makes a mistake point it out to them immediately, return the person to the last correct circle and continue the test from that point. Continue timing and record the number of errors made until task is completed

Time:	Errors:

Rapid Pace Walk

- The measuring tape is laid on the floor, pulled out to its full 10-ft length, and locked open at this length. The client walks next to the measuring tape, turns at the end, and walks back to the start position.
- Instructions: *"I want you to walk along side of this tape measure to the end, turn around, and walk back here as quickly as you can. Be sure that both feet cross the masking tape at both the turn and the end".* (Demonstrate) *"If you use a cane or walker, you may use it if you feel more comfortable. I am going to time you. Go as fast as you feel safe and comfortable."* - 3-2-1 START. Start timer when person picks up first foot and stop when back foot crosses the line.

Time: _____ **Notes** (e.g., difficulty staying near the line)_____

Pelli - Robson Contrast Sensitivity

- Setup eye chart area: Masking tape marker 1m = 3.25ft away from base of easel
- Height of participant should be approximately the height of the 3rd line of the eye chart
- Get Lux as close as possible to 913 (MIN 200)
- Administer from left to right, line by line, in triplets (circle every incorrect letter)
- If 2 of 3 in triplet are correct = Proceed
- If 1 or less are correct, STOP. Last triplet with 2 or 3 correct is Log Contrast Sensitivity

LUX: _____

0.00	V	R	S	K	D	R	0.15
0.30	N	H	C	S	O	K	0.45
0.60	S	C	N	O	Z	V	0.75
0.90	C	N	H	Z	O	K	1.05
1.20	N	O	D	V	H	R	1.35
1.50	C	D	N	Z	S	V	1.65
1.80	K	C	H	O	D	K	1.95
2.10	R	S	Z	H	V	R	2.25

Binocular

Log Contrast Sensitivity: _____

1. Alternating Trail Making - Examiner: "*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)]." - Allocate one point if the subject successful - Any error that is not immediately self-corrected earns a score of 0.	___/1
2. Copy Cube - Examiner points to cube: *"Copy this drawing as accurately as you can, in the space below"* - Allocate one point if the drawing is correct - Any error (not 3D, missing lines, disproportionate lines) earns a score of 0	___/1
3. Draw Clock - Examiner: *"In the space provided, draw a clock. Put in all the numbers and set the time to ten past eleven"*. - Contour (**1 pt.**): the clock face must be a circle with only minor distortion acceptable - 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 centered within the clock face	___/3
4. Naming - Beginning on the left, examiner points to each figure and says: *"Tell me the name of this animal"*. One point each is given for the following responses: 1) Lion 2) Rhino 3) Camel (or Dromedary)	___/3

Additional Notes for MoCA

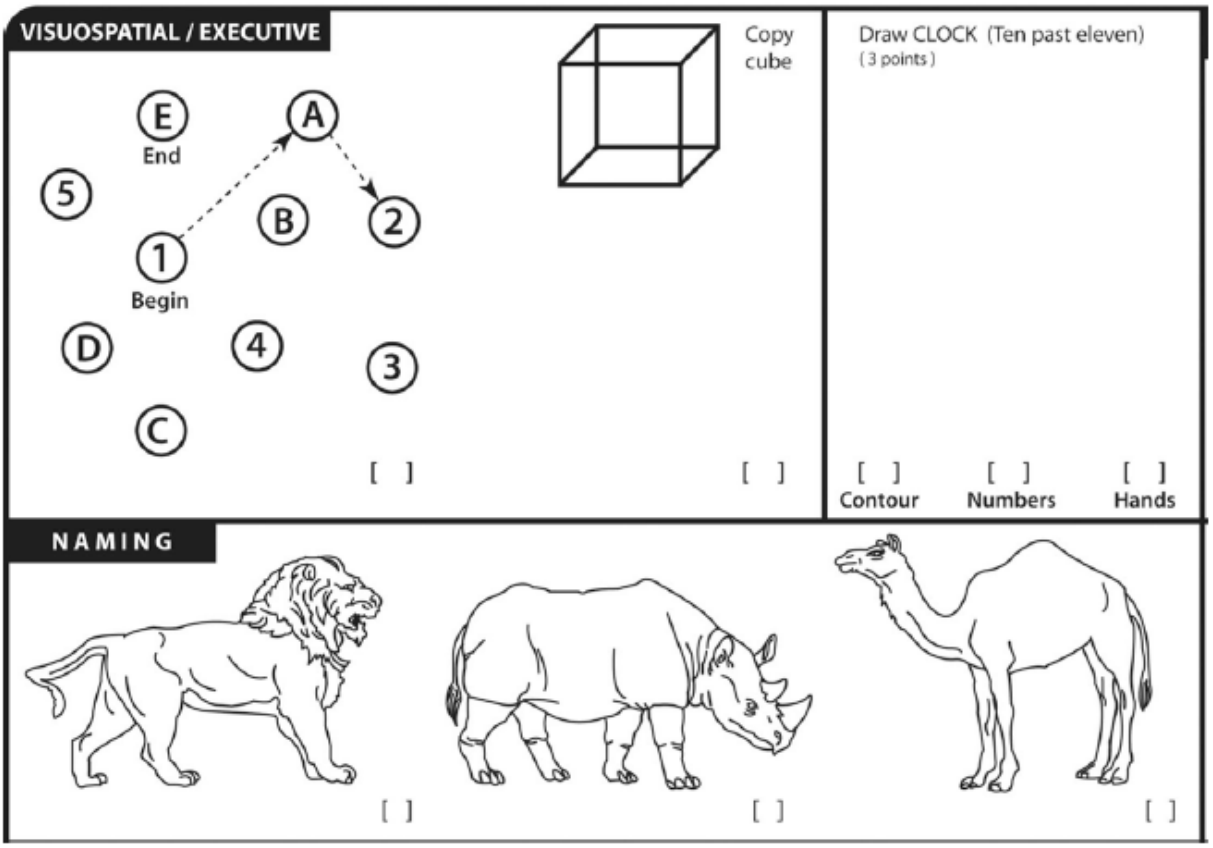
- Memory: Warn participant they will be asked to recall these words later. READ SLOWLY
- Attention: Must get all numbers correct for point. Read slowly. Repeat back in SAME vs. BACKWARD order.
- Letter String: Mark incorrect responses directly on sheet. Read Slowly.
- Serial Subtraction: Note all numbers on sheet, if error made but continue to subtract correctly onwards, only 1 error
- Language: Sentences must be IDENTICAL for point. Tell participant that Names & Proper Nouns not acceptable (ie. no Frank/France
- Abstraction: Must be specific - train-bicycle = transportation, watch-ruler = measurement
- Delayed recall: Does not matter what order - ONLY first time count for points. Prompts may be given for missed words (no points)
- Orientation: Must be specific - place: acceptable to say room or building they are in, you may prompt for city or vice versa

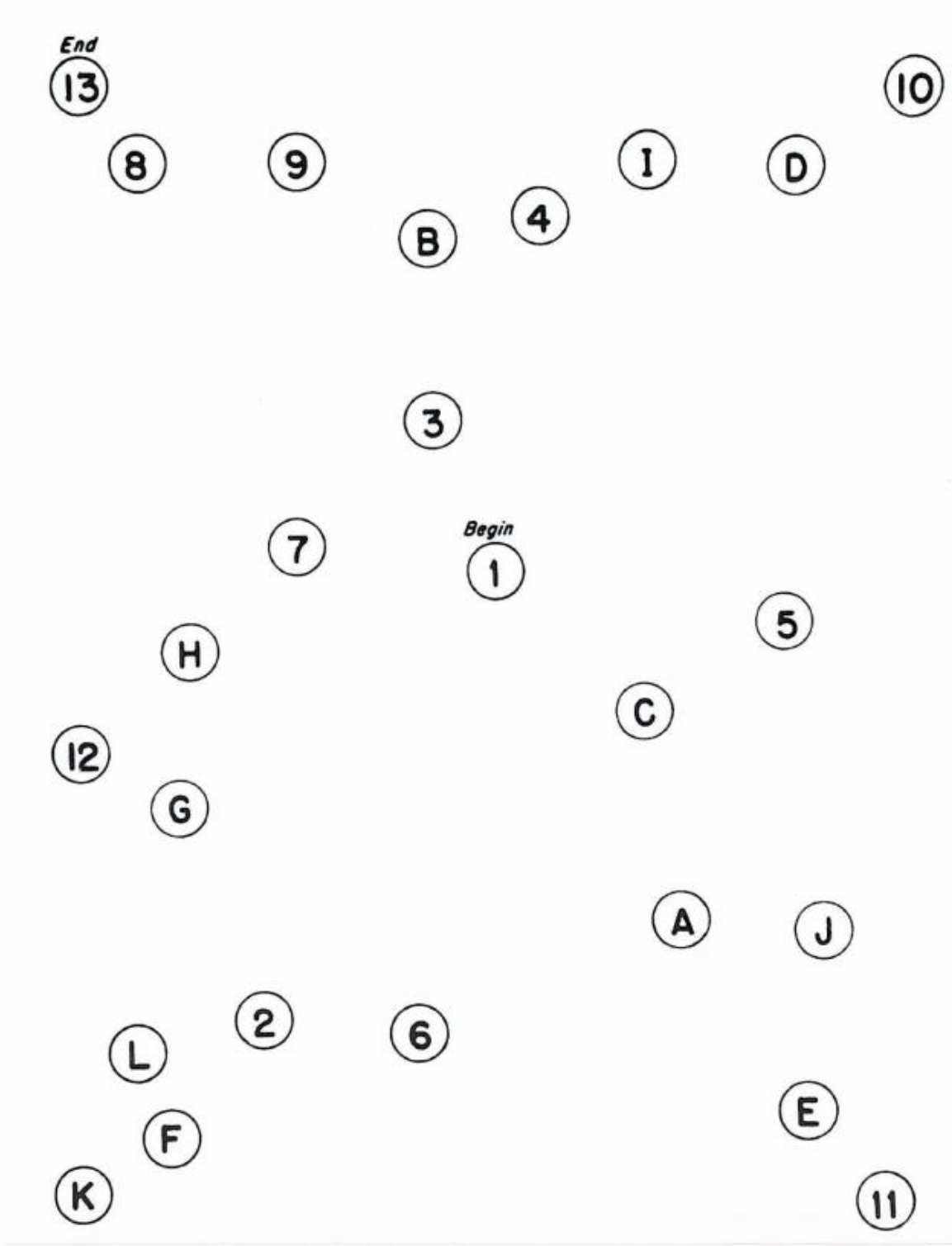
MEMORY	Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.		FACE	VELVET	CHURCH	DAISY	RED	No points
		1st trial						
		2nd trial						
ATTENTION	Read list of digits (1 digit/ sec.).	Subject has to repeat them in the forward order [ ] 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 [ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B								___/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 ≥ 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

© Z.Nasreddine MD **www.mocatest.org** Normal ≥26 / 30 TOTAL ___/30

Administered by: _____ Add 1 point if ≤ 12 yr edu

Participant Assessment Form




End
13
10
8
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L
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F
K
11

Situational Driving Frequency Scale (SDF)

Based on your present lifestyle, on average **how often** do you drive….?
Check one box for each situation.

	Never	Rarely Less than once a month	Occasionally More than once a month, but not weekly	Often 1 - 3 days a week	Very Ofte 4 - 7 days a week
1. In the winter?	☐	☐	☐	☐	☐
2. At night?	☐	☐	☐	☐	☐
3. On two-lane highways?	☐	☐	☐	☐	☐
4. In rural areas?	☐	☐	☐	☐	☐
5. On highways with 3 or more lanes?	☐	☐	☐	☐	☐
6. Over the posted highway speed limit?	☐	☐	☐	☐	☐
7. On one-way trips lasting over 2 hours?	☐	☐	☐	☐	☐
8. In heavy traffic or rush hour in town?	☐	☐	☐	☐	☐
9. In heavy traffic or rush hour on the highway?	☐	☐	☐	☐	☐
10. With passengers?	☐	☐	☐	☐	☐
11. Outside your village, town or city?	☐	☐	☐	☐	☐
12. In new or unfamiliar areas?	☐	☐	☐	☐	☐
13. Making left hand turns at intersections?	☐	☐	☐	☐	☐
14. Parking in tight spaces?	☐	☐	☐	☐	☐

Situational Driving Avoidance Scale (SDA)

If possible, do you **try to avoid** any of these driving situations?
(*Check all that apply.*)

1. Night	☐
2. Dawn or dusk	☐
3. Bad weather conditions (in general)	☐
4. Heavy rain	☐
5. Fog	☐
6. Nighttime driving in bad weather (e.g., heavy rain)	☐
7. Winter	☐
8. First snow storm of the season	☐
9. Trips lasting more than 2 hours (one way)	☐
10. Unfamiliar routes (different areas) or detours	☐
11. Heavy traffic or rush hour in town	☐
12. Heavy traffic or rush hour on the highway (or expressway)	☐
13. Making left hand turns with traffic lights	☐
14. Making left hand turns with no lights or stop signs	☐
15. Parking in tight spaces	☐
16. Highways with 3 or more lanes and speed limits of 100 km/h or more	☐
17. Changing lanes on a highway with 3 or more lanes	☐
18. Two-lane highways	☐
19. Rural areas at night	☐
20. Driving with passengers who may distract you	☐
21. No: I don't try and avoid any of these situations	☐

Perceived Driving Abilities Scale (PDA)

How would you rate your **current ability** to…..?
Assume daytime driving unless specified otherwise (night).

	Poor	Fair	Good	Very Good
1. See road signs at a distance	☐	☐	☐	☐
2. See road signs at a distance (night)	☐	☐	☐	☐
3. See your speedometer and controls	☐	☐	☐	☐
4. See pavement lines (at night)	☐	☐	☐	☐
5. Avoid hitting curbs or medians	☐	☐	☐	☐
6. See vehicles coming up beside you	☐	☐	☐	☐
7. See objects on the road (at night) with glare from lights or wet roads	☐	☐	☐	☐
8. Quickly spot pedestrians stepping out from between parked cars	☐	☐	☐	☐
9. Move your foot quickly from the gas to the brake pedal	☐	☐	☐	☐
10. Make an over the shoulder check	☐	☐	☐	☐
11. Quickly find a street or exit in an unfamiliar area and heavy traffic	☐	☐	☐	☐
12. Get in and out of your car	☐	☐	☐	☐
13. Reverse or back up	☐	☐	☐	☐
14. Make quick driving decisions	☐	☐	☐	☐
15. Drive safely (avoid accidents)	☐	☐	☐	☐

Driving Comfort Scales

DCS - Day

Please rate your level of comfort by choosing one option from the scale (0, 25, 50, 75 or 100 %) and checking the box beside each situation.

If you do not normally drive in the situation, imagine how comfortable you would be if you absolutely had to go somewhere and found yourself in the situation.

In your ratings, consider confidence in your own abilities and driving skills, as well as the situation itself (including other drivers).

Assume **normal traffic flow** unless otherwise specified.

'How **comfortable** are you driving in the **daytime**…?'

Comfort Level	**Not confident** **0%**	**25%**	**Moderately Comfortable** **50%**	**75%**	**Completely Comfortable** **100%**
1. In light rain?	☐	☐	☐	☐	☐
2. In heavy rain?	☐	☐	☐	☐	☐
3. In winter conditions (snow,ice)?	☐	☐	☐	☐	☐
4. If caught in an unexpected or sudden storm?	☐	☐	☐	☐	☐
5. Making a left hand turn with no lights or stop signs?	☐	☐	☐	☐	☐

~ Please continue on next page ~

Comfort Level	Not confident 0%	25%	Moderately Comfortable 50%	75%	Completely Comfortable 100%
6. Pulling in or backing up from tight spots in parking lots with large vehicles on either side?	☐	☐	☐	☐	☐
7. Seeing street or exit signs with little warning?	☐	☐	☐	☐	☐
8. On two lane highways?	☐	☐	☐	☐	☐
9. Keeping up with the flow of highway traffic when the flow is over the posted speed limit of 100 km/h (60 miles/h)?	☐	☐	☐	☐	☐
10. With multiple transport trucks around you?	☐	☐	☐	☐	☐
11. When other drivers tailgate or drive too close behind you?	☐	☐	☐	☐	☐
12. When other drivers pass on a non-passing lane?	☐	☐	☐	☐	☐
13. When other drivers do not signal or seem distracted?	☐	☐	☐	☐	☐

~ Please continue on next page ~

Now we would like you to rate your level of comfort when driving in the following situations **at night**.

Even if you **do not normally drive at night**, imagine that you were out in the afternoon, got delayed and it was dark on your way back.

In your ratings, consider confidence in your own abilities and driving skills, as well as the situation itself (including other drivers).

DCS - Night

'How **comfortable** are you driving **at night** …?'

Comfort Level	**Not confident** **0%**	**25%**	**Moderately Comfortable** **50%**	**75%**	**Completely Comfortable** **100%**
1. In good weather and traffic conditions?	☐	☐	☐	☐	☐
2. In light rain?	☐	☐	☐	☐	☐
3. In heavy rain?	☐	☐	☐	☐	☐
4. In winter conditions (snow,ice)?	☐	☐	☐	☐	☐
5. When there is glare of reflection from lights?	☐	☐	☐	☐	☐
6. In unfamiliar routes (different areas), detours or sign changes?	☐	☐	☐	☐	☐
7. Making a left hand turn with no lights or stop signs?	☐	☐	☐	☐	☐

~ Please continue on next page ~

Comfort Level	Not confident 0%	25%	Moderately Comfortable 50%	75%	Completely Comfortable 100%
8. Pulling in or backing up from tight spots in parking lots with large vehicles on either side?	☐	☐	☐	☐	☐
9. Seeing street or exit signs with little warning?	☐	☐	☐	☐	☐
10. On two lane highways?	☐	☐	☐	☐	☐
11. Keeping up with the flow of highway traffic when the flow is <u>over</u> the posted speed limit of 100 km/h (60 miles/h)?	☐	☐	☐	☐	☐
12. With multiple transport trucks around you?	☐	☐	☐	☐	☐
13. Merging with traffic and changing lanes on the highway?	☐	☐	☐	☐	☐
14. When other drivers tailgate or drive too close behind you?	☐	☐	☐	☐	☐
15. When other drivers pass on a non-passing lane?	☐	☐	☐	☐	☐
16. When other drivers do not signal or seem distracted?	☐	☐	☐	☐	☐

Transportation Use Questionnaire

1. By checking the boxes below, please indicate **how often** you use each type of transportation to travel outside the Village.

Type of Transport	Frequently (weekly or more)	Sometimes (a few times per month)	Rarely (less than once a month)	Never
a) passenger in vehicle	☐	☐	☐	☐
b) public bus	☐	☐	☐	☐
c) taxi	☐	☐	☐	☐
d) paratransit	☐	☐	☐	☐
e) motorized scooter	☐	☐	☐	☐
f) motorized wheelchair	☐	☐	☐	☐
g) Village shuttle bus	☐	☐	☐	☐

2. If you receive rides from others in their vehicles, please indicate who drives. (check **all** that apply if you receive rides from more than one individual)

☐ spouse ☐ son ☐ daughter ☐ son-in-law ☐ daughter-in-law

☐ adult grandchild ☐ sibling ☐ other family member

☐ friend living in the Village ☐ friend living outside the Village

☐ volunteer drivers (e.g., from church or other community groups or agencies)

☐ not applicable, I don't receive rides from others

Please continue on next page…

3. Do you have any concerns or reservations about taking **taxis**? (Check **all** that apply.)

☐ No ☐ Yes. If yes, please check which concerns you have below.

☐ cost ☐ safety (do not know the driver) ☐ fear of robbery
☐ inconvenience (e.g., may need to wait or pay for multiple stops)
☐ cleanliness
☐ other (specify): _____

4. Do you have any concerns or reservations about taking **public transit**?

☐ No ☐ Yes. If yes, please check which concerns you have below.

☐ cost
☐ inconvenience (location of bus stops, wait times, routes)
☐ safety concerns
☐ walking distance (to and from bus stops)
☐ waiting for the bus in bad weather
☐ other (specify): _____

5. Do you have any concerns or reservations about taking the **Village bus**?

☐ No ☐ Yes. If yes, please check which concerns you have below.

☐ the bus does not go where I want to go
☐ have to sign-up too far in advance
☐ trips are not frequent enough
☐ Other (specify): _____

Services & Amenities Checklist

1. Please check the **services and amenities** you used over the **last month**:

☐ Hair salon

☐ Spa (manicure/pedicure etc.)

☐ General store

☐ Village café

☐ On-site library

☐ On-site banking services

☐ On-site optometry services

☐ On-site dental services

☐ On-site laboratory services

☐ Massage therapy

☐ Physiotherapy

☐ Physician

☐ Wellness coordinator

☐ Martin's restaurant. For lunch? ☐ For dinner? ☐

2. Did you purchase any other services from the Village in the past month? (e.g., cleaning)

☐ No ☐ Yes If yes, please list: _____

3. Did you receive services from other agencies? (e.g. home care, grocery delivery)

☐ No ☐ Yes If yes, describe the services you purchase on a regular basis:

_____

Please continue on the next page

4. Check the types of **organized Village group activities** you regularly participate in.

☐ Religious Services

☐ Arts and Crafts (e.g., knitting, crafts, baking, etc)

☐ Games (e.g., bridge, bingo, shuffleboard or computer classes)

☐ Music, Theatre, or Concerts

☐ Special Events outside the Village (e.g., symphony, theatre, picnics)

☐ Physical Activity Classes (e.g., Tai Chi, Yoga, strength training, Wii, walk groups, line dancing),

If so, how many times in the **last week?** _____(#)

5. How would you describe your **sense of belonging** to the Village community?

☐ very strong ☐ somewhat strong ☐ somewhat weak ☐ very weak

Activities Outside the Village Questionnaire

1. Please go through the list of groups below and check the boxes on the left for those you belong to. For the groups you belong to please indicate on the right if you attend regularly.

Check if you belong to any of the groups below:	Attend regularly? YES	NO
☐ Sports-related group (such as a golf club, fitness centre, bowling team)	☐	☐
☐ Recreation, hobby or special interest group (such as quilting or bridge club)	☐	☐
☐ Cultural or educational group (such as book club, theatre group, lecture series)	☐	☐
☐ Service club or fraternal organization (such as Kiwanis, Knights of Columbus, the Legion, Kin Canada (Kinsman or Kinettes)	☐	☐
☐ Religious-affiliated group NOT including services (such as bible study, choir)	☐	☐
☐ Political party or group	☐	☐

2. Below is a list of various types of activities outside the Village. Please check the boxes for the ones you did in the **past month**.

☐ Shopping or errands		
☐ Ate at a restaurant	☐ Alone	☐ With others
☐ Ate at someone's home		
☐ Went to a movie, theatre or concert	☐ Alone	☐ With others
☐ Went to a sporting event / casino / racetrack etc.	☐ Alone	☐ With others
☐ Went to an educational event	☐ Alone	☐ With others
☐ Went to church, temple or synagogue	☐ Alone	☐ With others
☐ Volunteer work in the community	If **yes**, about how many hours/month? ___	
☐ Full day outings	☐ Overnight trips	
☐ Trips out of province	☐ Trips out of the country	

3. Since you moved to the Village, would you say that your involvement in community-based activities has…

☐ Increased ☐ Stayed the same ☐ Decreased

4. Overall, how **connected** to do you feel to the outside community?

☐ Very well connected ☐ Moderately connected ☐ Not well connected

5. Indicate how often you stay in touch with family and friends who live **outside the Village** through each of the following?

	At least once/week	Few times a month	Infrequently (less than once/month)	Never
They visit me at the Village	☐	☐	☐	☐
I visit them at their home	☐	☐	☐	☐
We get together at a restaurant or other location in town	☐	☐	☐	☐
We talk on the phone	☐	☐	☐	☐
We get in touch by e-mail	☐	☐	☐	☐

6. Since you moved to the Village, would you say that the **size of your social network** (number of family/friends you have regular contact with)…

☐ Increased ☐ Stayed the same ☐ Decreased

7. When was the last time you left the Village for any reason?

☐ In the last week ☐ In the last month ☐ In the last 3 months ☐ Don't Recall

Thank you for completing this questionnaire.
Please let us know if any of the questions were not clear.

Final Interview

Part A: Review of Travel Diaries

Go through the travel diaries while they are doing the questionnaires. Make notes on what was missing. Ask the participant about anything missing (i.e., blank travel diaries for certain days: confirm 0 trips) or incomplete. Ask whether they had any difficulty completing the diaries & logs.

Looking at your travel diaries:

1. Would you say that your travel patterns (# of trips outside the Village when you did not drive) over the last two weeks were **fairly typical?**

   ____ Yes ____ No, I took more trips than usual ___ No, fewer trips that usual

2. Do you usually use these modes of travel? ____ Yes ____ No
   If no, explain what was different:

   _____

3. Were there any special circumstances (e.g., illness) events (e.g., birthdays or appointments) or cancellations in the past two weeks that may have affected your usual travel patterns?

   _____

Part B: Driving experiences over the monitoring period

1. How about your driving? Would you say that you drove:
   ___ more than usual ___ less than usual? Or ___ about the same amount

Prompt: any special circumstances or events that caused you to drive more (or less) than usual?

Prompt: was weather a factor? Did you cancel or postpone any trips you planned to make?

2. Would you say that the last two weeks were fairly typical in terms of your usual driving (e.g., how much, when and where, and # of passengers)?

   ☐ Yes ☐ No *Prompt: what was unusual?*

3. Over the last two weeks, did you experience any vehicle or driving problems?
   Probes: car broke down, accidents involving other vehicles, near misses?

4. Do you feel having the devices in your vehicle affected your driving behaviour in any way?

   ☐ No ☐ Yes How so?

5. Did you drive any other vehicles (other than the one equipped) in the past two weeks?

   ☐ No ☐ Yes If yes, approximately how often? _____
   Relationship to the owner of the other vehicle: _____

Part C: Driving Restrictions & Thoughts on Transitioning to Non-driving

1. Generally speaking, what are the kinds of events/activities you might cancel or postpone if you did not feel like driving (e.g., when you are tired or the weather or road conditions are not good)?

_____

_____

_____

2. Most people eventually stop driving. What kinds of things might lead you to stop driving?

(*Could refer back to Ques. 6, 18-20 in DHHQ)*

_____

_____

_____

3. If you were no longer able to drive, what aspect of your life would be affected the most?

_____

_____

4. Do you feel you have the resources and support that you need when you eventually make the decision to stopping driving? ☐ Yes ☐ No
If **no**, what kind of resources/support might the Village provide?

_____

_____

_____

Part D: Ridesharing experience with other residents

1. Do you ever give rides in your car to other residents in the Village? ☐ Yes ☐ No

   If yes, about how often? _____

2. Do you ever get rides from other residents in their car?

   ☐ Yes ☐ No

   If yes, about how often? _____ More than one person? ☐ Yes ☐ No

If **no**, do you feel you could ask another resident for a ride if needed? ☐ Yes ☐ No

3. *If yes to both*, is this reciprocal (i.e., with the same people), meaning that sometimes you drive and sometimes they drive? "Take turns" ☐ Yes ☐ No

4. (*whether they do this themselves or not)* Do you see any advantages to sharing rides with other residents? (e.g., save gas) Any disadvantages?

_____

_____

_____

5. Do you think ridesharing would be something that might appeal to other residents?

_____

6. Do you think that family members may also be interested in taking turns driving multiple residents say to the same mall or to the same church?

_____

7. Any ideas how people might arrange to share rides and how the Village may help organize?

Part E: Other Comments on LV Transportation Supports

We asked on the transportation questionnaire how often you use the Village bus. Can you tell me if you use it: 1) frequently (weekly or more), 2) sometimes (few times/mo), 3) rarely (less than once a month) or 4) never?

Prompt accordingly: If 1 or 2: what types of outings do you enjoy most?
If 3 or 4: any particular reasons why?

_____

_____

_____

Do you have any suggestions for how the Village might improve this Village Bus service?

_____

_____

_____

Do you have any other suggestions for how the Village might better meet your transportation needs and those of other residents, particularly those who no longer drive?

_____

_____

_____

Appendix G: Normality of Variables

Variable	Normally Distributed	Shapiro-Wilk Value
Age	YES	0.209
Education	NO	0.000
Marital Status	NO	0.000
# diagnosed conditions	NO	0.001
Difficulty Score	NO	0.000
VPS	NO	0.046
GDS-15	NO	0.000
GDS-5	NO	0.000
ABC - 20	NO	0.000
ABC - 27	NO	0.000
ABC - 16	NO	0.000
DCS-D	YES	0.435
DCS-N	YES	0.235
Community Engagement Score	YES	0.052
Physical Activity Frequency Score	NO	0.000
SDA	NO	0.002
SDF	YES	0.710
MoCA	YES	0.118
Trails B	NO	0.000
RPW	NO	0.042
Contrast Sensitivity Score	NO	0.000
Number of Servces	NO	0.048
Days Driven	YES	0.463
Trips	NO	0.020
Stops	NO	0.007
Distance	NO	0.000
Duration	NO	0.000
Days/weekday	NO	0.048
Driving duration weekday	NO	0.001
Weekday KM by trip	NO	0.000
Days/weekend	NO	0.001
Duration weekend	NO	0.000
Nights Driven	NO	0.000
Night Trips	NO	0.000
Night Duration	NO	0.000
Maximum Radius	NO	0.000
Average Radius	NO	0.000
Travel Diaries		
# of trips in 2 weeks	NO	0.000
walking trips	NO	0.000
Passenger	NO	0.000
Public Bus	NO	0.000

Appendix H: Additional Results

Table H1: Additional Results from the Background Questionnaire

	SV Total Sample (N=27)	LV Total Sample (N=28)
Years ago retired		n=25
	21.71 ± 6.04	19.56 ± 8.05
	11 to 37	6 to 36
If married, spouse lives	n=7	n=19
Same room/housing	6 (85.7)	18 (94.7)
In another part of Village	1 (14.3)	0 (0)
In house etc. in the same city	0 (0)	1 (5.3)
In house etc. in another city	0 (0)	0 (0)
In another type of housing	0 (0)	0 (0)
If married, spouse still drives	n=7	n=19
Yes	2 (28.6)	12 (63.2)
No	5 (71.4)	7 (36.8)
Relatives in the area (within 15 km)	n=25	
Yes	19 (76.0)	14 (50)
No	6 (24.0)	14 (50)
Before move, housing type	n=26	
House or townhouse	17 (65.4)	24 (85.7)
Single level	*8 (57.1)*	*7 (31.8)*
Multi-level	*6 (42.9)*	*15 (68.2)*
Apartment or condo	8 (30.8)	4 (14.3)
Another retirement complex	1 (3.8)	0 (0)
Diagnosed with		
Arthritis	11 (40.7)	15 (53.6)
Osteoporosis	4 (14.8)	3 (10.7)
Diabetes	2 (7.4)	1 (3.6)
Parkinson's	0 (0)	2 (7.1)
Stroke	2 (7.4)	4 (14.3)
Hearing problems	8 (29.6)	8 (28.6)
Multiple Sclerosis	0 (0)	0 (0)
High blood pressure, cholesterol, heart problems	17 (63.0)	16 (57.1)
Glaucoma	3 (11.1)	1 (3.6)
Macular degeneration	3 (11.1)	3 (10.7)
Cataracts (even if repaired)	19 (70.4)	13 (46.4)
Taking prescription medications		
Yes	25 (92.6)	27 (96.4)
No	2 (7.4)	1 (3.6)

	SV Total Sample (N=27)	LV Total Sample (N=28)
Prescription glasses for driving		
All the time	20 (74.1)	21 (75.0)
Sometimes	3 (11.1)	2 (7.1)
Never	4 (14.8)	5 (17.9)
Difficulties experienced		
Staying awake or remaining alert	1 (3.7)	0 (0)
Keeping your balance	5 (18.5)	4 (14.3)
Initiating movement	2 (7.4)	5 (17.9)
Persistent pain	3 (11.1)	3 (10.7)
Limited strength or movement	9 (33.3)	6 (21.4)

Note: values are frequencies (valid %) and mean ± SD and range. Missing data is indicated by n's for each variable.

Table H2: Additional Results from the DHHQ

	SV Total Sample (N=27)	SV Males (n=12)	SV Females (n=15)	LV Total Sample (N=28)	LV Males (n=15)	LV Females (n=13)
1. Age obtained Drivers License	n=26 24.00 ± 8.47 16 to 46	n=11 20.45 ± 8.75 16 to 46	n=15 26.60 ± 7.51 16 to 44	18.68 ± 6.26 15 to 47	19.13 ± 8.04 15 to 47	18.15 ± 3.48 16 to 28
2. Commuted 1 hour to work	n=26	n=12	n=13			
No	18(69.2)	7 (58.3)	11(78.6)	24(85.7)	14(93.3)	10(76.9)
Yes	8 (30.8)	5 (41.7)	3 (21.4)	4 (14.3)	1 (6.7)	3 (23.1)
Before the move to the Village						
3. Other drivers in household	n=26	n=11	n=15			
No	11(40.7)	5 (41.7)	6 (40.0)	1 (3.6)	1 (6.7)	0 (0)
Yes	16(59.3)	7 (58.3)	9 (60.0)	27(96.4)	14(93.3)	13 (100)
3. If yes, who:	n=16	n=7	n=9	n=27	n=14	n=13
Spouse	13(81.3)	6 (85.7)	7 (77.8)	27 (100)	14 (100)	13 (100)
Other	3 (18.8)	1 (14.3)	2 (22.2)	0 (0)	0 (0)	0 (0)
4. Rely on for drive						
No	9 (33.3)	3 (25.0)	6 (40.0)	21(75.0)	13(86.7)	8 (61.5)
Yes	18(66.7)	9 (75.0)	9 (60.0)	7 (25.0)	2 (13.3)	5 (38.5)
6. Consider giving up license						
No	26(96.3)	11(91.7)	15 (100)	27(96.4)	14(93.3)	13 (100)
Yes	1 (3.7)	1 (8.3)	0 (0)	1 (3.6)	1 (6.7)	0 (0)
6. Regardless, glad kept driving	n=24	n=11	n=13			
No	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Yes	24 (100)	11 (100)	13 (100)	28 (100)	15 (100)	13 (100)
Current Driving Abilities						
8. Compared to 10 yrs						
Drive much less often	13(48.1)	5 (41.7)	8 (53.3)	7 (25.0)	4 (26.7)	3 (23.1)
Drive a little less	11(40.7)	5 (41.7)	6 (40.0)	11(39.3)	6 (40.0)	5 (38.5)
Drive the same	3 (11.1)	2 (16.7)	1 (6.7)	7 (25.0)	4 (26.7)	3 (23.1)
Drive more often	0 (0)	0 (0)	0 (0)	3 (10.7)	1 (6.6)	2 (15.3)

	SV Total Sample (N=27)	SV Males (n=12)	SV Females (n=15)	LV Total Sample (N=28)	LV Males (n=15)	LV Females (n=13)
15. Worry about car expenses						
Often	5 (18.5)	2 (16.7)	3 (20.0)	1 (3.6)	0 (0)	1 (7.7)
Sometimes	8 (29.6)	4 (33.3)	4 (26.7)	10(35.7)	5 (33.3)	5 (38.5)
Rarely	10(37.0)	4 (33.3)	6 (40.0)	6 (21.4)	3 (20.0)	3 (23.1)
Never	4 (14.8)	2 (16.7)	2 (13.3)	11(39.3)	7 (46.7)	4 (30.7)
16. Servicing vehicle						
Myself	24(88.9)	12 (100)	12(80.0)	26(92.9)	14(93.3)	12(92.3)
Other	3 (11.1)	0 (0)	3 (20.0)	2 (7.1)	1 (6.7)	1 (7.7)
17. Change tires in winter						
No	22(81.5)	8 (66.7)	14(93.3)	21(75.0)	10(66.7)	11(84.6)
Yes	5 (18.5)	4 (33.3)	1 (6.7)	7 (25.0)	5 (33.3)	2 (15.4)
18. Discussed driving with:	n=25	n=13	n=12			
Eye care professional	6 (24.0)	4 (30.8)	2 (16.7)	7 (25.0)	3 (20.0)	4 (30.8)
Physician	3 (12.0)	2 (15.4)	1 (8.3)	6 (21.4)	5 (33.3)	1 (7.7)
Family members	11(44.0)	6 (46.2)	5 (41.7)	12(42.9)	7 (46.7)	5 (38.5)
Friends	5 (20.0)	1 (7.7)	4 (33.3)	4 (14.3)	2 (13.3)	2 (15.4)
Not applicable	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
19. Anyone suggest limiting driving						
No	25(92.6)	10(83.3)	15 (100)	28 (100)	15 (100)	13 (100)
Yes	2 (7.4)	2 (16.7)	0 (0)	0 (0)	0 (0)	0 (0)
19. If yes, who						
Family	2 (100)	2 (100)	0 (0)	-	-	-
Friends	0 (0)	0 (0)	0 (0)	-	-	-
Physician	0 (0)	0 (0)	0 (0)	-	-	-
Eye care professional	0 (0)	0 (0)	0 (0)	-	-	-
20. Thought about giving up driving (in a few years)						
No	11(40.7)	7 (58.3)	4 (26.7)	17(60.7)	8 (53.3)	9 (69.2)
Yes	16(59.3)	5 (41.7)	11(73.3)	11(39.3)	7 (46.7)	4 (30.8)

	SV Total Sample (N=27)	SV Males (n=12)	SV Females (n=15)	LV Total Sample (N=28)	LV Males (n=15)	LV Females (n=13)
21. Difficulty staying awake/alert when driving						
Often	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Sometimes	3 (11.1)	2 (16.7)	1 (6.7)	5 (17.9)	2 (13.3)	3 (23.1)
Never	24(88.9)	10(83.3)	14(93.3)	23(82.1)	13(86.7)	10(76.9)
22. Past few years, taken driving course	n=26	n=12	n=14			
No	23(88.5)	10(83.3)	13(92.9)	26(92.9)	14(93.3)	12(92.3)
Yes	3 (11.5)	2 (16.7)	1 (7.1)	2 (7.1)	1 (6.7)	1 (7.7)
23. Thoughts about mandatory process	n=26	n=11	n=14	n=22	n=14	n=8
It's a good idea	25(96.2)	11 (100)	14(93.3)	19(86.4)	13(92.9)	6 (75.0)
Don't want to go through it	1 (3.8)	0 (0)	1 (6.7)	3 (13.6)	1 (7.1)	2 (25.0)
24. Past yr problems						
Accidents						
No	24(88.9)	11(91.7)	13(86.7)	28 (100)	15 (100)	13 (100)
Yes	3 (11.1)	1 (8.3)	2 (13.3)	0 (0)	0 (0)	0 (0)
If yes, at fault						
No	2 (66.7)	0 (0)	2 (100)	0 (0)	0 (0)	0 (0)
Yes	1(33.3)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)
Near Misses	*n=24*	*n=11*	*n=13*			
No	21(87.5)	8 (72.7)	13 (100)	25(89.3)	14(93.3)	11(84.6)
Yes	3 (12.5)	3 (27.3)	0 (0)	3 (10.7)	1 (6.7)	2 (15.4)
Backing into things						
No	23(95.8)	11 (100)	12(92.3)	24(85.7)	13(86.6)	11(84.6)
Yes	1 (4.2)	0 (0)	1 (7.7)	4 (14.3)	2 (13.4)	2 (15.4)
Getting lost						
No	24 (100)	11 (100)	13 (100)	23(82.1)	14(93.3)	9 (69.2)
Yes	0 (0)	0 (0)	0 (0)	5 (17.9)	1 (6.7)	4 (30.8)
Traffic violation						
No	24 (100)	11 (100)	13 (100)	28 (100)	15 (100)	13 (100)
Yes	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

	SV Total Sample (N=27)	SV Males (n=12)	SV Females (n=15)	LV Total Sample (N=28)	LV Males (n=15)	LV Females (n=13)
25a.Asked by MTO for eye/medical exam	n=26	n=11	n=15			
No	23(88.5)	11 (100)	12(80.0)	24(85.7)	12(80.0)	12(92.3)
Yes	3 (11.5)	0 (0)	3 (20.0)	4 (14.3)	3 (20.0)	1 (7.7)
25b.Asked for road test	n=25	n=12	n=13			
No	20(80.0)	11(91.7)	9 (69.2)	26(92.9)	13(86.7)	13 (100)
Yes	5 (20.0)	1 (8.3)	4 (30.8)	2 (7.1)	2 (13.3)	0 (0)
25c.Asked for driving assessment	n=24	n=11	n=13			
No	23(95.8)	11 (100)	12(92.3)	27(96.4)	14(93.3)	13 (100)
Yes	1 (4.2)	0 (0)	1 (7.7)	1 (3.6)	1 (6.7)	0 (0)
26. Main reasons to drive						
Shopping/errands	27 (100)	12 (100)	15 (100)	28 (100)	15 (100)	13 (100)
Going to appointments	26(96.3)	12 (100)	14(93.3)	26(92.9)	14(93.3)	12(92.3)
Visit family/friends	22(81.5)	11(91.7)	11(73.3)	25(89.3)	14(93.3)	11(84.6)
To religious services	15(55.6)	5 (41.7)	10(66.7)	12(42.9)	7 (46.7)	5 (38.5)
Recreational/Social	16(59.3)	9 (75.0)	7 (46.7)	16(57.1)	9 (60.0)	7 (53.8)
Employment/Volunteer	2 (7.4)	1 (8.3)	1 (6.7)	8 (28.6)	4 (26.7)	4 (30.8)
27. Driving Importance						
Extremely important	9 (33.3)	5 (41.7)	4 (26.7)	8 (28.6)	3 (20.0)	5 (38.5)
Very important	11(40.7)	4 (33.3)	7 (46.7)	15(53.6)	9 (60.0)	6 (46.2)
Moderately important	6 (22.2)	2 (16.7)	4 (26.7)	4 (14.3)	2 (13.3)	2 (15.3)
Somewhat important	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Not that important	1 (3.7)	1 (8.3)	0 (0)	1 (3.5)	1 (6.7)	0 (0)
28. Reasons to Drive Score	n=24	n=11	n=13			
Maintain lifestyle	1.63 ± .924	1.55 ± 0.69	1.69 ± 1.11	1.86 ± 0.97	2.20 ± 1.08	1.46 ± 0.97
Maintain freedom	1.67 ± 1.05 *n=23*	1.55 ± 0.93 *n=11*	1.77 ± 1.17 *n=12*	2.04 ± 1.14	2.40 ± 1.18	1.62 ± 0.96
Meet commitments	3.70 ±	3.64 ±	3.75 ±	3.21 ±	3.53 ±	2.85 ±

	1.64 *n=22*	1.63 *n=10*	1.71 *n=12*	1.64	1.69	1.57
Poor public transport	3.00 ± 1.45 *n=23*	2.70 ± 1.49 *n=10*	3.25 ± 1.42 *n=13*	3.64 ± 1.42	3.60 ± 1.55	3.69 ± 1.32
To drive others	3.61 ± 1.67	3.50 ± 1.96	3.69 ± 1.49	3.50 ± 1.45	3.67 ± 1.50	3.31 ± 1.44
Not bothering others	2.58 ± 1.53	2.82 ± 1.66	2.38 ± 1.45	3.82 ± 1.28	3.80 ± 1.37	3.85 ± 1.21
Physical difficulty	3.88 ± 1.65	3.91 ± 1.58	3.85 ± 1.77	4.29 ± 1.24	4.07 ± 1.34	4.54 ± 1.13

Note: values are frequencies (valid %) and mean ± SD and range. Missing data is indicated by n's for each variable.

Table H3: GDS-15 Item Scores

GDS Items	SV Total Sample (N=27)	LV Total Sample (N=28)
Satisfied with life	n=26	
No	**2 (7.7)**	**0 (0)**
Yes	24 (92.3)	28 (100.0)
Dropped activities	n=25	
No	20 (80.0)	22 (78.6)
Yes	**5 (20.0)**	**6 (21.4)**
Life is empty	n=26	
No	25 (96.2)	26 (92.9)
Yes	**1 (3.8)**	**2 (7.1)**
Bored	n=26	
No	24 (92.3)	25 (89.3)
Yes	**2 (7.7)**	**3 (10.7)**
Good spirits	n=26	
No	**0 (0)**	**1 (3.6)**
Yes	26 (100)	27 (96.4)
Afraid something bad will happen	n=26	
No	24 (92.3)	27 (96.4)
Yes	**2 (7.7)**	**1 (3.6)**
Feel happy	n=26	
No	**0 (0)**	**0 (0)**
Yes	26 (100.0)	28 (100.0)
Feel helpless	n=26	
No	25 (96.2)	25 (89.3)
Yes	**1 (3.8)**	**3 (10.7)**
Prefer to stay at home	n=26	
No	19 (73.1)	19 (67.9)
Yes	**7 (26.9)**	**9 (32.1)**
Problems with memory	n=26	
No	26 (100.0)	27 (96.4)
Yes	**0 (0)**	**1 (3.6)**
Wonderful to be alive	n=26	
No	**2 (7.7)**	**1 (3.6)**
Yes	24 (92.3)	27 (96.4)
Are worthless	n=26	
No	25 (96.2)	28 (100.0)
Yes	**1 (3.8)**	**0 (0)**

GDS Items	SV Total Sample (N=27)	LV Total Sample (N=28)
Full of energy	n=26	
No	**12 (46.2)**	**11 (39.3)**
Yes	14 (53.8)	17 (60.7)
Situation is hopeless	n=26	
No	26 (100.0)	28 (100.0)
Yes	**0 (0)**	**0 (0)**
Most people better than me	n=26	
No	25 (96.2)	28 (100.0)
Yes	**1 (3.8)**	**0 (0)**
Total score	1.31 ± 1.38	1.82 ± 1.46
Normal (0 to 5)	26 (100.0)	28 (100.0)
Depression suspected (5 to 10)	0 (0)	0 (0)

Note: values are frequencies (valid %) and mean ± SD and range. Missing data is indicated by n's for each variable. **Bold** response is used to calculate possible depressive symptoms. One person (SV) did not complete the entirety of the GDS scale.

Table H4: VPS Item Scores

VPS Items	SV Total Sample (N=27)	LV Total Sample (N=28)
Time till asleep	4.19 ± .90 2 to 5	3.93 ± 1.18 1 to 5
Sleep quality	4.08 ± .86 2 to 5	3.79 ± 1.03 1 to 5
Degree of sleepiness during the day	3.60 ± .91 1 to 5	3.50 ± 0.84 1 to 5
Quality of appetite	4.00 ± 1.20 1 to 5	4.46 ± 0.64 3 to 5
Level of constipation	3.68 ± 1.63 1 to 5	4.14 ± 1.24 1 to 5
Presence aches and pains	3.42 ± 1.17 1 to 5	3.57 ± 0.88 2 to 5
Energy level	3.76 ± .66 3 to 5	3.39 ± 0.79 2 to 5
Stiffness level	3.96 ± .92 2 o 5	3.50 ± 1.14 1 to 5
Level of relaxation	3.92 ± 1.32 1 to 5	4.14 ± 0.71 2 to 5
General wellness feeling	4.36 ± .70 3 to 5	4.21 ± 0.83 2 to 5

Note: values are mean ± SD and range.

Table H5: MoCA Individual Components

MoCA Scores	SV Sample (n=27)	LV Sample (n=28)	Whole Sample (N=55)		
			Males (n=27)	Females (n=28)	Total (N=55)
Trails B /1	n=24	n=26	n=24	n=26	n=50
0/1	7 (29.2)	1 (3.8)	3 (12.5)	5 (19.2)	8 (16.0)
1/1	17 (70.8)	25 (96.2)	21 (87.5)	21 (80.8)	42 (84.0)
Draw Cube /1	n=24	n=26	n=24	n=26	n=50
0/1	21 (87.5)	15 (57.7)	18 (75.0)	18 (69.2)	36 (72.0)
1/1	3 (12.5)	11 (42.3)	6 (25.0)	8 (30.8)	14 (28.0)
Draw Clock /3	n=24	n=26	n=24	n=26	n=50
0/3	3 (12.5)	0 (0)	2 (8.3)	1 (3.8)	3 (6.0)
1/3	5 (20.8)	7 (26.9)	7 (29.2)	5 (19.2)	12 (24.0)
2/3	8 (33.3)	8 (30.8)	7 (29.2)	9 (34.2)	16 (32.0)
3/3	8 (33.3)	11 (42.3)	8 (33.3)	11 (42.3)	19 (38.0)
Naming /3	n=24	n=26	n=24	n=26	n=50
0/3	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1/3	1 (4.2)	0 (0)	0 (0)	1 (3.8)	1 (2.0)
2/3	5 (20.8)	7 (26.9)	8 (33.3)	4 (15.4)	12 (24.0)
3/3	18 (75.0)	19 (73.1)	16 (66.7)	21 (80.8)	37 (74.0)
Visuospatial Score	n=24 5.42 ± 1.59 3 - 8	n=26 6.27 ± 1.15 4 - 8	n=24 5.67 ± 1.47 3 - 8	n=26 6.04 ± 1.39 3 - 8	n=50 5.86 ± 1.43 3 - 8
Digit Lists /2	n=24	n=26	n=24	n=26	n=50
0/2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1/2	6 (25.0)	5 (19.2)	5 (20.8)	6 (23.1)	11 (22.0)
2/2	18 (75.0)	21 (80.8)	19 (79.2)	20 (76.9)	39 (78.0)
Letters /1	n=24	n=26	n=24	n=26	n=50
0/1	5 (20.8)	3 (11.5)	2 (8.3)	6 (23.1)	8 (16.0)
1/1	19 (79.2)	23 (88.5)	22 (91.7)	20 (76.9)	42 (84.0)
Subtraction	n=24	n=26	n=24	n=26	n=50
0 correct	1 (4.2)	1 (3.8)	1 (4.2)	1 (3.8)	2 (4.0)
1 correct	1 (4.2)	0 (0)	1 (4.2)	0 (0)	1 (2.0)
2/3 correct	6 (25.0)	2 (7.7)	4 (16.7)	4 (15.4)	8 (16.0)
4+ correct	16 (66.7)	23 (88.5)	18 (75.0)	21 (80.8)	39 (78.0)
Attention Score	n=24 5.04 ± 1.16 2 - 6	n=26 5.50 ± 0.86 2 - 6	n=24 5.29 ± 1.16 2 - 6	n=26 5.27 ± 0.92 2 - 6	n=50 5.28 ± 1.03 2 - 6

MoCA Scores	SV Sample (n=27)	LV Sample (n=28)	Whole Sample (N=55)		
			Males (n=27)	Females (n=28)	Total (N=55)
Sentence Repeat /2	n=24	n=26	n=24	n=26	n=50
0/2	1 (4.2)	5 (19.2)	5 (20.8)	1 (3.8)	6 (12.0)
1/2	14 (58.3)	9 (34.6)	9 (37.5)	14 (53.8)	23 (46.0)
2/2	9 (37.5)	12 (46.2)	10 (41.7)	11 (42.3)	21 (42.0)
Fluency /1	n=24	n=26	n=24	n=26	n=50
0/1	8 (33.3)	8 (30.8)	8 (33.3)	8 (30.8)	16 (32.0)
1/1	16 (66.7)	18 (69.2)	16 (66.7)	18 (69.2)	34 (68.0)
Language Score	n=24	n=26	n=24	n=26	n=50
	2.00 ± 0.78	1.96 ± 0.99	1.88 ± 0.99	2.08 ± 0.79	1.98 ± 0.89
	1 - 3	0 - 3	0 - 3	1 - 3	0 - 3
Abstraction Score /2	n=24	n=26	n=24	n=26	n=50
0/2	3 (12.5)	0 (0)	0 (0)	3 (11.5)	3 (6.0)
1/2	10 (41.7)	7 (26.9)	7 (29.2)	10 (38.5)	17 (34.0)
2/2	11 (45.8)	19 (73.1)	17 (70.8)	13 (50.0)	30 (60.0)
Delayed Recall No Clue	n=23	n=26	n=23	n=26	n=49
	3.35 ± 1.07	3.85 ± 1.38	3.52 ± 1.37	3.69 ± 1.58	3.61 ± 1.26
	1 - 5	0 - 5	0 - 5	1 - 5	0 - 5
Delayed Recall Needed a Clue	n=23	n=26	n=23	n=26	n=49
	1.22 ± 0.85	0.85 ± 1.19	1.04 ± 1.22	1.00 ± 0.89	1.02 ± 1.05
	0 - 3	0 - 5	0 - 5	0 - 3	0 - 5
Delayed Recall Multiple Choice	n=23	n=26	n=23	n=26	n=49
	0.43 ± 0.79	0.31 ± 0.68	0.43 ± 0.73	0.31 ± 0.74	0.37 ± 0.73
	0 - 2	0 - 3	0 - 2	0 - 3	0 -3
Memory Score	n=24	n=26	n=24	n=26	n=50
	3.35 ± 1.07	3.85 ± 1.38	3.52 ± 1.37	3.69 ± 1.58	3.61 ± 1.26
	1 - 5	0 - 5	0 - 5	1 - 5	0 - 5
Orientation Score	n=24	n=26	n=24	n=26	n=50
	5.79 ± 0.51	5.92 ± 0.27	5.96 ± 0.20	5.77 ± 0.51	5.86 ± 0.41
	4 - 6	5 - 6	5 - 6	4 - 6	4 - 6
Total Scores	n=24	n=26	n=24	n=26	n=50
	23.08 ± 2.7	25.46 ± 2.9	24.04 ± 2.7	24.58 ± 3.3	24.32 ± 3.0
	18 - 28	18 - 29	19 - 29	18-29	18 - 29
Normal (≥ 26)	3 (12.5)	17 (65.4)	8 (33.3)	12 (46.2)	20 (40.0)
MCI (<26)	21 (87.5)	9 (34.6)	16 (66.7)	14 (53.8)	30 (60.0)

Note: values are frequencies (valid %) and mean ± SD and range. Missing data is indicated by n's for each variable.

Table H6: ABC Scale Item Scores

ABC Items	SV Sample (N=27)	LV Sample (N=28)
1. walk around Village	n=26 99.04 ± 4.90 75 to 100	95.54 ± 9.75 75 to 100
2. walk around outside	n=25 89.00 ± 12.67 75 to 100	93.75 ± 11.02 75 to 100
3. walk outside (night)	n=25 72.00 ± 26.34 0 to 100	86.61 ± 25.89 0 to 100
4. bend over – pick up	87.96 ± 16.07 50 to 100	90.18 ± 14.17 50 to 100
5. walk up/down stairs	n=26 80.77± 22.70 0 to 100	78.57 ± 20.09 50 to 100
6. reach for item at eye level	93.52 ± 16.40 25 to 100	95.54 ± 9.75 75 to 100
7. stand on tip toes and reach	85.19 ± 19.93 25 to 100	984.82 ± 22.91 25 to 100
8. stand on chair and reach	n=26 60.58 ± 30.96 0 to 100	64.29 ± 33.63 0 to 100
9. get in/out of bathtub	85.19 ± 19.93 25 to 100	93.75 ± 12.96 50 to 100
10. sweep floor	n=26 88.46 ± 24.73 0 to 100	94.64 ± 14.20 50 to 100
11. walk outside to car	n=26 97.15 ± 8.15 75 to 100	97.32 ± 10.40 50 to 100
12. get in/out of car	95.37 ± 9.90 75 to 100	91.96 ± 16.74 25 to 100
13. walk across busy parking lot	n=26 86.54 ± 16.17 50 to 100	91.96 ± 18.07 25 to 100

ABC Items	SV Sample (N=27)	LV Sample (N=28)
14. walk up/down ramp	n=26 90.38 ±14.28 50 to 100	94.64 ± 12.47 50 to 100
15. walk in crowded mall	n=26 87.50 ± 14.58 50 to 100	91.96 ± 15.30 50 to 100
16. bumped by people in mall	n=24 81.25 ± 18.43 50 to 100	86.61 ± 20.95 0 to 100
17. step on/off escalator holding onto railing	n=26 87.50 ± 21.51 0 to 100	85.71 ± 14.32 50 to 100
18. walk down stairs/ramp carrying something	81.48 ± 22.57 0 to 100	78.57 ± 24.62 25 to 100
19. walk on icy sidewalks	49.07 ± 32.88 0 to 100	58.04 ± 25.51 25 to 100
20. walk outside (very windy)	75.00 ± 25.94 0 to 100	84.82 ± 20.79 25 to 100
21. walk in heavy rain with umbrella	n=26 62.50 ± 31.02 0 to 100	85.71 ± 20.89 25 to 100
22. walk uneven paths or sidewalks	67.59 ± 26.69 0 to 100	75.00 ± 23.57 25 to 100
23. step on/off sidewalk curb	n=26 79.81 ± 21.34 25 to 100	85.71 ± 20.89 25 to 100
24. get on/off bus	n=25 74.00 ± 27.46 0 to 100	87.50 ± 18.63 50 to 100
25. stand on moving bus/train	n=25 70.00 ± 25.00 25 to 100	77.68 ± 20.79 25 to 100
26. cross street at timed pedestrian intersection	n=25 83.00 ± 26.73 0 to 100	87.50 ± 19.84 25 to 100
27. cross street with no pedestrian crosswalk	n=25 64.00 ± 28.94 0 to 100	82.14 ± 26.27 0 to 100

Note: mean ± SD and range. Missing data is indicated by n's for each variable.

Table H7: Additional Results from the Transportation Use Questionnaire

	SV Total Sample (N=27)	LV Total Sample (N=28)
Concerns about taxi	n=25	n=26
No	20 (80.0)	18 (69.2)
Yes	5 (20.0)	8 (30.8)
If yes,		
Cost	4 (80.0)	5 (62.5)
Safety	1 (20.0)	1 (12.5)
Fear of robbery	0 (0)	0 (0)
Inconvenience	0 (0)	2 (25.0)
Cleanliness	1 (20.0)	0 (0)
Other	0 (0)	1 (12.5)
Concerns about public transit	n=24	n=26
No	18 (75.0)	19 (73.1)
Yes	6 (25.0)	7 (26.9)
If yes,		
Cost	0 (0)	0 (0)
Inconvenience	5 (83.3)	6 (85.7)
Safety concerns	0 (0)	1 (14.3)
Walking distance	2 (7.4)	3 (42.9)
Waiting for bus (bad weather)	5 (83.3)	5 (71.4)
Other	0 (0)	2 (28.6)
Concerns about village bus	n=25	n=26
No	23 (92.0)	23 (88.5)
Yes	2 (8.0)	3 (11.5)
If yes,		
Doesn't go where want it to	2 (100)	0 (0)
Sign-up too far in advance	1 (50.0)	0 (0)
Limited trip frequency	1 (50.0)	0 (0)
Other	0 (0)	3 (100.0)

Note: values are frequencies (valid %). Missing data is indicated by n's for each variable.

Table H8: Additional Results from the Village Service and Amenities Checklist

	SV Total Sample (N=27)	SV Males (n=12)	SV Females (n=15)	LV Total Sample (N=28)	LV Males (n=15)	LV Females (n=13)
Services/Amenities used over last month	n=25	n=11	n=14	n=26	n=13	n=13
Hair salon	15(60.0)	4 (36.4)	11 (78.6)	5 (19.2)	0 (0)	5 (38.5)
Spa	2 (8.0)	0 (0)	2 (14.3)	2 (7.7)	2 (15.4)	0 (0)
General store	13 (52.0)	4 (36.4)	9 (64.3)	15 (57.7)	8 (61.5)	7 (53.8)
Laundry facilities	5 (20.0)	2 (18.2)	3 (21.4)	N/A	N/A	N/A
On-site café	18 (72.0)	8 (72.7)	10 (71.4)	18 (69.2)	9 (69.2)	9 (69.2)
On-site library	14 (56.0)	5 (45.5)	9 (64.3)	13 (50.0)	6 (46.2)	7 (53.8)
On-site banking	1 (4.0)	0 (0)	1 (7.1)	5 (19.2)	3 (23.1)	2 (15.4)
On-site optometry	0 (0)	0 (0)	0 (0)	3 (11.5)	1 (7.7)	2 (15.4)
On-site dental	1 (4.0)	0 (0)	1 (7.1)	0 (0)	0 (0)	0 (0)
On-site pharmacy	2 (8.0)	0 (0)	2 (14.3)	N/A	N/A	N/A
On-site laboratory	N/A	N/A	N/A	2 (07.7)	1 (7.7)	1 (7.7)
Massage therapy	1 (4.0)	0 (0)	1 (6.7)	1 (3.8)	0 (0)	1 (7.7)
Physiotherapy	6 (24.0)	2 (18.2)	4 (28.6)	4 (15.4)	1 (7.7)	3 (23.1)
Kinesiologist	7 (28.0)	3 (27.3)	4 (28.6)	N/A	N/A	N/A
Physician	5 (20.0)	1 (9.1)	4 (28.6)	7 (26.9)	3 (23.1)	4 (30.8)
Nurse practitioner	6 (24.0)	3 (27.3)	3 (21.4)	N/A	N/A	N/A
Medication assistance	1 (4.0)	1 (9.1)	0 (0)	N/A	N/A	N/A
Bathing assistance	2 (8.0)	0 (0)	2 (14.3)	N/A	N/A	N/A
Meals in dining area:	16 (64.0)	7 (63.7)	9 (64.3)	N/A	N/A	N/A
One meal/day	*3 (12.0)*	*1 (9.1)*	*2 (14.3)*	N/A	N/A	N/A
Two meals/day	*6 (24.0)*	*2 (18.2)*	*4 (28.6)*	N/A	N/A	N/A
Three meals/day	*7 (28.0)*	*4 (36.4)*	*3 (21.4)*	N/A	N/A	N/A
Wellness coordinator	N/A	N/A	N/A	9 (34.6)	4 (30.8)	5 (38.5)
Martin's restaurant						
For lunch	N/A	N/A	N/A	*7 (26.9)*	*5 (38.5)*	*2 (15.4)*
For dinner	N/A	N/A	N/A	*4 (15.4)*	*2 (15.4)*	*2 (15.4)*
Both	N/A	N/A	N/A	*7 (26.9)*	*3 (23.1)*	*4(30.8)*

	SV Total Sample (N=27)	SV Males (n=12)	SV Females (n=15)	LV Total Sample (N=28)	LV Males (n=15)	LV Females (n=13)
Services purchased (other agencies)						
No	24 (100)	11(100)	14 (100)	21(80.8)	11(84.6)	10 (76.9)
Yes	0 (0)	0 (0)	0 (0)	5 (19.2)	2 (15.4)	3 (23.1)
Services purchased from LV						
No	N/A	N/A	N/A	23 (88.5)	11 (84.6)	12 (92.3)
Yes				3 (11.5)	2 (15.4)	1 (7.7)
Organized Village group activities	n=25	n=11	n=14	n=26	n=13	n=13
Religious services	10 (40.0)	3 (27.3)	7 (50.0)	6 (23.1)	3 (23.1)	3 (23.1)
Arts & crafts	7 (28.0)	3 (27.3)	4 (28.6)	3 (11.5)	2 (15.4)	1 (15.4)
Games	8 (32.0)	4 (36.4)	4 (28.6)	5 (19.2)	1 (7.7)	4 (30.8)
Music, theatre, movies	18 (72.0)	7 (63.6)	11 (78.6)	13 (50.0)	6 (46.2)	7 (53.8)
Special events outside	7 (28.0)	3 (27.3)	4 (28.6)	10 (38.5)	4 (30.8)	6 (46.2)
Physical activities	12 (48.0)	5 (45.5)	7 (50.0)	12 (46.2)	5 (38.5)	7 (53.8)
Frequency/last week	2.83 ± 2.13 1 to 7	3.60 ± 2.41 1 to 7	2.29 ± 1.89 1 to 5	1.12 ± 1.42 0 to 5	0.77 ± 1.09 0 to 3	1.66 ± 1.66 0 to 5
Sense of belonging						
Very strong						
Somewhat strong	8 (32.0)	2 (18.2)	6 (42.9)	15 (57.7)	7 (53.8)	8 (61.5)
Somewhat weak	13 (52.0)	7 (63.6)	6 (42.9)	8 (30.8)	4 (30.8)	4 (30.8)
Very weak	2 (8.0)	0 (0)	2 (14.3)	1 (3.8)	1 (15.4)	0 (0)
	2 (8.0)	2 (18.2)	0 (0)	2 (7.7)	1 (15.4)	1 (15.4)

Note: values are frequencies (valid %) and mean ± SD and range. Missing data is indicated by n's for each variable.

Table H9: Additional Results from the Activities Outside the Village Questionnaire

	SV Sample (N=27)	SV Males (n=12)	SV Females (n=15)	LV Sample (N=28)	LV Males (n=15)	LV Females (n=13)
Belong to group	n=24	n=11	n=13	n=26	n=13	n=13
Sports-related	2 (8.3)	1 (9.1)	1 (7.7)	3 (11.5)	2 (15.4)	1 (7.7)
Attend regularly:						
No	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Yes	2 (100)	1 (100)	1 (100)	3 (100)	2 (100)	1 (100)
Recreation & hobby	7 (29.2)	3 (27.3)	4 (30.8)	8 (30.8)	3 (23.1)	5 (38.5)
Attend regularly:						
No	1 (14.3)	1 (33.3)	0 (0)	0 (0)	0 (0)	0 (0)
Yes	6 (85.7)	2 (66.7)	4 (100)	8 (100)	3 (100)	5 (100)
Cultural & education	6 (25.0)	2 (18.2)	4 (30.8)	10(38.5)	6 (46.2)	4 (30.8)
Attend regularly:						
No	0 (0)	0 (0)	0 (0)	1 (10.0)	1 (16.7)	0 (0)
Yes	6 (100)	2 (100)	4 (100)	9 (90.0)	5 (83.3)	4 (100)
Service club	1 (4.2)	1 (9.1)	0 (0)	3 (11.5)	1 (7.7)	2 (15.4)
Attend regularly:						
No	0 (0)	0 (0)	-	0 (0)	0 (0)	0 (0)
Yes	1 (100)	1 (100)	-	3 (100)	1 (100)	2 (100)
Religious-affiliated	4 (16.7)	1 (9.1)	3 (23.1)	8 (30.8)	4 (30.8)	4 (30.8)
Attend regularly:						
No	1 (25.0)	0 (0)	1 (33.3)	1 (12.5)	1 (25.0)	0 (0)
Yes	3 (75.0)	1 (100)	2 (66.7)	7 (87.5)	3 (75.0)	4 (100)
Political party	0 (0)	0 (0)	0 (0)	3 (11.5)	3 (23.1)	0 (0)
Attend regularly:						
No	0 (0)	0 (0)	0 (0)	1 (33.3)	1 (33.3)	0 (0)
Yes	0 (0)	0 (0)	0 (0)	2 (66.7)	2 (66.7)	0 (0)
Connection to outside community	n=23	n=10	n=13	n=26	n=13	n=13
Very well connected	5 (20.8)	1 (9.1)	4 (30.8)	7 (26.9)	3 (23.1)	4 (30.7)
Moderately connected	12(50.0)	7 (63.6)	5 (38.5)	13(50.0)	6 (46.2)	7 (53.8)
Not well connected	7 (29.2)	3 (27.3)	4 (30.8)	6 (23.1)	4 (30.7)	2 (15.5)
Family comes visit	n=24	n=11	n=13	n=26	n=13	n=13
Frequently/sometimes	16(66.7)	7 (63.6)	9 (69.2)	15(57.7)	6 (46.2)	9 (69.2)
Rarely/never	8(33.3)	4 (36.4)	4 (30.8)	11(42.3)	7 (53.8)	4 (30.8)

	SV Sample (N=27)	SV Males (n=12)	SV Females (n=15)	LV Sample (N=28)	LV Males (n=15)	LV Females (n=13)
Visit family home	n=24	n=11	n=13	n=26	n=13	n=13
Frequently/sometimes	10(41.7)	5 (45.5)	5 (38.5)	15(57.7)	8 (61.5)	7 (53.8)
Rarely/never	14(58.3)	6 (54.5)	8 (61.5)	11(42.3)	5 (38.5)	6 (46.2)
Visit elsewhere	n=24	n=11	n=13	n=26	n=13	n=13
Frequently/sometimes	6 (25.0)	3 (27.3)	3 (23.1)	8 (30.8)	2 (15.4)	6 (46.2)
Rarely/never	18(75.0)	8 (72.7)	10(76.9)	18(69.2)	11(84.6)	7 (53.8)
Talk on the phone	n=24	n=11	n=13	n=26	n=13	n=13
Frequently/sometimes	20(83.3)	9 (81.8)	11(84.6)	22(84.6)	12(92.3)	10(76.9)
Rarely/never	4 (16.7)	2 (18.2)	2 (15.4)	4 (15.4)	1 (7.7)	3 (23.1)
Email with family	n=24	n=10	n=13	n=26	n=13	n=13
Frequently/sometimes	16(69.6)	6 (60.0)	10(76.9)	17(65.4)	9 (69.2)	8 (61.5)
Rarely/never	7(30.4)	4 (40.0)	3 (23.1)	9 (34.6)	4 (30.8)	5 (38.5)
Last time left Village	n=24	n=11	n=13	n=26	n=13	n=13
In the last week	21(87.5)	10(90.9)	11(84.6)	26 (100)	13 (100)	13 (100)
In the last month	3 (12.5)	1 (9.1)	2 (15.4)	0 (0)	0 (0)	0 (0)
In the last 3 months	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Don't recall	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Trips out of Province	n=24	n=11	n=13	n=26	n=13	n=13
Yes	0 (0)	0 (0)	0 (0)	6 (23.1)	4 (30.8)	2 (15.4)
No	24 (100)	11 (100)	13 (100)	20(76.9)	9 (69.2)	11(84.6)
Trips out of Country	n=24	n=11	n=13	n=26	n=13	n=13
Yes	0 (0)	0 (0)	0 (0)	4 (15.4)	3 (23.1)	1 (7.7)
No	24 (100)	11 (100)	13 (100)	22(84.6)	10(76.9)	12(92.3)
Volunteer Hours per Month	-	-	-	n=11 18.4±20.1 2 - 60	n=5 8.0±7.3 2 - 16	n=6 27.0±23 4 - 60

Note: values are frequencies (valid %) and mean ± SD and range. Values larger than 100% because participants could check more than one answer. Missing data is indicated by n's for each variable.

Table H10: Components of the Community Engagement Score

Which of the following activities have you done outside the Village in the past month?	SV Sample (n=24)	LV Sample (n=26)	Full Sample		
			Males (n=24)	Females (n=26)	Total (N=50)
1. Shopping or errands	23 (95.8)	26 (100)	23 (95.8)	26 (100)	49 (98.0)
2. Ate at a restaurant	21 (87.5)	23 (88.5)	20 (83.3)	24 (92.3)	44 (88.0)
3. Ate at someone's home	16 (66.7)	19 (73.1)	17 (70.8)	18 (69.2)	35 (70.0)
4. Went to movie, theatre or concert *	8 (33.3)	18 (69.2)	10 (41.7)	16 (61.5)	26 (52.0)
5. Went to a sporting event/ casino/ racetrack	6 (25.0)	3 (11.5)	6 (25.0)	3 (11.5)	9 (18.0)
6. Went to an educational event	9 (37.5)	9 (34.6)	7 (29.2)	11 (42.3)	18 (36.0)
7. Went to church, temple or synagogue	12 (50.0)	14 (53.8)	11 (45.8)	15 (57.7)	26 (52.0)
8. Volunteer work in the community *	0 (0)	11 (42.3)	5 (20.8)	6 (23.1)	11 (22.0)
9. Full day outings *	2 (8.3)	10 (38.5)	7 (29.2)	5 (19.2)	12 (24.0)
10. Overnight trips *	1 (4.2)	9 (34.6)	5 (20.8)	5 (19.2)	10 (20.0)

Note: values are frequencies (valid %) for those who responded *YES*.

Appendix I: Comparison with Prior Studies on Community Drivers

	Blanchard (2008)[1] N=61	Trang (2010)[2] N=47	Crizzle (2011)[3]		Present Study N=55
			PD Group N=27	Control Group N=20	
Age	80.4±5.5 67 to 92	77.2±6.6 65 to 91	71.6±6.6 57 to 82	70.6±7.9 57 to 84	81.9 ± 6.2 66 to 95
% Male	25 (41%)	24 (51%)	21 (78%)	16 (80%)	27 (49%)
MoCA Score	NA	NA	22.78 ± 3.12	25.25 ± 2.61	24.32 ± 3.0
Perception Scores DCS-D	68.9±15.2 30.8 to 100	70.6±17.1 36.5 to 100	71.1±19.2 28.9 to 100	79.8±13.3 50 to 100	61.85 ± 20.78 13.5 to 100
DCS-N	54.3±24.8 6.3 to 100	58.1±23.0 18.8 to 100	58.6±26.1 1.6 to 100	73.8±15.5 40.6 to 100	50.34 ± 25.72 0 to 96.9
PDA	32.5±6.3 15 to 45	32.5±6.5 21 to 42	33.4±8.7 13 to 44	37.7±5.4 27 to 44	31.80 ± 6.9 18 to 44
Self-Reported Driving SDF	30.2±9.0 12 to 49	33.5+6.5 19 to 51	33.9±8.2 16 to 48	38.8±6.7 23 to 53	29.2 ± 10.1 6 to 50
SDA	9.2±4.8 0 to 19	6.3+4.1 0 to 16	8.5±4.9 0 to 20	4.2±3.3 0 to 9	7.7 ± 5.7 0 to 18
Objective Driving # Days Driven	5.2±1.9 1 to 7	4.88±1.48 1.5 to 7	4.8±1.4 2 to 7	6.1±.8 4.5 to 7	3.5 ± 1.6 0.5 to 7
Duration (hr:min)	4:07 ± 3:06 0:07 to 13:20	4:30±2:29 0:52 to 10:15	4:59 ± 2:04 1:59 to 9:14	6:32 ± 2:59 3:06 to 14:03	2:41 ± 2:05 0:08 to 9:46
Distance (km)	164.1±158.4 4.2 to 633.3	156.6±108.8 22.7 to 466.1	188.8±102.3 60.95 to 407.9	285.7±174.3 96.1 to 686.9	100.9 ± 103.2 2.8 to 511.5
Mileage Category Low Middle High	 17 (29%) 28 (53%) 13 (22%)	 9 (20%) 31 (67%) 6 (13%)	 0 21 (81%) 5 (19%)	 0 12 (60%) 8 (40%)	 22 (45%) 24 (49%) 3 (6%)
Average Radius	7.4±7.5 1.0 to 45.1	7.0±5.7 1.9 to 26.5	6.0±4.7 1.99 to 21.22	6.7±5.4 1.5 to 23.1	10.3 ± 10.6 1.9 to 45.8
Maximum Radius	21.3±27.4 1.8 to 113.7	18.0±18.3 2.4 to 80.8	18.6±24.2 3.3 to 112.4	37.9±39.9 2.7 to 121.9	34.8 ± 41.9 2.5 to 131.3

	Blanchard (2008)[1] N=61	Trang (2010)[2] N=47	Crizzle (2011)[3]		Present Study N=55
			PD Group N=27	Control Group N=20	
% Drove at Night	28% 16/58	89% 41/46	89% 23/26	90% 18/20	29% 14/49
# Nights	1.5±1.1 1 to 5	1.9±1.5 0 to 6	1.2±.80 0 to 3	2.4±1.5 0 to 5.5	0.35 ± 0.6 0 to 2.5
Night Distance (km)	25.4±34.1 2.7 to 129.4	31.2±39.7 0 to 215.9	16.2±16.7 0 to 73.45	40.4±38.5 0 to 142.7	6.6 ± 14.8 0 to 71.6

Note: Values are Mean ± SD, range or Frequencies (valid %). Present sample perception scores and SDA (n=52), and SDF (n=51). All driving data averaged to one week. Exposure: Present sample (n=49), Crizzle PD Group (n=26), Blanchard (n=58) and Trang (n=46); Radius: Present sample (n=36), Crizzle PD Group (n=26), Control Group (n=19), Blanchard (n=55) and Trang (n=40).

In addition to the respective theses, findings are reported in the following publications: [1] Blanchard & Myers (2010) and Blanchard, Myers & Porter (2010); [2] Myers, Trang, Crizzle (2011); and [3] Crizzle & Myers (2013).