Constraints on Elderly Daily Travel Behaviour: London, Ontario

by

Steven R. Smeltzer
Department of Geography

Submitted in partial fulfilment
of the requirements for the degree of
Master of Arts

Faculty of Graduate Studies
The University of Western Ontario
London, Ontario
January, 1997

Abstract

The purpose of this study was to investigate constraints on urban travel experience by the elderly. To understand transportation use and activity participation, a survey of 115 subjects over the age of sixty was conducted in London, Ontario. Instead of trying to predict an individual's behaviour directly, the research uses Hägerstrand's theory of constraints to detect barriers restricting transportation and activity choice. When the sample was divided into three groups, based on the use of specialized transportation and type of residence, it was observed that most people who use specialized transportation still experience many constraints. In particular, the majority of seniors who need specialized transportation rely on taxis to meet their transportation needs. While over half of seniors who live in retirement homes do not have appropriate transportation, people who use specialized transportation indicated a strong need for the assistance of someone. It is recommended that a "user-side" approach, which allows seniors to use taxis at a subsidized rate, would enable short-notice emergency trips, reduce demand on paratransit, fulfill a larger portion of the population's needs, lower costs per trip, and increase access to a wider variety of social, health, and retail services. Following an increased understanding of activity patterns and needs, society must provide convenient and comfortable transportation to the elderly.

Keywords: Elderly, Transportation, Paratransit, Travel, Constraints, Seniors, Hägerstrand, Mobility.

Acknowledgement

First, my thanks goes out to Professor D. Janelle, who has guided and supported me throughout the completion of this thesis. Countless meetings and conversations have widened my interest and knowledge on this topic. By improving my writing style, furnishing a solid foundation on which to build, and sharing his knowledge, he has provided me with the necessary support to finish this thesis.

Secondly, I would like to thank Professor Hopkins for his support during the completion of this thesis and Professor Meeker from Brock University for her support and guidance during my undergraduate studies. Also, I would like to thank the other professors at The University of Western Ontario for their help and suggestions.

Thirdly, I would like to thank Shelia Wax, coordinator of Friendship in Action, and Tim Dupee from Paratransit for their insight. The information they provided was very useful.

Special thanks to my parents for their support. Without them, this thesis would never have been complete. My sister, Sandra, understood and encouraged me during difficult periods of the research and writing process. Stephen Coulstring deserves special mention for his stylistic recommendations. To my other friends, Jared, Terry, Laura, Murray, Steve, Todd, Jon, Paula, Ravi, and Brian, appreciation for your support and friendship.

Finally, special thanks to my fiance Monica whose constant support and belief in me helped me to get this paper done. Your caring, companionship, and love are what makes my life complete. Thank you.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES:

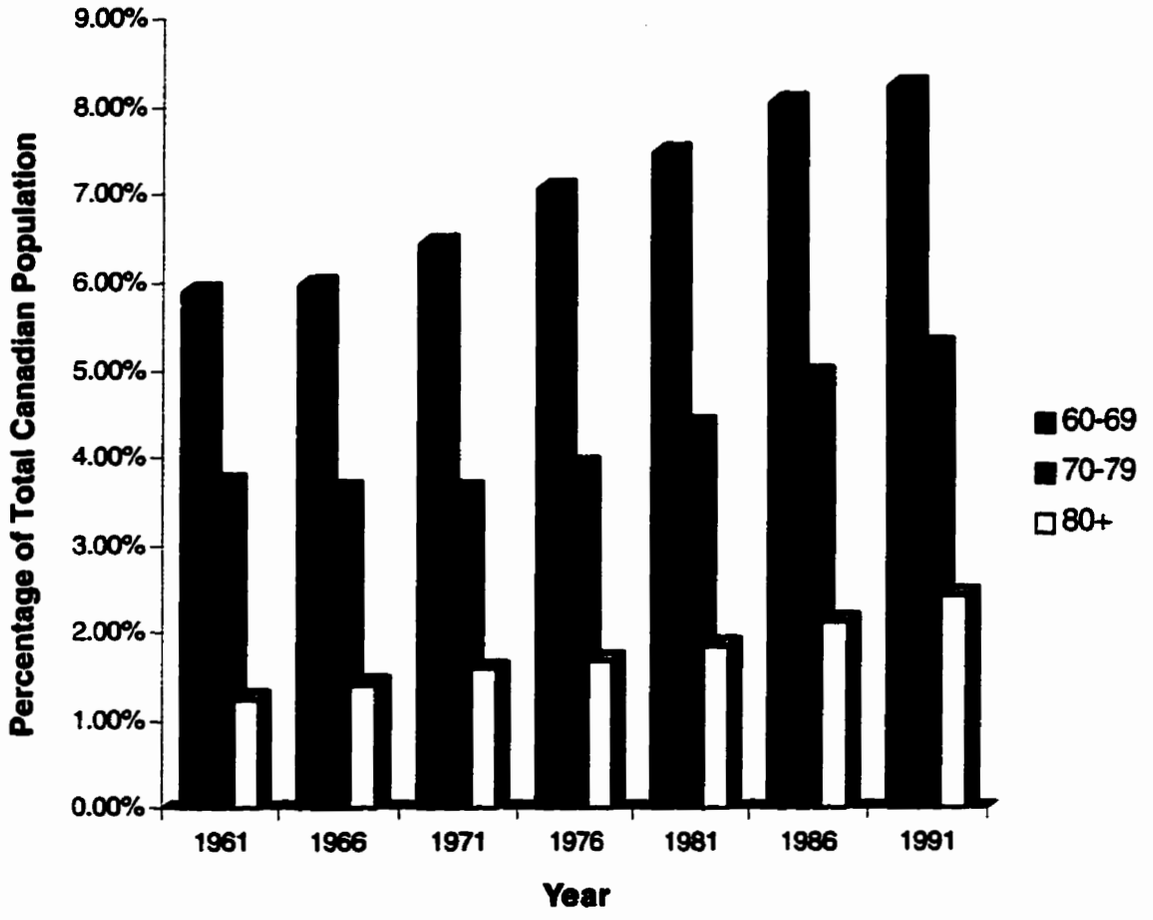
Chapter 1 - Introduction: Transportation and the Elderly

Increase in life expectancy, since the Second World War, has initiated rapid growth in the size and percentage of elderly citizens in Canada (Rosenberg, Moore, and Bell 1989, 220). Notably, the percentage of people over the age of eighty has more than doubled in the last thirty years (Figure 1.1). If this trend continues, Moore and Rosenberg (1997, 163) have predicted the number of older people will double by 2011. As this large population group expands, an increasing stress on geriatric services will occur (Smith 1988, 189). As such, the demand for specialized transportation facilities may exceed their supply and seriously undermine their efficiency.

Residential setting, health, gender, and other socio-economic aspects can influence elderly travel patterns, day-in and day-out. Since almost half the elderly in Canada suffer from at least one type of disability, their mobility can be restricted (Figure 1.2). While mobility/agility are the most common forms of disabilities, visual and hearing disabilities can also severely reduce mobility (Figure 1.3). Furthermore, because 60 percent of seniors with disabilities had annual incomes of less than ten thousand dollars in 1986, diminished wealth may restrict travel patterns (Dunn 1990, 28).

Through an examination of these various factors, in relation to the problems that the elderly face when using different modes of transportation, this thesis proposes to gain a better understanding of older people's travel behaviour. In this research, travel behaviour is defined as the frequency and purpose of trips by the elderly that

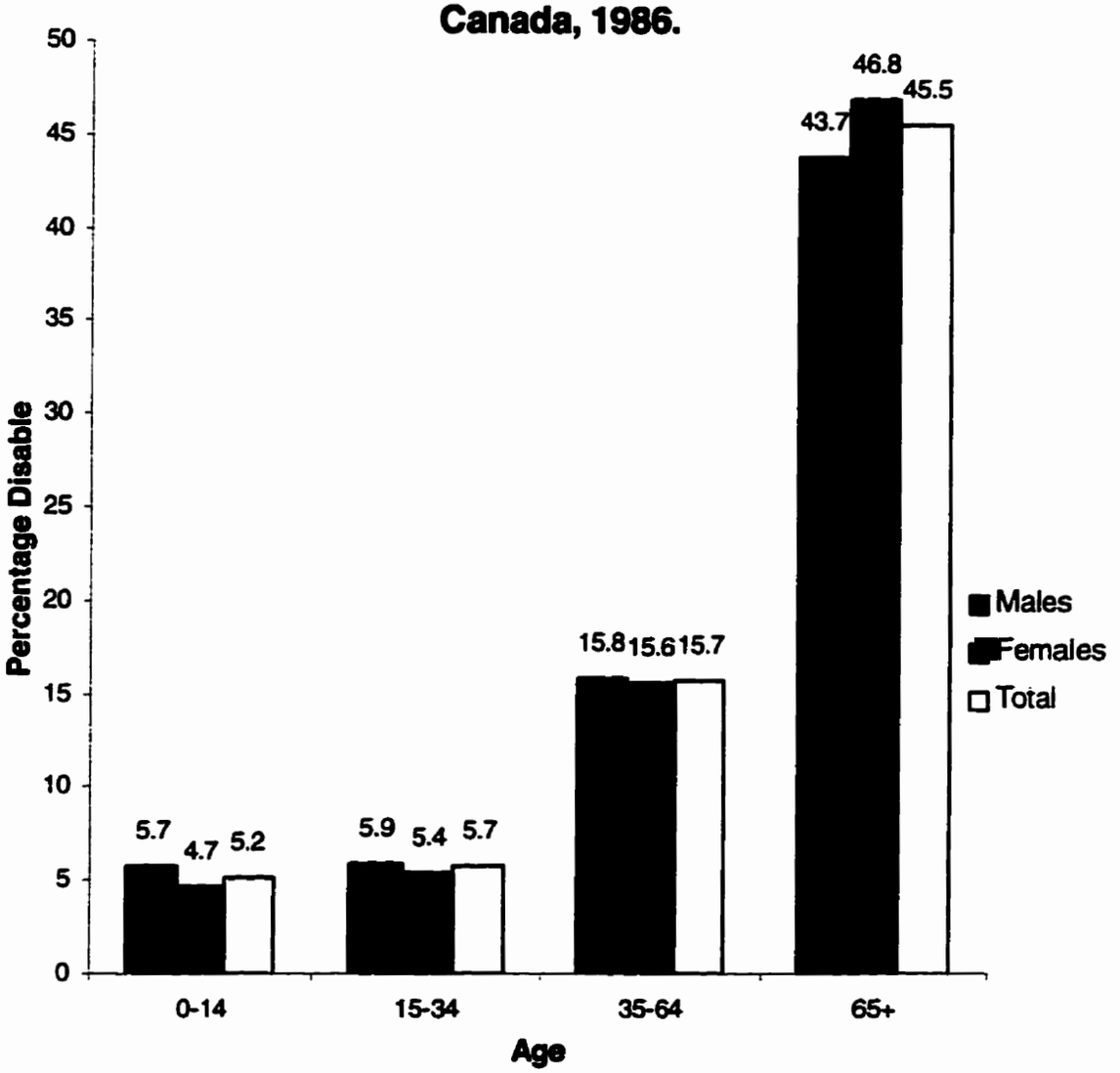
Figure 1.1: Percentage of Elderly in Canada, 1961-1991.



Source: Statistic Canada (1991).

do not take more than twenty-four hours. Therefore, these trips are a series of movements that begin and terminate at the home place and could consist of several stops at various locations. For purposes of this study, the elderly are defined as individuals over the

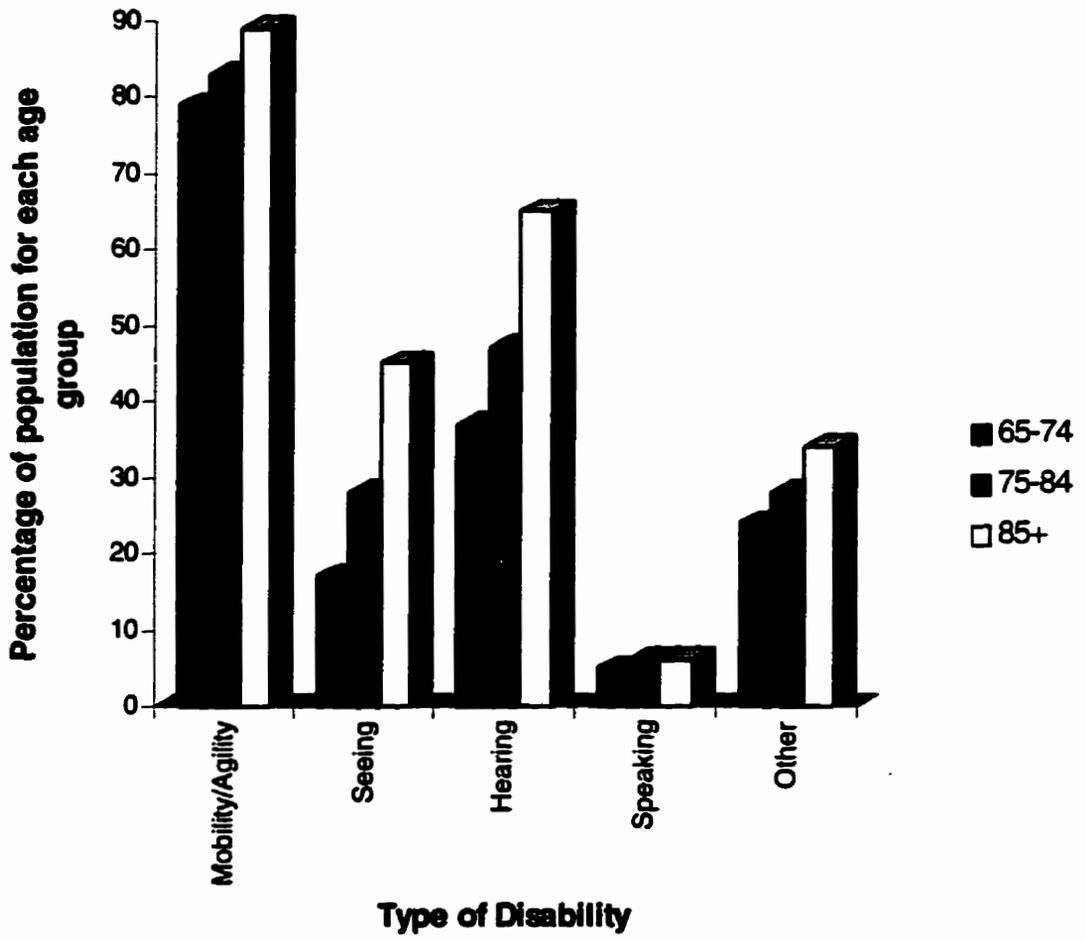
Figure 1.2: Percentage of Disabled by Age in Canada, 1986.



Source: Dunn (1990, 4).

age of sixty. Ideally, society must recognize the constraints senior citizens face, and then, one hopes, reduce or eliminate these barriers.

Figure 1.3: Percentage of People with Different Disabilities by Age, Canada, 1986.



Source: Dunn (1990, 9).

1.1 Study Objectives

This paper focuses primarily on the restrictions influencing the travel behaviour of elderly people. With this focus, the main objects of the research are as follows:

1) uncover how transportation use varies among different subsets of the elderly population;

2) determine the barriers or constraints that inhibit elderly travel movement, and show how these vary among sub-populations of senior citizens; and

3) suggest possible solutions for removing some of the barriers to transportation encountered by older people.

Using a survey data collection method to investigate these objectives, this study endeavours to gain insight into elderly lifestyles in London, Ontario. To suggest ways of improving transportation access for senior citizens, this research investigates the capabilities of different elderly sub-populations to use existing transportation facilities in London. More specifically, it examines the roles that gender, health, age, and residence type play in distinguishing transportation behaviour among the elderly.

This brief introductory chapter is followed with a review of research literature in Chapter 2 on travel patterns and activity constraints on the elderly. Chapter 3 presents the research methodology, theoretical foundation, study site, hypotheses, and survey design. Then, in Chapter 4, research results focus on constraints affecting elderly travel patterns, activities outside the home place, and the use of specialized transportation services. The final chapter discusses the study's conclusions and their implications for policy measures.

Chapter 2 - A review of Research Findings and Research Needs

This chapter reviews the literature on elderly travel behaviour and activity patterns, considers general policy issues relating to constraints on transportation access, presents different activity use models and establishes the need for extended research. Not surprisingly, in our highly mobile society, many studies have found that the elderly have reduced activity spaces because the necessary transportation is not readily available. Usually, transportation systems that are far from optimum force older people to take fewer trips than they would prefer.

Although access to recreational activities, goods, social contacts, and services are important for an individual's quality of life, accessibility to these components can be reduced by environmental, social, and economic barriers (Freund and Martin 1993, 55). Unless the barriers are removed, lack of access to transportation facilities will, in turn, create segregation and discrimination (The Ontario Advisory Council on Senior Citizens ... 1987, 1). To make responsible decisions, McLaren and Fleming (1985, ix) claim that comprehending both the barriers that elderly face and their transportation needs is vital.

Even though the lack of access to transportation facilities negatively influences senior citizens' activity levels, there has been relatively little research, until recently, on elderly mobility problems. Although research has tended to ignore how travel behaviour varies among subsets of the elderly, there are a number of general studies investigating the impact of the aging process on travel (Smith 1988, 196). As people age, these

studies suggest that travel patterns change through a reduction in the number of trips, variations in the time that these trips are made, fewer multiple purpose trips, and shifts to different modes of travel.

By supporting older people's ability to travel throughout the city, providing transportation to senior citizens has an economic value to society (Ministry for Senior Citizens Affairs 1985c, 1). With better access to transportation, elderly can remain in their residences for longer periods, instead of in nursing homes. Freund and Martin (1993, 184) state that "transportation is a vital indication of the quality of our individual lives, as well as the quality of our relationships with each other and with the earth". Consequently, Golant (1979, 127) affirms that both planners and geographers alike must examine and suggest ways to relieve the numerous transportation barriers suffered by older citizens.

2.1 The Need for Change in Current Planning Policies

Usually, transportation planning policies aim to satisfy the needs of the average urban resident, while inadvertently multiplying the hardships and immobility for disadvantaged groups. In modern society, the cultural belief that automobiles and individual freedom are closely related, Freund and Martin (1993, 45) argue, obscures how reduced access to cars precipitates social inequalities. When they design urban environments, Whitelegg (1993, 83) declares that planners often formulate planning policies that strive to increase transportation convenience for car owners. Indeed, the public sector's budgets, for example, invariably devote massive amounts of capital to road construction, traffic

lights, road maintenance, and other facilities used by automobiles. Despite public transit's role as a major mode of transportation for the elderly, these researchers document serious underfunding for transit services.

Writing in 1975, Schaeffer and Sclar (105) remarked that as society relies on the automobile for the primary form of urban transportation, there is little concern for individuals who lack access to this transportation mode. In Canada, car ownership has risen from one car for every 3.8 people in 1960 to one car for every 2.1 people in 1990 (Freund and Martin 1993, 16). In addition, 86 percent of all urban trips in North American are made using a privately owned car (Hanson 1995, 18). Because most households have cars, planners expect all members of society to have access to automobiles. Since not every family owns a car, Schaeffer and Sclar (1975, 105) mention access to transportation is not evenly distributed throughout society. In 1987, 11 percent of households in North America did not have access to a car (Freund and Martin 1993, 55). By preventing them from making as many trips as they need, the carless elderly, as a result, suffer inequality in society (Schaeffer and Sclar 1975, 108).

Illich (1974, 41) noticed the formation of a worldwide class system based on access to speed. Simply put, inequality intensifies in society as the speed that individuals can travel increases. He insists, because no individual can save time without forcing another to lose it, that there is a net transfer of power from people without access to automobiles to individuals with cars. While disadvantaging individuals without cars, the government supports policies which aim to increase the speed, within society's accepted safety limits, that car owners can travel. Today, Whitelegg (1992, 7) and

Taaffe, Gauthier, and Morton (1996, 340) observe how transportation policies continue to concentrate on the automobile transportation mode. There is little evidence of change since Illich wrote his book.

As planners concentrate on facilities for car owners, Whitelegg (1993, 83) asserts that a growing proportion of activity opportunities become inaccessible to people without access to this transportation mode. With an enlargement of urban areas and the continual process of urbanization, many services are now spaced farther apart and are inaccessible to individuals without cars. Since many people without cars are deprived of numerous urban services and facilities, he argues that the social consequence of this process is enormous (Whitelegg 1993, 7-8). Furthermore, Turton and Knowles (1992, 35-36) claim that this process is exacerbated by government policies that restrain public transportation subsidies. During the off-peak hours, because of lower frequency and restricted hours for public transportation facilities, this inaccessibility becomes even more severe. Without access to easily obtainable public transportation, Rittner and Kirk (1993, 366) noted that many elderly are restricted in their mobility.

Guess (1990, 1,10) documents how many municipal governments support policies that favour car ownership and suburbanization, while withholding capital needed to manage or modernize transit systems. As governments persist in ignoring people without access to transportation, Whitelegg (1992, 7-8) foresees continued hardships for the elderly. Until planners realize that many seniors have different travel patterns and needs than the majority of the population, Freund and Martin (1993, 45) predict that many senior citizens, unfortunately, will be disenfranchised from society.

Lately, because of the increasing concern for the well-being of the elderly,

some planners are starting to realize that the population cannot be treated as an undifferentiated mass with similar needs and resources. For today's society, specialized services must be implemented for senior citizens who have difficulties using conventional means of transportation (The Ontario Advisory Council on Senior Citizens ... 1987, iii). When adequate transportation is provided to older people, they are better able to integrate into society and use society's resources more fully (Ministry for Senior Citizens Affairs September 1985c, 8). This approach also addresses transportation barriers faced by other disadvantaged groups in society.

Although there is increasing concern for the elderly, a lack of data and knowledge about elderly travel patterns complicates urban planning decisions concerning this group. In fact, Wachs (1979, 212) found that it is often difficult to interpret the complex relationships between observed travel behaviour, transportation needs, and transportation services. Whatever the goals, securing quality documentation is, of course, always an indispensable element of the planning process.

2.2 Overview of Elderly Transportation Patterns

The substantial increase in leisure time, through a loss of work roles, increases the need for access to efficient transportation services; such services will allow the elderly to engage in activities that were previously too time-consuming (Golant 1976, 283). In his 1980 paper, Carp declares that "in order for the urban resident to take advantage of the wide variety of shopping, social services, and recreational activities provided by his environment he must in some way gain access to them "(140). Roper

and Mulley (1996, 415) declare that the elderly should be able to easily and with confidence use all means of transportation.

Because most of the aged are dependent on walking and public transportation, Smith (1991, 86-87) argued that elderly travel patterns, for the most part, are confined to home neighbourhoods. Bearing in mind that higher life satisfaction and independent living are related to a person's ability to travel throughout the city, the declining levels of personal mobility and the limited spatial areas of older individuals seriously affect their social well-being. Similarly, Golant (1984, 530) regards the restrictions on using existing transportation facilities, which might not meet elderly preferences or wants, as limiting their spatial activities.

Inasmuch as aging does not affect everyone the same way, Wachs (1979, 1) realized we must consider social, physiological, and psychological differences. While physical health is dependent, for example, on access to medical facilities, psychological well-being is enhanced by the ability to choose one's range of actions and to be unbridled from isolation. Moreover, he claims that key requirements for social well-being include access to friends, family, and recreational activities. Clearly, access to adequate transportation facilities can help to alleviate many of these problems. But, irrespective of potential benefits, some senior citizens might be unwilling, or even fearful, of leaving their homes to engage in activities (Ferraro and LaGrange 1992, 233).

In combination, the loss of work roles, reduced transportation access, poor health, and fewer social activities may induce strains on the elderly. To find substitutes that can replace some of these losses, they must, as a result, have access to adequate transportation. Notably, in terms of location, demography, and socio-economic characteristics,

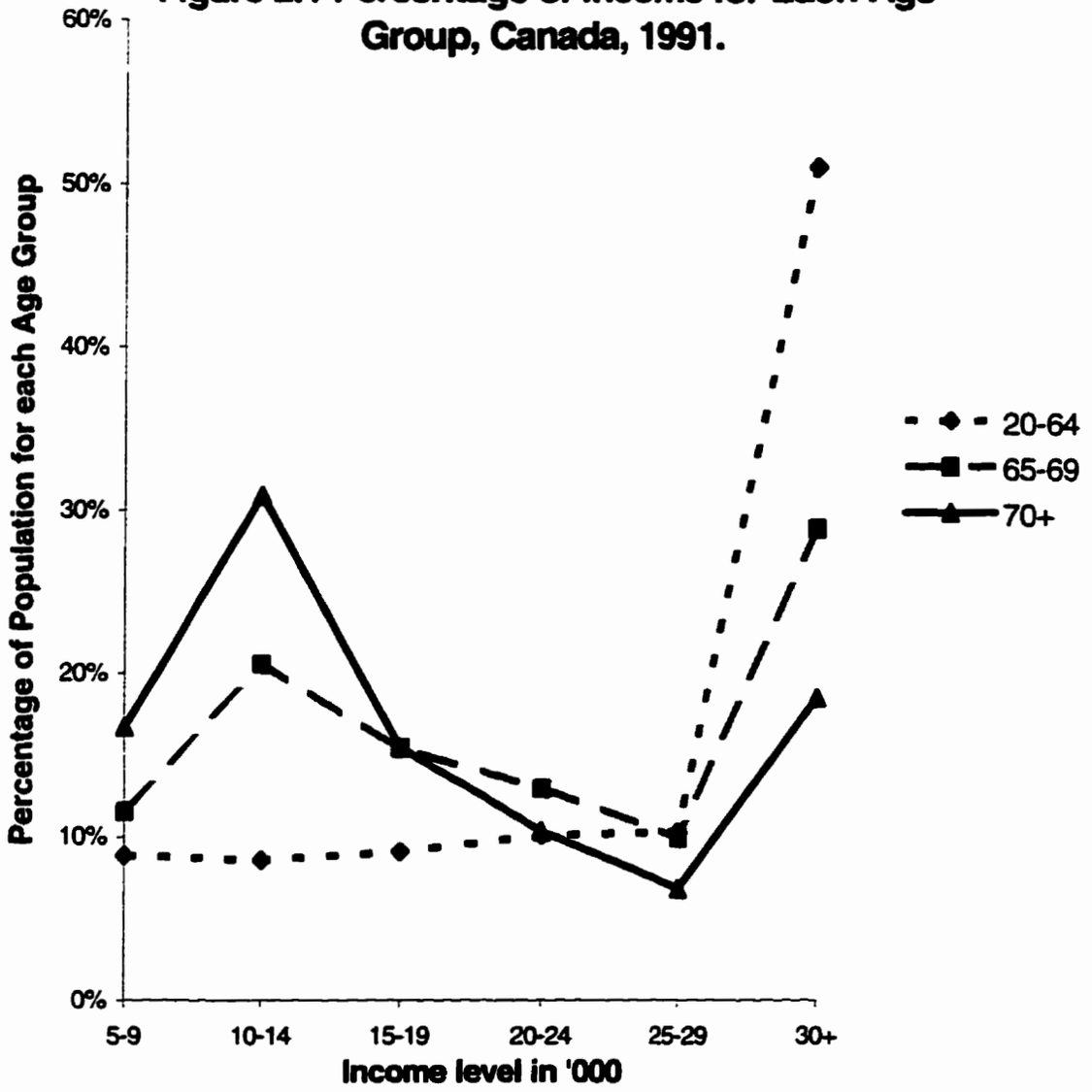
the elderly are a diverse group. Since travel patterns vary dramatically among the elderly, policy makers are obliged to prepare transportation facilities to meet different travel needs and living patterns.

2.3 Constraints on Elderly Travel Patterns:

While trip purposes alter when a person ages, their personal means of transportation, in turn, also change. As individuals age, sensory ability declines, responses slow, car ownership decreases, and agility deteriorates (Smith 1988, 189). Since their income is less than when they were younger, the ability to own a car is frequently no longer an option for older individuals. Especially for the very old, the percentage of seniors with low income is considerably higher than for people between 20 and 64 years old (Figure 2.1). For example, while only 9 percent of people between the ages of 20 and 64 had an income of 10-14 thousand dollars, 31 percent of elderly over the age of 70 where in the 10-14 thousand dollars income bracket.

In addition, for physiological, perceptual, and cognitive reasons, the use of the automobile, on average, becomes increasingly unobtainable. Because of increased physical and cognitive difficulties, Rentchin and Anapolle (1993, 284-285) discovered that older drivers have higher crash rates than any other age group per mile driven and the crashes are more likely to result in fatalities. Despite the general trend, Golant (1979, 128) established that these effects vary among the elderly because some older people still drive or have access to automobiles through friends or family who are willing to drive for them.

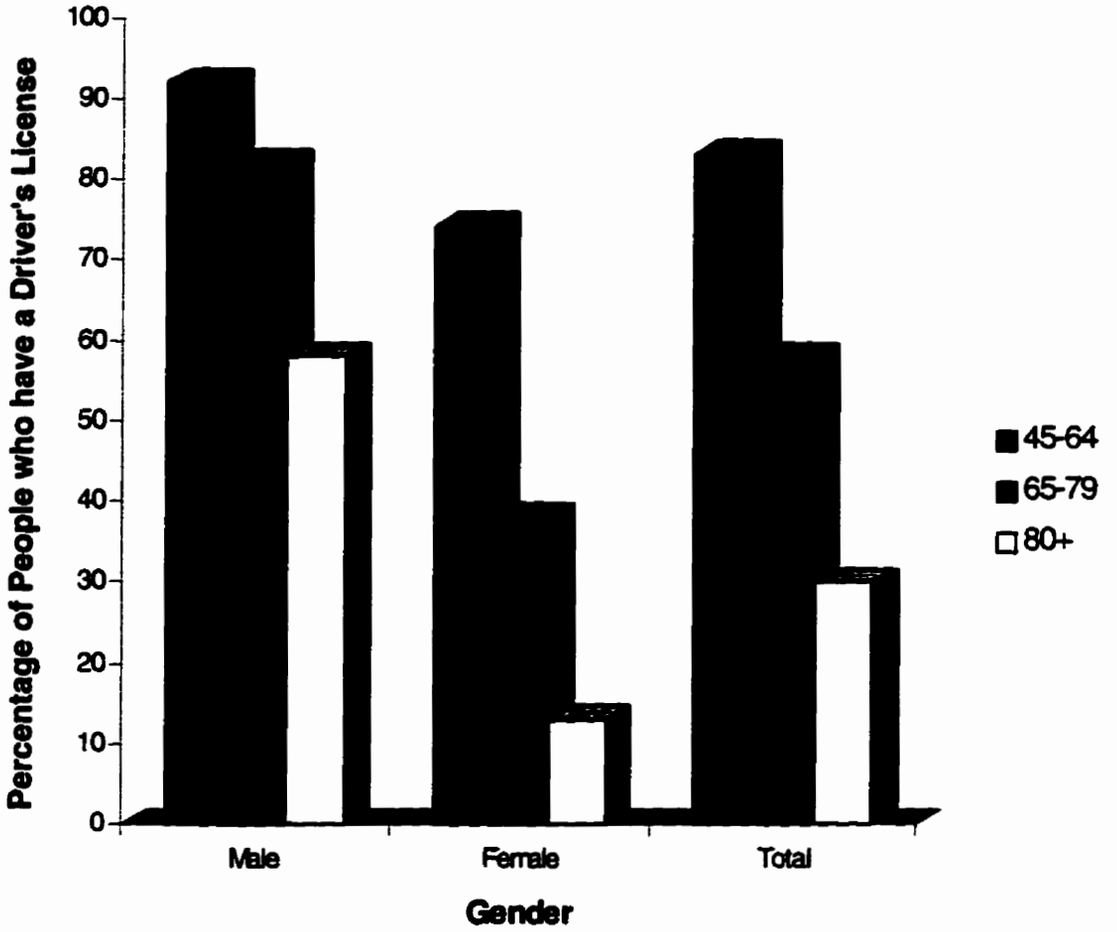
Figure 2.1 Percentage of Income for Each Age Group, Canada, 1991.



Source: Statistics Canada (1991).

Unfortunately, a high proportion of senior citizens do not have access to cars and are forced to rely on public means of transportation, scooters, taxis or walking (Golant 1979, 128). When they can no longer drive, Rosenbloom (1993, 297) noted that many elderly suffer from lack of access to important services and facilities. As

Figure 2.2 Percentage of Canadians over 45 with a Driver's License, 1991.



Source: Ministry of National Health and Welfare (1993, 29).

shown in Figure 2.2, the percentage of Canadians with a drivers licence is dramatically decreased as people age. In particular, only 13 percent of women over 80 have a driver's licence in Canada.

Walking is of particular significance; yet, typically, bones become more brittle,

senses deteriorate, equilibrium diminishes, and joints stiffen as the body ages (Wilson and Rennie 1981, 144). Closely related to the declining physical ability, Freund and Martin (1993, 55) observe how features of the human-made environment, such as bridges, brief traffic lights, and wide roads, might also hamper walking. Inasmuch as poor health and lower income might restrict movement, Golant (1976, 283) noted that elderly travel behaviour may reflect their capability to use existing transportation facilities more than their actual preferences or wants. To address the elderly population's need for essential services and goods, Wachs (1979, 5) asserted that special transportation programs are required for the elderly. For the elderly unable to use conventional modes of transportation, specialized services unfortunately have not been developed extensively (Gilderbloom and Rosentraub 1990, 271).

2.4 Space-Time and Activity Use Models

Since time and space are the most basic element of an individual's life from birth to death, they provide the framework for human existence (Kellerman 1989, xi). In practice, Ed Ullman contends that "space is conceived of as a passive and . . . a more concrete dimension than time; time is a more active and more mental construct; space implies being, time implies becoming" (Kellerman 1989, 21). With a change in the way time is perceived by society, solutions to spatial problems might be realized (Parkes and Thrift 1980, 109).

Traditionally, geographers and planners use a compositional approach to examine how phenomena are partitioned into a hierarchy of individual sections. By using this

approach, geographers scrutinize each part and then investigate how the sections are joined together (Pred 1977, 210). In essence, these deductive models are built around aggregated data on population, employment, or other factors; these models are most commonly used to predict urban growth and other factors. The crudity of these models, their reliance on extremely aggregated data, and a failure to successfully provide a solution to local planning problems are among the many criticisms of these techniques (Procos and Harvey 1977, 257).

For planning and policy-making, information on the historical background and the present state of affairs is not enough to reveal the best explanation (Hägerstrand 1973, 68). Since planners view resources and people in a three-dimensional framework, the concept of urban areas is static and timeless. With this strategy, planning polices often ignore the time factor as a crucial component (Schurer 1978, 1). By examining transportation only as flows or as trip making, this procedure omits the elements which produce and influence transportation flows (Burns 1979, 7).

Time-geography, on the other hand, uses a contextual approach to discover the situations of different people. With this approach, the connections between an individual's behaviour and the characteristics of different situations can be investigated. According to Hägerstrand, this means that "structural patterns and outcomes of processes can be uncovered which can seldom be derived from the laws of science as they are formulated today" (Pred 1977, 210-211). In other words, within the time-geography framework, both the individual and society can be treated as a whole.

Since time must be consider explicitly, both as a uniting agent and as an accounting procedure, geographers have to categorize people's spatial behaviour by a different

system than they do now. Rather than arranging actions according to observable characteristics of their performance, they categorize events by the motivation to carry out the action. To comprehend human spatial behaviour, we must realize that decision and deliberation come before the response (Cullen 1977, 31). Likewise, some activities impose constraints on the amount of freedom available for an individual because they require a fixed quantity of time for their execution and are inelastic in duration (Parkes and Thrift 1980, 116).

Traditionally, night-time residential locations of respondents are the bases of social geography research on urban areas. To fulfil requirements for services, goods, entertainment, income, and education, individuals must travel throughout the city during the day (Janelle and Goodchild 1983, 403). Most importantly, societal rules and dominant institutions control the timing of individual movements and pursuits. By setting the opening and closing hours of public transportation, work, schools, and other services, these institutions and rules determine where and what activities individuals can participate in (Goodchild and Janelle 1984, 807). While this paper uses Hägerstrand's theory of constraints, as described in Chapter 3, to discover elderly mobility patterns, there are a number of other space-time models available.

2.41 Space-Time Budgets

With consistency in their frequency, duration, timing, and sequential order, temporal allocation of human actions contributes to emerging patterns of social life. Likewise, timetables, rush-hours, shift work, office hours, and mass media, are all

aspects of social life influenced by timing in modern society. In terms of what could and should be done, time has immense affect on social activity patterns. Consequently, a time budget record of how people spend their time assists in the investigation of human behaviour (Szalai 1972, 1,3).

During the day, there is a rationality in the way people participate in undertakings and how activities are influenced by what one wants to do following the event and what one has accomplished before. Internal inspiration and external restrictions, which regulate sequential order, are not sufficiently understood (Szalai 1972, 4.). An individual's undertakings are, in fact, carefully interwoven with the timing of activities at particular sites and with the programs of other individuals (Goodchild and Janelle 1984, 807-808). Essentially, the time budget method is a data-collection technique that planners employ to analyze who does what, in what order, how often, where, with whom, and at what time (Szalai 1972, 5). In order to make observations and calculations on current pursuits and to assess how these activities can be improved, time budgets customarily ask a sample population to fill out a daily record over a period of time (Thrift 1977, 5).

Initially, time budgets were used in non-spatial sociological studies of lifestyles and leisure behaviour, market research for the mass media, and in time and motion investigations by institutions (Holly 1976, 104). The extension of a time budget, which records information on the separation characteristics and spatial location of pursuits, is referred to as a space-time budget. By tracking the daily undertakings and movements of humans, a space-time budget approach can be advantageous to organizations responsible for urban policy and decision-making (Goodchild and Janelle 1984, 808).

Space-time budgets, nevertheless, tend to overlook time use over long durations, do not report very personal or socially inappropriate actions, and do not consider preferences versus necessities. Additionally, they do not allow the frequency of time spent on pursuits to be connected with the enjoyment obtained from the activity, do not tap the meaning or quality of time designated to distinctive undertakings, and rarely differentiate between time use during the weekday and weekend. Similarly, space-time budgets do not appraise the potential association between the day of interviewing and the week, month, or stage in life. Finally, for a given day, time budgets do not appraise the possible affect of mood states, health condition, or the demands of other people in the choice of time use (Harvey 1986, 5-6). Besides, there is often a low response rate which might make the statistics questionable (Schurer 1978, 35).

2.42 Chapin's Choice Theory

To explain patterns of urban residents' pursuits, Chapin introduced a theory of choice. This approach, based on activity pattern bundles, differentiates groups by various economic and social components (Schurer 1978, 37). Choice theory examines "The solutions of urban planning problems through a better understanding of the living patterns of city residents." With this undertaking, "the way (people) allocate their time to different activities in the course of a day, the rhythms of these activities around the clock, and the locus of these pursuits in the city space are investigated" (Parkes and Thrift 1980, 206).

Whereas Hägerstrand emphasizes the constraints dictated by the urban surroundings,

Chapin, using a more minuscule method, underscores activities as the outcome of choices reflecting individual values (Anderson 1971, 353). According to Chapin (1974, 23), "urban activity systems (are) an umbrella term for the patterned ways in which individuals, households, institutions, and firms pursue their day-in and day-out affairs in a metropolitan community and interact with one another in time and space." The various subsystems of the overall activity system are connected by time (Harvey 1976, 2).

Chapin's method, based on motivation - choice - outcome sequence, stresses the preference or choice factor of individual behaviour. The four principal components of the model are the quality, availability, motivations, and roles (Parkes and Thrift 1980, 209). The factors, which are the most influential in the formation of an activity pattern, are:

1) Propensity - determines what activities are likely to fall into a person's realm of concerns, thus defining the scope of choice.
2) Opportunity - the availability of a physical place facility suited to the activity and the suitability of surroundings.
3) Situation - incorporates the appropriateness of timing and other circumstances for the activity.
4) Urban environment context - is the milieu within which choices are made: it is everything of a non-physiological nature influencing a person's behaviour, including their own previous behaviour, thus establishing a feedback loop (Parkes and Thrift 1980, 211).

Compared to Hägerstrand's concentration on time as coordinates, Chapin underlines the substance of time. In other words, by viewing time as a dimension, Hägerstrand considers time as coordinates to place activities in a temporal location, while Chapin appreciates time as a variable or property (Holly 1976, 104-5). Chapin considers existing spatial arrangements and the way these organisations are understood

(Dangschat *et al.* 1982, 1157).

2.43 Other Approaches

In contrast to Hägerstrand, Cullen (1972, 459) argues for a wider scope of flexibility defined by the time-space fixity of events and an individual's dedication to the activity. Notably, Cullen views activities occurring within both preferences or priorities and a set of temporal-spatial constraints. Methodologically speaking, the categories of commitment to pursuits are based on arranged activities, routine undertakings, planned activities, and unexpected events. Hence, Cullen incorporates both Hägerstrand's constraint method and Chapin's motivational choice mechanisms (Harvey 1976, 5).

Meier (1962, 59), however, emphasizes the potential of an activity as a means of evaluating the overall efficiency of urban systems and the general quality of urban life. In this way, he stresses the practical rather than the theoretical value of space-time models. As a measure of the well-being of urban residents, Meier proposes to measure the amount of time allocated to various activities. In terms of this proposal, he underscores the importance of measuring the amount and variety of free time available to individuals (Meier 1962, 49-52).

In contrast to this technique, the routine and culturally transmitted structure theory developed by the Martin Centre for Architectural and Urban Studies at Cambridge makes no specific attempt to explain behaviour in terms of motivation or from the standpoint of an individual as a decision maker. Because this approach starts with a space-time budget for the modelling of the activity patterns, the reasons by which

individuals choose to do something are omitted. For this theory, time rhythms are hypothesised to have a culturally communicated formation. Basically, this method estimates the aggregate distribution of people in the three-dimensional frame of activity, location, and time (Parkes and Thrift 1980, 206).

Another theory, the activity-based approach, stresses that activities are primary to the individual, while travel is secondary. Since travel is a derived demand, an individual's activities should be studied instead of single trips. And, because household structures are related to activity patterns, they can influence travel patterns and activities. Due to changes in behaviour, attitudes, perceptions, and preferences, these activities and travel behaviour are not static, but change over time (Jones *et. al.* 1983, p xii-xiv).

Kellerman, by elaborating on Hägerstrand's theories, proposes:

1) Time and space are more than the aggregate time and space of all the individual members within society. Society acts not only through individuals but through institutions as well. Individuals may also operate beyond their immediate time and space.
2) Societal time and space (as well as individual) are more than just limiting movement resources, as implied by Hägerstrand. Above all, they are economic resources and organizational-ordering dimensions.
3) At the societal level, there are constraints in addition to or instead of some of those identified by Hägerstrand. These restraints are related to cultural values pertaining to time and space and to differences between men and women.
4) There are, at least at the societal level, positive enabling forces regarding the use of time and space. These may be related to the capitalist system or to national values, which calls for a certain pace and certain norms of use for both time and space (Kellerman 1989, 16).

Harvey (1990, 418), utilizing a Marxist perspective, observes that "space and time are deeply implicated in the processes of social reproduction." The social order, divisions of labour, and hierarchies in society are all defined by the representation

of space and time in culture. The 'when' and 'where' of events, for instance, convey clear social messages. As such, all institutions and individuals must comply with the social definitions of space and time. However, conflicts between different social definitions and meanings of time might bring into being new social definitions of time and space (Harvey 1990, 418-21).

2.5 Summary

Since many elderly are not served adequately by transportation systems, they have reduced activity spaces and take fewer trips. Until recently, urban planning policies encouraged car use, while ignoring the needs of and creating hardships for people without access to cars. As urban areas grow and public subsidies are restrained, seniors are increasingly disadvantaged.

Due to financial, physiological, perceptual, and cognitive constraints, the ability of older people to meet their needs is reduced. Therefore, constraints encountered by the elderly may reflect their travel behaviour more then their actual needs or wants. To understand elderly transportation patterns, a wide variety of models can be utilized. Of importance, there is a wide variance among different subsets of the elderly in their ability to use transportation. The following chapter reviews the theoretical model, data collection, and methods of analysis for uncovering the constraints that influence travel by the elderly.

Chapter 3 - Methodology

A detailed review of elderly transportation patterns, constraints on these transportation patterns, and the need for a change in current planning policies were provided in pervious chapters. Building on these ideas, this chapter provides a model for the study, discusses the gathering of information on factors influencing elderly travel behaviour, and presents a focused view of travel constraints. Limitations in data, and strengths in the study design and weakness are also identified.

3.1 Theoretical Base

For a research topic to be valid, the subject matter must reinforce or question theory, be of practical importance, or add to the existing body of knowledge. This study aims to fit all three criteria. Until recently, most urban planning has ignored or failed to comprehend human behaviour in the urban setting. To overcome these shortcomings, this research proposes to use Hägerstrand's concept of constraints. Rather then trying to predict an individual's behaviour directly, Hägerstrand's (1975, 3-4) theory probes the constraints on the individual's freedom of action. Both time and space dimensions are, for instance, always considered in real life and to a certain extent are interchangeable (Hägerstrand 1973, 77).

Hägerstrand (1975, 9) contends that people make decisions to obtain a

future goal; yet, such decisions are not always based on past or present conditions. This means that direct observation of behaviour cannot successfully predict actions because each individual has a different perspective on the world. Thus, Hägerstrand (1975, 9) explains that a person's goals, perceptions, and knowledge cannot be fully examined. Future goals, for example, can be imminent or remote (Thrift 1977, 21).

3.2 Hägerstrand's Model

Basically, everyone has the same amount of time to allocate, and time is a scarcity which affects all pursuits. With a wide variety of alternative activities open to an individual and a limited amount of time, Thrift (1977, 21) supports Hägerstrand's claim that a person is forced to choose activities in some temporal sequence. In other words, because there is a scarcity of time, an individual must decide what undertakings to participate in. To discover an individual's potential behaviour, planners must seek to identify all the constraints affecting this decision process (Thrift 1977, 3-4).

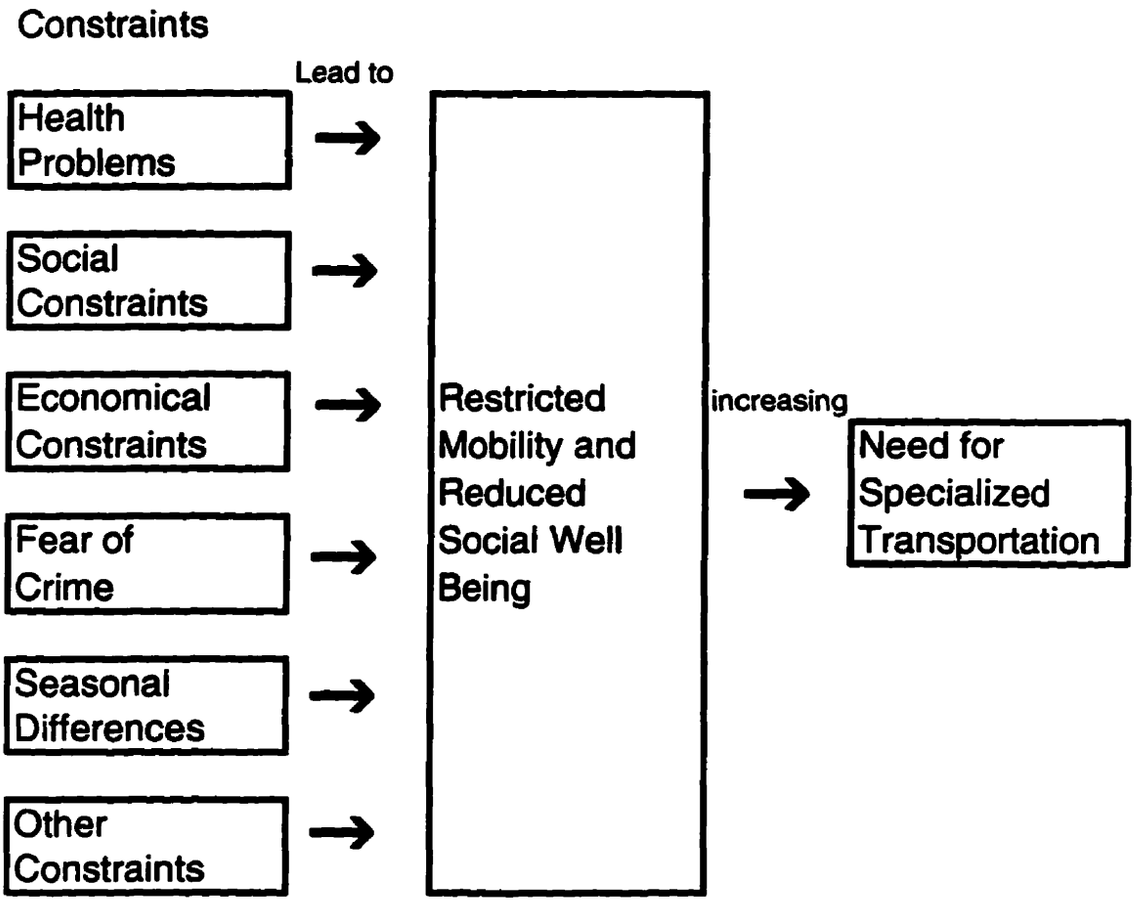
In essence, constraints, imposed by physiological necessities, physical requirements, common decisions, and private determination, interact against the travel paths of individuals. Primarily, because they limit an individual's possible actions, Dangshat *et al.* (1982, 1158) maintain that constraints can explain activity patterns better than the motivating forces that make people carry out activities. The main restrictions, which affect the daily path of an individual, are classified by

Hägerstrand according to capability, coupling, and authority constraints. Restrictions due to a person's biological needs and the equipment they can use are defined as capability constraints. In order to transmit, consume, and produce, coupling constraints define when, where, and how long the individual has to be at a certain location. Finally, authority constraints define how a person is regulated, governed, or under the control of other individuals, groups, or organizations (Hägerstrand 1970, 12-16). Obviously, the level and quality of life, for an individual, are determined by these constraints.

Overall, Hägerstrand's theory of constraints, in relationship to transportation use, forms the theoretical basis of this study. The elderly, in general, are more affected by constraints on their travel behaviour than the majority of the population. Since these constraints can take many forms, such as restrictions on the operating hours of public transportation, opening hours of facilities for the elderly, and difficulties associated with using different transportation modes, they can significantly inhibit elderly mobility.

It is concluded that careful scrutiny of the constraints faced by elderly will offer a strong basis for understanding their travel behaviour. No matter where and what they want to do, older people's actual behaviour is strongly influenced by the constraints they encounter. Pragmatically, they evaluate the restrictions on their movements, and then decide what activities they will undertake. Figure 3.1 illustrates how constraints can restrict mobility and increase the need for specialized transportation services. As mentioned, the elderly are not an undifferentiated mass

Figure 3.1: How Constraints can Restrict Mobility and Increase the Need for Specialized Transportation.



affected by constraints in the same manner. Correspondingly, it is important, of course, to interpret how these constraints affect different sub-populations of the elderly.

3.3 Study Site

Since the city is easily accessible for the researcher and has a large population base to support specialized services for the elderly (including specialized transportation), the proposed study site is London, Ontario. London, was selected because the area, for the most part, is familiar to the researcher. Bearing in mind that previous knowledge of a region is crucial for accurate data collection, the city is appropriate for the study.

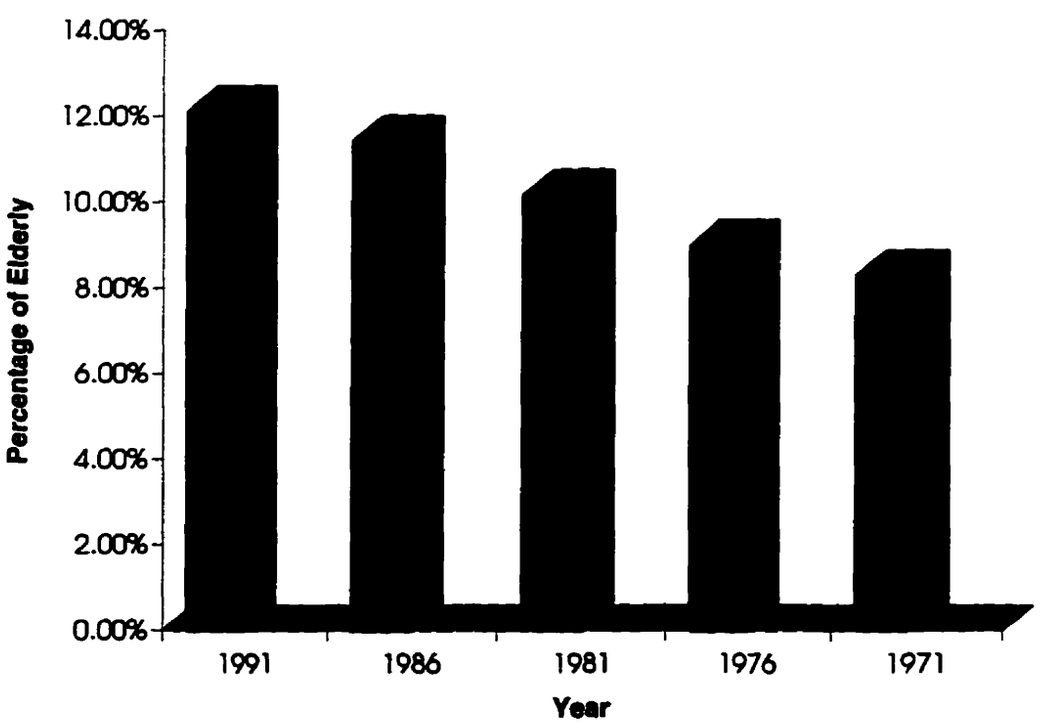
Situated in Southwestern Ontario, London is a growing medium-size city with a population of 381, 520 (Statistics Canada, 1991). Like the rest of Canada, London's elderly population is expanding. While Table 3.1 shows that the elderly population has grown from 18 465 in 1971 to 46 160 in 1991, Figure 3.2 illustrates that the percentage of senior citizens in London has increased to 12.1 percent of the population in 1991 from 8.3 percent in 1971 (Statistics Canada, 1971-1991).

Table 3.1: Percentage of Elderly in London from 1971 to 1991.

	1991	1986	1981	1976	1971
Total Population	381 520	342 300	283 668	270 383	223 220
Elderly Male	18 590	15 700	11 450	9 670	7 250
Elderly Female	27 570	23 365	17 340	14 610	11 215
Total Elderly	46 160	39 065	28 790	24 280	18 465
Percentage of Total Population	12.10%	11.41%	10.15%	8.98%	8.27%

Source: Statistics Canada (1971-1991).

Figure 3.2: Percentage of Elderly in London, 1971-1991.



Source: Statistics Canada (1971-1991).

3.4 Survey Groups

To provide substantial contrast between the environment in which they live and their access to various transportation modes, the present study concentrates on three different subject groups. Rather than strict groups in a laboratory experiment, they are sub-groups in the total population and are formed for comparative purposes.

1) Independent community residents who do not use transportation services specifically provided for older people. Thus, members of this group live outside retirement or nursing homes.
2) Community residents who use at least one transportation service designated for older people (for example, meals on wheels, para-transit, etc.). This group also does not live in a retirement or nursing home.
3) Retirement home and nursing home residents who have access to transportation outside the nursing home. Accessible transportation can include walking, cars, buses, etc.

This study also examines dissimilarities in travel behaviour and constraints based on age, gender, and health affecting elderly activity patterns.

Often, when analyzing social groups, control and experimental groups are used in behavioural science. To measure the influence of variables applied to an experimental group, a control group is needed for reference or control against the influence of variables. Throughout this study, the first group acts as the control group. Because it is expected that this group has the minimum constraints, it

represents the elderly with the least difficulty moving about the city in present-day society. The other two groups, in turn, are measured against the first group. Although Group 1 is expect to have fewer restrictions on mobility, the results will be checked to see if this prediction is accurate. Moreover, the second group is used to identify whether or not specialized transportation services are meeting the needs of the elderly. For the elderly living in retirement homes, the last group allowed the researcher to identify how the travel patterns of this sub-population are reduced.

3.5 Hypotheses

To test for variations in travel behaviour among various elderly sub-groups, three hypotheses have been formulated for evaluation. Based on the subject groups listed in the previous section, the following three hypothesis are considered:

1) Group 1 will have the greatest access to transportation and services, while the other two groups will have reduced access to these services.
2) Group 1 will have the least difficulty moving around the city, whereas the other two groups will experience more obstacles.
3) Group 2 and 3 will be the most restricted in the activities they can accomplish.

3.6 Sample Size

To make conclusions about the general population, the number of surveys required for an accurate representation is an important question. Because the answer to a suitable sample size is not always clear-cut, several major factors must be given careful consideration. Due to time restrictions and budget constraints, a 95 percent level of confidence, which is the risk of error the researcher is willing to accept, was chosen. Similarly, the confidence interval, which determines the level of sampling accuracy, was set at ± 10%. Since the population size of the elderly is finite and less than 100 000, the following equation was used to select the sample size.

$$n = \frac{Z^2\ (0.25)\ N}{Z^2\ (0.25) + (N-1)\ C^2_p}$$

where,

$Z = 1.96$ - for a 95% confidence level

N = population size - 46 160 in 1991 from figure 3.1

$C_p = .10$ - for a ± 10% confidence interval

n = sample size

therefore,

$$n = \frac{(1.96)^2\ (0.25)\ (46\ 160)}{(1.96)^2\ (0.25) + (46\ 160 - 1)\ (0.10)^2}$$

$$n = 95.84$$

(Rea and Parker 1992, 131)

Because the data for the population size of each group is not available, the desired number of respondents could only be calculated for the whole elderly population. As noted earlier, the desired number of respondents was 96 senior

citizens. Due to expected refusals and other problems, it was decided a minimum of 120 interviews should be conducted. Methodologically speaking, the over-sampling rate of 25 percent was calculated based on findings from earlier research on senior citizens (Ministry of Senior Citizen Affairs 1985b, 6). While a larger sample size would be better, time and financial constraints made it impractical. Because of a possible low response rate to the survey, the method of accessing respondents might not allow the optimum sample size for the statistic stipulated level of significance.

3.7 Survey Methodology

3.71 Implementation

A survey was chosen as the most efficient and precise way to obtain information for testing the research hypotheses. The survey was designed to elicit information about how travel behaviour, barriers to travel, and transportation needs vary among sub-populations of senior citizens. After collecting the random sample, the respondents are separated into three groups based on population elements. Although there might be an overlapping of respondents in more than one group, each respondent was located in the most appropriate group. For example, this would apply to respondents interviewed at social agencies who indicated that they use specialized transportation. Hence, these individuals were placed into Group 2 instead of Group 1.

For conducting a survey, a mail method was selected to obtain information

about elderly travel patterns. A telephone survey was rejected because many elderly may be suspicious, anxious, and even fearful when interviewed over the phone by an unknown person. Since some elderly also have hearing difficulties, a telephone survey is ruled out. Most importantly, the amount of data needed for collection on each participant makes a telephone survey impractical. Likewise, a face-to-face interview, in turn, might also introduce error in the survey. Occasionally, interviewers might project their own values and desires upon the respondent or there might be pressure upon respondents to answer in a desired way. Variations in the method of administration and changes in mood or health of the respondent, also, might introduce errors in the survey. In addition, situation factors, such as the presence of a spouse or time of day, could also generate errors in data collection. Critically, the cost of a face-to-face approach prohibits the researcher from pursuing this method.

Initially, to evaluate the survey design and to appraise the interview technique, a pre-test was conducted, based on ten elderly respondents. With this goal in mind, the pre-test was administered during the week of December 1, 1994. The types of answers expected and the extent to which these answers provide the desired data were determined by the pre-test. During this stage, the 'other, please specify' category offered new alternatives for the list of closed-answer questions. Also, the pre-test offered new insights into the problems elderly face; hence, the survey design was altered to include this new information.

Once the pre-test was completed, and problems were noted and corrected, the main survey commenced. From January 5 to March 31, 1995, 158 potential

respondents were approached to participate in the survey. A 27-percent refusal rate or 41 refusals, was partially attributed to the method of sampling. The sample size of respondents and refusal rate for each group are shown in Table 3.2.

Table 3.2: Stratification of Survey Respondents:

	Group 1	Group 2	Group 3	Total
Valid	51	29	35	115
Refusal	10	18	13	41
Invalid	0	1	1	2
Total	61	48	49	158

To obtain a large enough sample, the elderly were sampled at a large variety of places. The sample methods included approaching potential respondents at elderly social organizations, using a mail survey, sent out to users of specialized transportation services, and handing out surveys at retirement and nursing homes. Since there is no population record of elderly people of the age of 60 available to researcher in a suitable form, and because of time restrictions on the researcher, this was a practical method to obtain a sample. The social organizations, including religious meetings, recreational organizations, and social associations, provided a convenient way for the researcher to contact potential respondents. When a potential respondent was approached, the researcher asked if he/she would be interested in completing a survey. If the respondent said yes, they were handed a survey to fill out at home and mail back to the researcher.

Using this approach, surveys were also mailed out by different transportation providers to appropriate individuals. Likewise, because of an overlap, the people

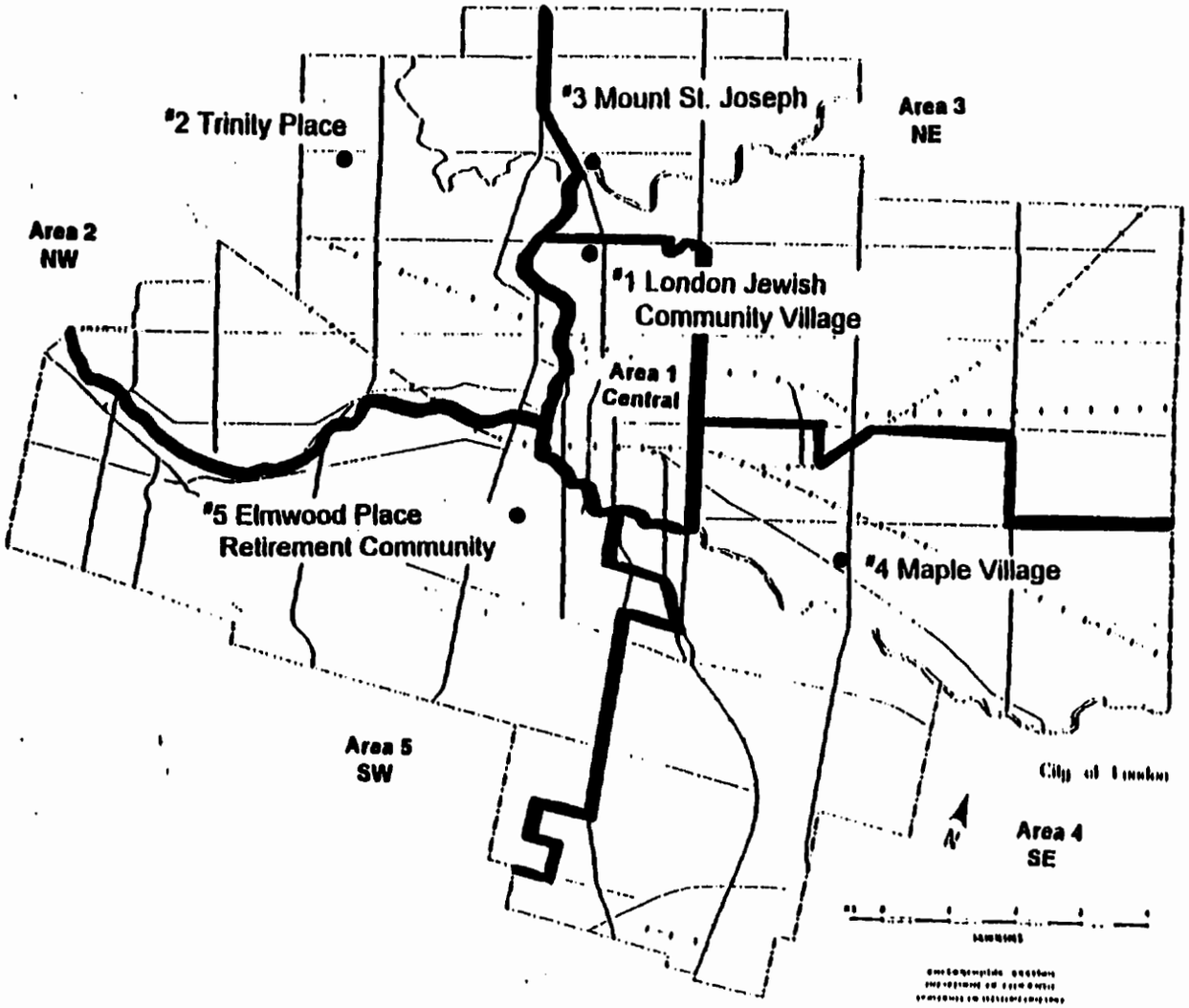
interviewed at social organizations, who also use specialized transportation services, were included in this group instead of the first group. Because of time and budget limitations, a clustered sample technique was used to locate five retirement homes in the city. With a clustered sample technique, a random sample of individuals is taken from a random sample of homes. As shown in Figure 3.3., one retirement home was selected randomly from each of the five sections of the city as designated by census boundaries. Then, the administrators of the homes were contacted to see if the researcher or staff could pass out a questionnaire to a random selection of individuals. The administrators were informed of the value of the survey to their organization and were told they would receive a copy of the final report. If the administration refused to participate in the survey, the next closest home was contacted.

Although this is not an ideal way to obtain a sample population, it is necessary because there is no age-based record of citizens in the city. Hence, the assumption of randomness is tenuous, and acceptance of the results must be made with this in mind. The only other way to get respondents, random phone calls to find people over the age of 65, would be too time-consuming and impractical.

3.72 Format

The questionnaire was divided into a cover letter explaining the purpose of the research, questions concerning transportation patterns, and inquiries about individual attributes of respondents. At the beginning of the survey, each

Figure 3.3: Location of Selected Retirement Homes for London, Ontario (1996)



respondent was handed a cover letter outlining the purpose and value of the research and instructions. Most of the survey questions used a close-ended format based on a fixed list of alternative responses. As the set of alternative answers is uniform, differences between sub-groups are easily comparable. Most importantly, this method makes the questions clearer to the respondents, reminds them of alternatives that they might not have considered, and facilitates data entry (Rea and Parker 1992, 38-39).

Despite indications that close-ended questions are easier to complete, there is the possibility that respondents might not answer questions in a thoughtful fashion (Rea and Parker 1992, 38-39). Moreover, participants might be unsure of the best response and the question could be misunderstood or influence their opinions (Scheaffer, Mendenhall, and Ott 1990, 44). Anticipating these possible errors in data collection, most of the closed-answer questions also had a section for other responses (Rea and Parker 1992, 38,42).

A few questions used an open-ended format with no pre-existing response categories. This allowed respondents a great deal of latitude for their answers. Although the responses tend to be less clear, take more of the respondent's time, and make data analysis more difficult, the open-ended questions were used where a close-ended format would produce unsatisfactory responses and where it would be useful for respondents to express shades of meaning and to go into further detail (Scheaffer, Mendenhall, and Ott 1990, 44).

For comprehensive and precise responses, the layout of the questions is critical. Questions were standardized throughout the survey and made as simple

as possible. The order of the questions is also important. To encourage individuals to answer questions, the first few inquiries asked for straightforward and uncomplicated answers. Avoiding sensitive information or complicated questions at the beginning stimulated interest in the questionnaire without confusing, threatening, boring, or offending the respondent (Rea and Parker 1992, 45). Following these queries, the questionnaire had a sequential order of related questions designed to avoid confusing the respondent.

3.73 Survey Questions

The survey was administered to collect categorical data about the social-demographic characteristics of respondents and their travel behaviour. Then the survey asked respondents about problems experienced using different transportation modes. Since travel patterns may not accurately reflect an individual's preferences or demands, the survey also asked respondents if they would travel more often if suitable transportation was readily available, and what needs are not being satisfied by present forms of transportation. Finally, the respondents were asked how their transportation situation could be improved and what transit services they would use more if they had the opportunity. The cover letter and questionnaire appears in Appendix 1.

Many of the survey questions are based on studies by Carp (1971), Carp (1974), and Ministry for Senior Citizens Affairs (1985a and 1985b). Even though it would be useful to ask more questions, a longer survey might increase the

reluctance of respondents to participate in the survey. Ideally, the questions are designed to provide sufficient information on the object of the study without taking excessive space and time.

It is essential that the independent and dependent variables be identified and noted. "The independent variable is the change agent, or the variable that attempts to explain changes in the dependent variable" (Rea and Parker 1992, 189). Therefore, the independent variables precede, influence, or act on the dependent variable. Below is a list of independent and dependent variables used in this study.

Table 3.3: List of Independent and Dependent Variables.

Independent	Dependent
- Residence	- Problems using different transportation modes
- Living arrangement	- Walking, buses, and cars
- Health	- Concerns about safety outside the residence
- Sex	- Difference in travel difficulty between summer and winter
- Age	- Kind of assistance needed
- Martial status	- Travel frequencies
- Use of transportation facilities provided for elderly	- Activities respondents would like to participate in outside their homes

3.74 Strengths of the Survey

Since this research had a limited budget, the reduction in cost of a mail survey was essential. Nonetheless, it was important that respondents have ample

time to respond to questions. The questionnaire could be completed at the respondent's convenience. Furthermore, respondents may feel that their responses are more anonymous when there is no personal contact with the interviewer. In fact, this anonymity is important when surveying the elderly, especially for older women, because many are fearful when contacted by an unknown person (Rea and Parker 1992, 8). According to Raj (1972, 117), some respondents might answer questions in a mail survey which they would not do through a face-to-face interview. Ultimately, there is reduced interviewer bias because each respondent is exposed to precisely the same wording on questions.

3.75 Weaknesses

Bias, either by a respondent, analyst, or interviewer, may be introduced at any number of points in an investigation. Ideally, by recognizing problems at the beginning, bias can be minimized. However, since it is only possible to reduce some of the errors, the researcher must identify how these problems might influence the results. For example, in using a mail survey approach, there is a lack of interviewer involvement to clarify questions and to record spontaneously volunteered information (Rea and Parker 1992, 8). Unfortunately, bias may also be introduced when respondents do not care to complete and return the questionnaire.

Sometimes, especially for personal questions, the respondent might answer incorrectly or not at all. Hence, using broad categories or class intervals for response to questions of a personal nature, such as age and income, may reduce

some inconsistencies, but sacrifice information. In some cases, a respondent may miss filling out one or two questions, thus creating a partial non-response. When there is a difference between the characteristics of a partial respondent and a full respondent, a sampling error may result. Identifying and evaluating the importance of these errors can be difficult. Questions that might provoke objections from respondent were placed at the end of the survey. At the outset, the participants were informed that they may discontinue the survey at any time.

Unfortunately, Question 16, "what problems do you have using a car", failed to yield reliable data because of confusion over the wording. Some of the respondents thought they should only answer the question if they drove, while others answered the question even if they did not drive. Hence, answers to this question are not used in the analysis. During data entry, a visual inspection of the data was undertaken to reduce possible errors to a minimum.

3.8 Data Coding

Using a standard approach, survey questions were coded and questions with missing information were identified. Since the survey contained many questions, there was no reason to drop a respondent from the analysis if he/she failed to answer a few questions. Perhaps, the respondents felt the question was not applicable, or they might have just simply missed the question. Whatever the case, it does not mean that the rest of the answers are invalid. Where it is applicable, questions with missing information are noted.

After the data were collected and the coding procedure established, categorical data were entered into Borland's Paradox for Windows. Once the data were entered and queries were performed in a Fox Pro data base, Minitab for Windows was used to tabulate and analyze the data. For qualitative data, information was summarized qualitatively by the author.

3.9 Data Analysis

After confirming that the survey data were representative of the total elderly population in London, the information was used to induce findings about senior citizens' travel behaviour and life styles. Since this study calls for a simultaneous analysis of more than one variable, contingency tables were used to examine relationships between two or more variables (Appendix 2). Since a contingency table offers an explanatory dimension to the frequency distribution, the study can measure the influence that one variable may have on another. Besides, the table provides additional information on how the variables vary among sub-groups of the elderly population. With a contingency table, the results can be visually compared to measure differences in the dependent variable (row) for each independent variable (column) (Rea and Parker 1992, 188).

When using the tables, tests of statistical significance and strength of association must be conducted. These tests are needed to discriminate among the massive amount of data generated by the survey. By identifying the strength of association between variables, the tests are able to point out the most significant

findings (Rea and Parker 1992, 190-192).

After the data were organized into contingency tables, a Chi-Square test of significance was preformed to identify differences that may be due to random sampling error. Since it is a fairly general test that allows verification of whether or not empirically-derived frequencies are significantly different from expected theoretical frequencies, the Chi Square test is suitable for this study. To discover if there are true differences among the categories of variables, the test of significance compares the differences between the frequencies expected and the ones obtained. As such, the following equation was used to test statistical significance.

$$X^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

where

X^2 = the Chi-Square statistic

f_o = the actual frequency

f_e = the expected frequency (Rea and Parker 1992, 193-194)

If any of the cells in the contingency table contain an expected frequency of less than 5, the chi-square test can be inadequate. In appropriate instances, these categories were merged with other categories to eliminate errors in the calculation (Rea and Parker 1992, 198). For example, in the Chi Square test of age versus "would you travel more often", the original matrix contained 12 blocks, of which 4 contained frequencies of less than five (Appendix 2 Table 56). To minimize the

potential influence of low frequencies that might affect the results, the original matrix was compressed to 6 from 12 blocks. Age was categorized into one of three groups of 60-69, 70-79, and 80+ in the matrix to calculate the Chi Square.

Whether one was comparing a variable such as "fear of crime during the night" or "would you travel more often", the practice of categorization was maintained fairly consistently. However, to minimize low frequencies in several cases the matrix had to be compressed in subsequent tests. When two variables have no significant relationship between them, the Chi Square test confirms the null hypothesis. Because of a low number of recorded frequencies for some variables, relationships between a few of the variables could not be analyzed.

The Chi-Square test was calculated on the questions that are nominal in scale. For a nominal scale, the data are placed into categories and the frequency of occurrence is counted. The scale does not imply an ordering or ranking of the data; it simply labels or identifies the observations that comprise the survey data (Rea and Parker 1992, 64).

Compared to the nominal scale, the questions that use an ordinal scale rank the categories in a logical sequence. When calculating the Chi-Square for these questions, a median test is employed. If a nominal Chi-Square test is utilized, a large variance in one of the cells may result in an incorrect assumption. Therefore, a median test collapses the dependent variable into two categories of above the median and at or below the median. Afterwards, the Chi-Square is tested using only the two rows of dependent variables that are formed (Rea and Parker 1992, 64,198).

Once the calculations are completed, the researcher refers to a table of critical Chi-Square values to interpret the calculated figures. If a calculated value is less than the Chi-Square value, the differences between the cells are attributed to sampling error, rather than to a genuine relationship. To compare the calculated value with the table, the degrees of freedom is computed by the following equation:

$$df = (r - 1)(c - 1)$$

where

df = degrees of freedom

r = the number of categories of the dependent variable: row variable

c = the number of categories of the independent variable: column variable (Rea and Parker 1992, 196)

Although the Chi Square statistic identifies if a relation exists, it does not measure the strength of the relationship. Consequently, Cramer's V and Phi (O) tests were used, depending on the circumstances, to gauge the strength of association for the calculated Chi-Square. To this end, the formula for Crammer's V is:

$$V = \sqrt{\frac{X^2}{n(M - 1)}}$$

where

V = the strength of association

X^2 = the calculated Chi-Square

n = the sample size

M = the minium number of rows or columns

In turn, Phi (O) is a special case of Crammer's V, where one of the variables only contains two categories. With this in mind, the formula for Phi (O) is:

$$O = \sqrt{\frac{X^2}{n}}$$

where

O = the strength of association

X^2 = the calculated Chi-Square

n = the sample size

The results for Chi Square and Crammer's V for all the tests referred to in this study are listed in Appendix II.

In some cases, factors other than a designated independent variable might account for observed relationships between variables. Under these circumstances, the relationship is only spurious, or not genuine, and invalidates any conclusions. Hopefully, such relationships have been identified by the author.

After the data were analyzed by the author, results were compared with findings from other studies. As well, any significant differences between results were fully analyzed. This step is essential to determine any possible errors in the author's research approach or any changes in individual behaviour since the earlier studies were conducted.

3.10 Summary

Applying the theoretical approach of Hägerstrand, this study uses a survey to establish factors that constrain elderly travel behaviour. Elderly sub-populations are identified to ascertain if restrictions in activity behaviour are related to increasing constraints on travel. Likewise, the survey determines how other factors, such as age, gender, living arrangements, may or may-not constrain movement. Although a larger sample size would help strengthen the study, time and cost limitations prevented the collection of a larger data base. It is believed the data collected and the methods of analysis, regardless of weaknesses, satisfactorily reflect elderly behaviour, perceptions, and attitudes.

The following chapter considers the results of the survey and provides an analysis of the survey data. In turn, each elderly sub-population is discussed in relationship to travel constraints. Finally, factors that produce positive or negative influences on travel behaviour will be examined.

Chapter 4 - Analysis and Results

This chapter presents and analyzes the results of the questionnaires. The three sample groups, independent community residents who do not use transportation services specifically provided for older people (Group 1), community residents who use at least one transportation service designated for older people (Group 2), and retirement home and nursing home residents (Group 3), are discussed according to factors affecting mobility. After the results are presented and analyzed, specialized services provision in London and Ontario government policies for specialized transportation are reviewed. Recommendations based on the results are suggested in the final chapter.

4.1 Goals of Analysis

To arrive at an evaluation of the research hypotheses, specifically to establish the constraints on elderly travel behaviour, this chapter examines the results of the survey and interviews with service providers. This researcher seeks to identify the constraints on travel patterns faced by each of the three types of elderly sub-populations. After this, other factors, such as gender, age, living arrangements, are analyzed to ascertain if they offer statistically significant explanations of relationships. Unfortunately, there is a degree of personal interpretation involved in any analysis, even if the statistics clarify differences

between groups. However, the researcher is confident the analysation reflects accurately the views of the respondents.

4.2 Verification of Sample

Bearing in mind that the survey sample is relatively small, a visual inspection of the data was undertaken to detect any major errors. Accordingly, inappropriate responses were removed before analysis. Likewise, responses in the 'other, please specify' category were reviewed to see if they would fit in a pre-coded category.

Of particular importance for a mail survey, this stage established the validity of the data. Systematically, the reasons for non-responses and incorrect responses were accounted for and examined. Any resulting biases, due to low return rates, were identified and explained.

4.3 Comparing the Sample and Census Data for Age and Residential Location

To ensure that respondents surveyed constituted an accurate representation of elderly in London, the sample was compared with census counts on elderly population in London (Table 4.1). As shown, the sample tended to under represent men and people under the age of 64. Based on a visual inspection of the data, overall the differences are not significant and, under the circumstances, represent the population as best as possible. However, these differences are not viewed as a major problem. Since some men are reluctant to fill out a survey and are more

Table 4.1: Comparison of the Sample with the Elderly in London.

Total for London

	Male		Female		Total	
	n	%	n	%	n	%
60-64	7645	12.32	8265	13.32	15910	25.63
65-74	12055	19.42	15390	24.8	27445	44.22
74+	6535	10.53	12175	19.62	18710	30.15
Total	26235	42.27	35830	57.73	62065	100

Source: Statistic Canada (1991).

Sample

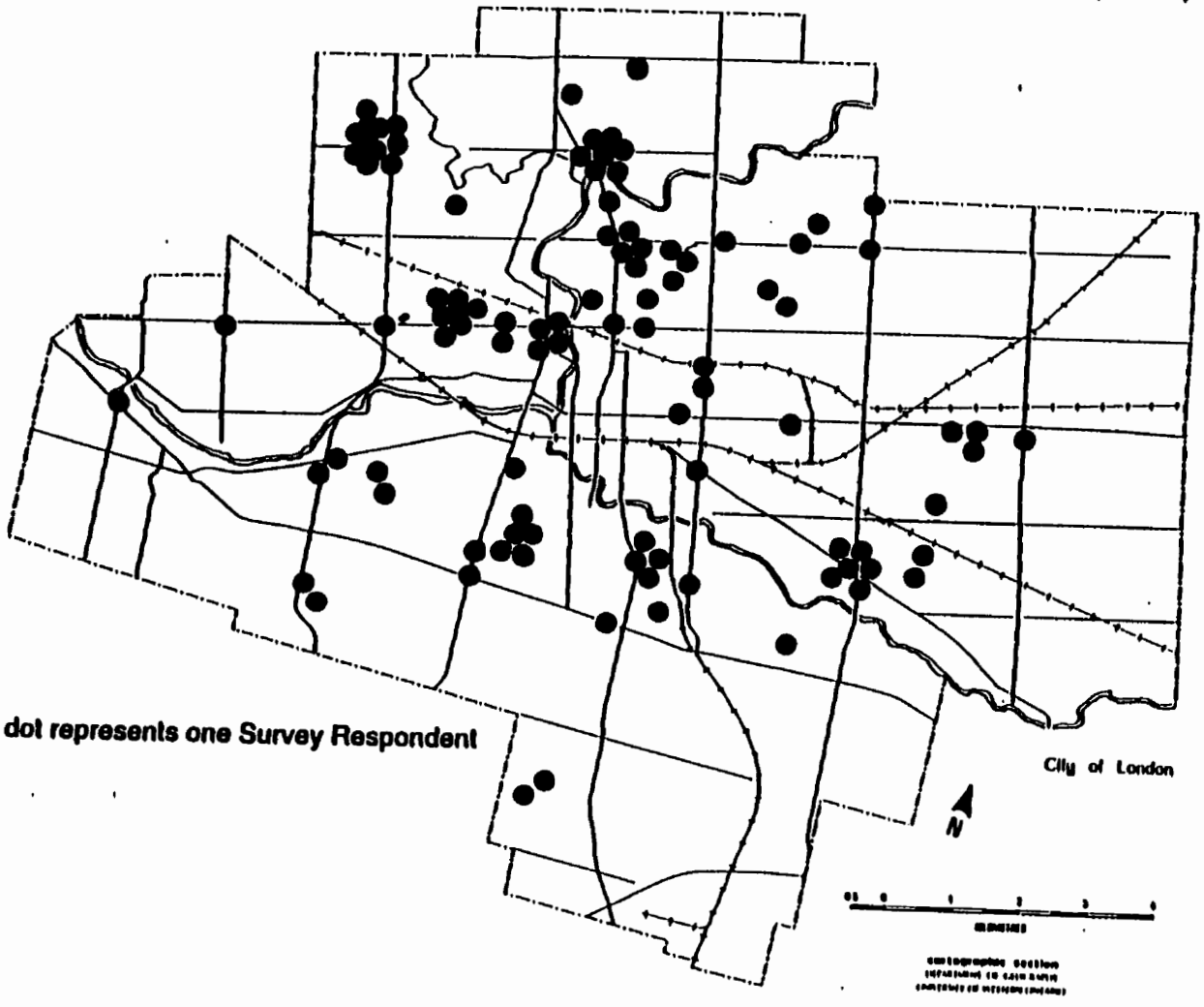
	Male		Female		Total	
	n	%	n	%	n	%
60-64	2	1.75	6	5.26	8	7.02
65-74	17	14.91	27	23.68	44	38.60
74+	17	14.91	45	39.47	62	54.39
Total	36	31.58	78	68.42	114	100

Source: Survey by Author, 1995.

likely to give it to their spouse instead, this could explain why woman were over represented in the survey. In turn, the over representation of older people in the survey probably resulted from the large number of respondents sampled at retirement homes.

As a final step in the verification of the sample, the respondent's nearest intersections were plotted on a map of London (Figure 4.1). After the respondents' locations were plotted, the percentage of respondents for each of the five areas was compared with the actual elderly population distribution in 1991 (Figure 4.2 and

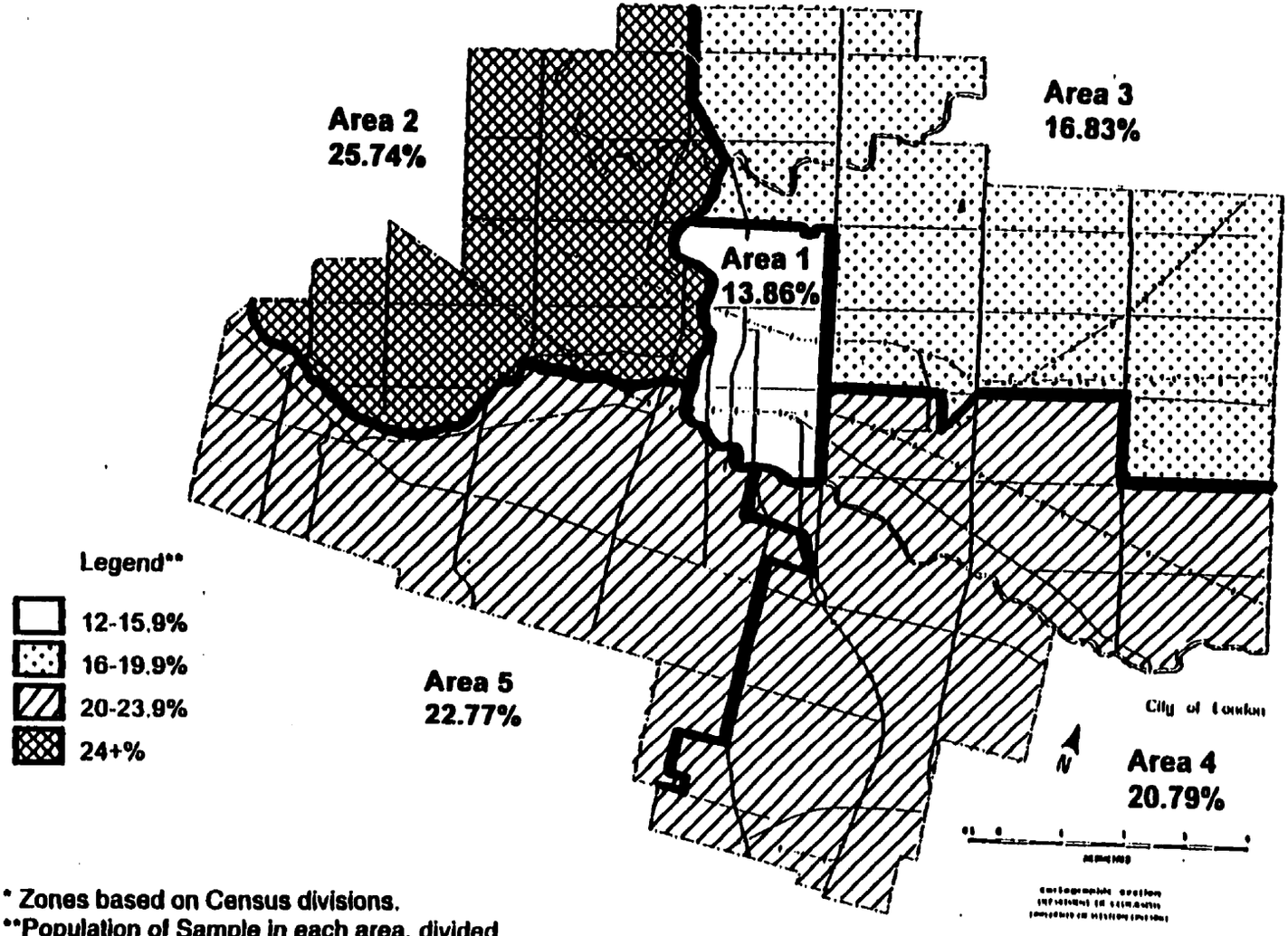
Figure 4.1: Location of Survey Respondents in London, Ontario (1995).*



* one dot represents one Survey Respondent

Source: Survey by Author (1995).

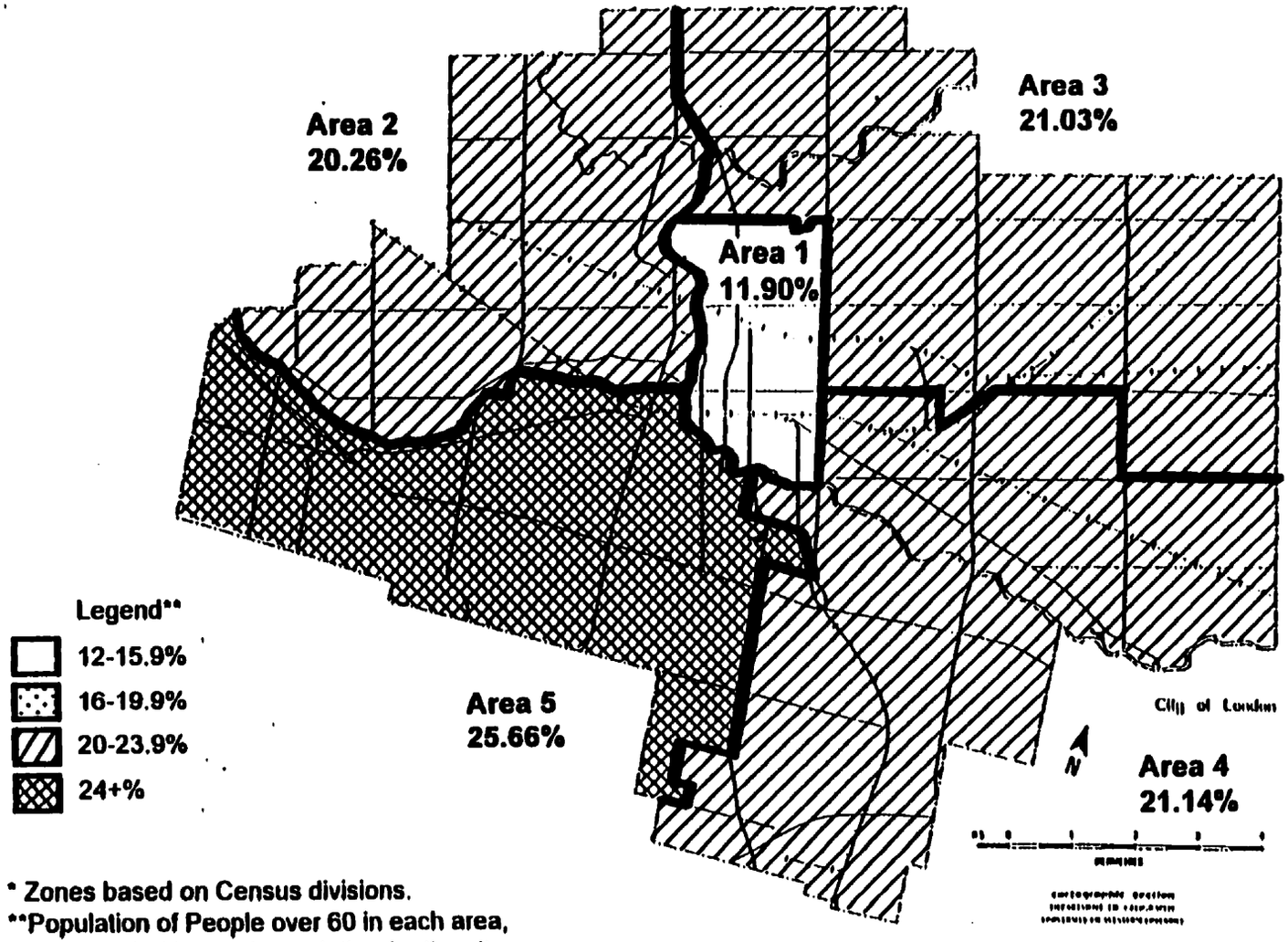
Figure 4.2: Distribution of Survey Respondents for London, Ontario (1995).*



* Zones based on Census divisions.
**Population of Sample in each area, divided by total sample population for the city.

Source: Survey by Author (1995).

Figure 4.3: Elderly Population Distribution for London, Ontario (1991).*



* Zones based on Census divisions.
**Population of People over 60 in each area, divided by total population for the city.

Source: Statistics Canada (1991).

Figure 4.3). After these maps were plotted, a Chi-Square test was perform to see if there was any significant differences between the sample population distribution and actual population distribution (Table 4.2). The test indicates that there is no major difference between the sample population distribution and the actual elderly population distribution. Although differences in age group and gender representation apply to the survey and census data, the survey warrants analysis because it provides reasonable representation of the three specified study groups.

4.4 Demographic Characteristics of Respondents

In this section, the demographic characteristics of age, sex, marital status, housing, and living arrangements of the sample are reviewed. Twenty-three percent of the respondents were between the ages of 60 and 69, 42 percent were in the 70 to 79 years-of-age bracket, and one-third of the sample were over 80 years of age. Notably, more than two-thirds of the sample were women; the percentage of women

Table 4.2: A Comparison of the Sample Population Distribution and Actual Population Distribution.*

	Area 1	Area 2	Area 3	Area 4	Area 5
Sample	13.86	25.74	16.83	20.79	22.77
Population	12.02	20.46	21.24	21.35	25.91

Chi-Square=3.02
Sign. at .95 level: No
*note: All values are in percentages

Source: Survey by the Author, 1995 and Statistics Canada (1991).

increased in the older age cohorts.

Almost half of the residents were widowed, thirty-six percent were married, nine percent were divorced, and ten percent were single. While the number of men roughly equals that of the women in the "Married" and "Divorced" categories, women outnumber men by a ratio of four to one in both the "Widowed" and "Single" designations. The likelihood of being married decreases with age: only 14 percent of people over the age of 80 were married.

Upon considering the types of residents, it was found that one-third of the respondents lived in their own homes, 36 percent occupied apartments or condominiums, and 30 percent resided in retirement homes. The majority of the survey population lived alone. In contrast, only one third of the total survey population lived with a spouse. Another 13 percent lived with friends or family. Over two-thirds of the people over 80 years of age lived alone, indicating that age profoundly influences a person's living arrangements. Despite the findings noted above, age and gender did not appear to have a significant impact on those respondents who were living in an independent home. On the other hand, the number who lived in their own homes was significantly lower for both widows and widowers.

4.5 Results of the Analysis

The researcher's main hypotheses test how the ability to travel is related to housing choice and reliance on specialized transportation services. Survey variables

help establish the most significant constraints on travel. The Chi Square test provides a basis for identifying the most statistically significant associations, while Crammer's V gives an indication of strength (Table 4.3). Significant variables at the .95 level for Chi Squares are indicated in the table.

Since questions 3,4,5,6,13,16,17,21, and 23 (see Appendix 1) did not allow for mutually exclusive responses, the calculation of Chi Square statistics was not possible. Questions that had high levels of missing data were not subjected to Chi Square analysis. Responses to these questions are, however, useful in subsequent interpretations. The following sections evaluate the results to determine constraints on elderly travel behaviour and restrictions on patterns of activity.

4.6 Constraints on Elderly Travel Patterns

4.61 Location of Residence

In order to ascertain a senior's transportation requirements, it is necessary to consider whether or not they perceive the location of their residence as too far from social and material resources. Since access to services, family, and friends is an important component of an individual's quality of life, the potential inability to satisfy these needs is relevant to this study. It was hypothesized that Group 2 and Group 3 would reply that their residence location was too far from services, a factor that may relate to inadequate access to transportation services.

According to expectations, only 39 percent of Group 1 stated that their residence was too far for some of their needs (Appendix 2 Table 8). In contrast, a

Table 4.3: Chi Square Test Results and Strength of Relationship (Crammer's V) for Survey Variables.

Strong Relationships:	Chi-Square	Crammer's V	Sign. at .95 Level	Table # in Appendix 2
Martial Status and Using Public Transportation	26.830	0.4939	yes	2
Gender and Using Public Transportation	20.211	0.4211	yes	3
Age and Using Public Transportation	30.266	0.5176	yes	4
Martial Status and Driving	24.257	0.4696	yes	7
Health and Assistance Needed to Walk	29.585	0.5072	yes	15
Age and Assistance Needed to Walk	21.177	0.4310	yes	16
Category Code and Assistance Needed to Use Bus	39.686	0.4500	yes	21
Driving and Activities You can not do	21.057	0.4355	yes	22
Driving and Would You Travel more Often	23.426	0.4769	yes	23
Category Code and Walking in Winter	21.690	0.4401	yes	25
Age and Walking in Summer	19.100	0.4130	yes	26
Problems from Health and Activities You can not do	33.278	0.5684	yes	46
Category Code and Would You Travel more Often	21.968	0.4596	yes	54
Health and Would You Travel more Often	22.997	0.4702	yes	55
Strong-Moderate Relationships:				
Gender and Driving	13.746	0.3473	yes	5
Age and Driving	14.807	0.3620	yes	6
Residence Type and Assistance Needed to Walk	13.651	0.3460	yes	16
Category Code and Walking in Summer	11.701	0.3218	yes	24
Age and Walking in Winter	15.946	0.3790	yes	27
Residence Type and Walking in Winter	16.087	0.3790	yes	29
Category Code and Feeling Safe Walking at Night	14.997	0.3659	yes	34
Gender and Walking During Night	14.997	0.3676	yes	35
Residence Type and Walking at Night	12.681	0.3365	yes	38
Category Code and Problems from Health	23.314	0.3198	yes	41
Age and Problems from Health	21.310	0.3071	yes	42
Age and Would You Travel more Often	9.559	0.3046	yes	56
Marital Status and Would You Travel more Often	8.667	0.3638	yes	58
Residence Type and Would You Travel more Often	13.766	0.3638	yes	59
Weak-Moderate Relationship				
Marital Status and Assistance Needed to Walk	5.303	0.2196	yes	17
Who do You live with and Assistance Needed to Walk	7.624	0.2586	yes	18
Marital Status and Walking in Summer	9.162	0.2913	yes	30
Marital Status and Walking in Night	6.319	0.2430	yes	37
Marital Status and Problems from Health	4.586	0.2051	no	43
Residence Type and Problems from Health	14.107	0.2487	yes	44
Category Code and Activities You can not do	6.621	0.2431	yes	45
Martial Status and Activities You can not do	5.370	0.2230	yes	47
Who do You live with and Would You Travel more Often	7.297	0.2649	yes	57

Table 4.3: Chi Square Test Results and Strength of Relationship (Crammer's V) for Survey Variables (cont.).

Weak Relationships:	Chi-Square	Crammer's V	Sign. at .95 Level	Table # in Appendix 2
Category Code and Location of Residence	3.941	0.1851	yes	8
Gender and Location of Residence	1.441	0.1124	no	9
Age and Location of Residence	1.441	0.1124	no	10
Residence Type and Walking in Summer	1.905	0.1298	no	28
Marital Status and Walking in Winter	1.370	0.1132	no	31
Residence Code and Walking in Summer	1.426	0.1182	no	32
Age and Walking at Night	2.751	0.1567	no	36
Who do You Live with and Walking at Night	1.361	0.1107	no	37
Residence Code and Walking at Night	3.252	0.1777	no	40
Residence Code and Activities You can not do	2.819	0.1671	no	53
Gender and Would You Travel more Often	1.093	0.1030	no	60
No Relationships:				
Gender and Assistance Needed to Walk	0.703	0.0785	no	20
Residence Code and Walking in Winter	0.849	0.0917	no	33
Gender and Activities You can not do	0.521	0.0685	no	48
Who do You live with and Activities You can not do	0.659	0.0771	no	49
Age and Activities You can not do	0.689	0.0788	no	50
Residence Type and Activities You can not do	0.687	0.0780	no	51

Source: Calculated by author using the Minitab for Windows statistics software. Complete tabulations and statistical data are provided in Appendix II.

large proportion--58 percent--who use specialized transportation services felt that their residence was too far removed from some essential services. Depending on individual needs and perceptions, essential services can vary amoung the different groups. Finally, for Group 3, the results closely resemble those for people who availed themselves of specialized transportation services. The strength of association between the respondent category codes and the perception that their residences were too far away was a weak but statistically significant 0.1851.

Because the strength of association was only 0.1124 for both age and gender, they are not statistically significant variables that effect how survey participants view the location of their residence (Appendix 2 Tables 9-10). Results suggest that the hypothesis that older seniors and elderly women have stronger need for suitable transportation to maintain social wellness and general health was incorrect. In fact, the study has indicated a wide variety of seniors need access to transportion and services.

Furthermore, elderly who use specialized transportation or live in retirement housing expressed the strongest feelings of isolation from friends and services (Appendix 2 Table 11). Although specialized transportation is intended to meet the needs of the elderly, the survey results show that some of these needs are not being met. As mentioned, an extreme display of dissatisfaction regarding the isolation of their residence came from people in retirement homes.

4.62 Transportation Modes

To discover the transportation constraints that continually confront the elderly, it is necessary to determine which transportation modes they currently use. Although driving a car was most often selected in the survey, the other four modes: taxi cabs, walking, a passenger in a car, and bus, were also frequently used (Appendix 2 Table 1). When the information is broken down into the three categories of respondents, as outlined in Chapter 3.4, the most popular mode of transportation in Group 1 was driving a car. Since most members of this group indicated that they did not use cabs, ride buses, or walk on a regular basis, this suggests that the automobile offered them reliable transportation.

Conversely, survey Group 2, those who live independently in their own homes and use specialized transportation, reported a high dependence on taxi cabs. Almost 70 percent of Group 2 reported the use of taxi cabs on a regular basis. These numbers suggest that specialized forms of transportation were not meeting their needs. A further assumption that Group 2 members spend a sizable portion of their income on transportation, arises from the rates charged by taxi services. Because half of the elderly over the age of 70 make below fifteen thousand dollars a year, they are not able to afford taxis on a regular basis (Statistics Canada 1991).

Among the groups under consideration, walking, passengers in a car, and riding a bus, were prevalent modes of transportation. Only a few members of Group 2 reported that driving was their means of transportation. For survey Group 3, elderly who inhabited retirement homes, a large percentage of members responded

that they often walk. In comparison to Group 2, there was less reliance on cars and cabs as a means of traveling to various locations in the city of London.

When use of transportation services is examined for social-demographic groupings, people who are married, males, and below the age of 70, are less likely to use public transportation (Appendix 2 Tables 2-4). This confirms the findings by the Ministry for Senior Citizens Affairs (1985c, 15) and Ministry of National Health and Welfare (1993, 32), that women and unwed elderly primarily use the bus. In contrast, fewer women, elderly over 80 years of age, and married elderly drive a car (Appendix 2 Tables 5-7). Kington *et al.* (1994, 1328) substantiate these findings by observing that woman and older seniors in the United States are less likely to drive. Also, this finding supports the Ministry of National Health and Welfare's (1993, 29) observation that a higher proportion of elderly men than women possess drivers' licenses in Canada.

4.63 Problems Using Different Transportation Modes

Even though there is a wide selection of transportation modes available to the public, certain limitations and complications restrict the elderly from using them. Because walking is an important source of transportation for the elderly, it is vital to identify the constraints on walking. Decreased agility, reduced ability to see clearly—especially in low light, diminished strength, lowered endurance, and impaired hearing can all play a part in increasing complications with walking.

In the completed surveys, the participants indicated that problems with winter

weather were the most dominant constraint when walking (Appendix 2 Table 12). Health problems, fatigue—especially from hills and remote destinations, and fear of crime can also interfere with the ability to walk. It is interesting that, overall, only 17 percent of the survey population had no problem using walking as a mode of transportation.

Although they are perceived to have few restrictions on mobility, 73 percent of Group 1 mention at least one problem in walking outside. In contrast, only 7 percent and 11 percent of Group 2 and Group 3 had no problem walking. This emphasizes the presence of major obstacles, physical and other, that prevent most elderly from using walking as a means of transportation. Also, some respondents stated other problems: the need for something to hold on to when moving up or down slopes, problems involving shortness of breath, and inability to carry much weight or bulk, such as parcels from the store.

It was predicted that Group 1 would have the fewest difficulties with walking as a form of transportation. The results from the completed surveys were consistent with this expectation. Of the people who used specialized transportation, the majority declared that they had problems with walking during the winter months. This, then, suggests that the need for specialized transportation is greatest during the winter. In addition to weather conditions, health problems played a significant role in restricting Group 2 members' ability to walk. In contrast to the preceding problems, people who lived in retirement homes listed "fear of crime" as a strong barrier that interfered with walking.

A few of those surveyed specifically mentioned problems with irregular

surfaces of sidewalks and roads. As well, grades at curbs present difficulties for those elderly who are visually impaired or have balance problems. Similarly, many crosswalks are too busy and difficult to cross for visually impaired people. Another respondent related information about a heart condition that prevents him from "going out on windy and cold days."

Generally speaking, it appears that Group 2, people who use specialized transportation, need the most assistance in walking (Appendix 2 Table 13). Notably, almost half of this group reported that they require another person to assist them when they walk. Thus, these people need someone in attendance, instead of or in addition to a customized vehicle. Correspondingly, a major obstacle to using public transportation involves inability to walk to the bus stop or to board the bus!

It appears that health, age, and type of residence have a strong correlation with the need for assistance in walking (Appendix 2 Tables 14-16). Other factors that affect assisted walking include marital status and the immediate presence of other people in or around the place of residence (Appendix 2 Tables 17-18). For those elderly who have lower health, live alone, or are divorced or widowed, an increased need for walking assistance is evident. Gender did not have a significant effect with respect to assisted walking (Appendix 2 Table 19).

Due to a smaller proportion of elderly with drivers licenses, compared with younger adults, there is a greater reliance on public transportation. Since public transportation is an important means of mobility, it is of paramount importance to understand the difficulties that elderly people encounter when using the bus.

Respondents noted such difficulties as uncertain footing and balance on the bus, fear of falling, fatigue from waiting for the bus, and fear of falling when embarking and disembarking from the vehicle (Appendix 2 Table 20). This list confirms the findings of Peter Dunn (1990, 20) that elderly have the most difficulties while standing in a moving bus, mounting and dismounting the steps of the bus, walking to the bus stop, and waiting for the bus. Only slightly more than 25 percent of respondents affirmed that they had no problems using the bus; hence, public transportation is definitely not meeting the needs for the majority of elderly citizens.

It was reasoned that Group 1 should have the least trouble using the bus. This was indeed the case, as almost half of Group 1 did not report any problems with using the bus. In extreme contrast, survey Group 2 had the most difficulty: members frequently tired while waiting for the bus, had problems transferring between buses, and were often too exhausted to walk home from the bus stop. By expressing these concerns, this category of elderly demonstrates a clear need for door-to-door specialized transportation.

Problems with embarking and disembarking the bus commonly involve steps that are too high. Other problems not previously discussed but noted by respondents include inability to identify names of buses and bus routes due to poor vision, poor or absent knowledge about bus schedules, absence of bus shelters, and intervals between buses that are too long. Since most buses do not accommodate wheelchairs, a few of the survey participants could not use the bus.

Regarding assistance needed to use the bus, 54 percent of those surveyed expressed no need for assistance, whereas 33 percent of the sample population

needed assistance some of the time. Only 13 percent of the respondents needed human assistance all of the time. While 77 percent of Group 1 did not need any assistance riding the bus, only 31 percent of Group 2 could do without assistance all of the time (Appendix 2 Table 21). If there is no one available to assist the elderly, a major barrier to their riding the bus results.

By comparing "do you drive?" with "activities you cannot do," it was anticipated that inability to drive a car would represent a barrier to participating in desired activities. In actuality, there was a strong correlation between activities they cannot do and the ability to drive a car (Appendix 2 Table 22). On the other hand, when asked, "would you want to travel more often?", elderly who did not drive gave strong evidence that they would want to travel more often (Appendix 2 Table 23). Perhaps when the ability to drive is lost, a perceived loss in freedom occurs, accompanied by a yearning to participate in leisure activities. In and of itself, driving a car can be classified as a leisure activity, as in the so-called "Sunday drive" and "enjoying a drive in the countryside".

4.64 Seasonal Constraints

Since London, Ontario is situated in a northern climate, the changes of seasons have a marked influence on elderly mobility. During the winter, accumulated snow, ice, and resulting slippery surfaces can all restrict the elderly from walking outside their residences. It was expected that independent community residents would be less limited by inclement weather, while the other two groups

would be most limited. As expected, there was a moderately strong correlation between the ability to walk outside during the summer and category code, and the correlation between category code and the ability to walk during winter was also strong (Appendix 2 Tables 24-25). While the majority of independent community residents had few problems walking in winter weather, the majority of respondents in the other two populations communicated a range of difficulties. That these populations have considerable hardships walking during the winter, lends credence to the idea that specialized transportation is urgently required to help these people meet their needs, particularly in the winter season.

Like the correlation between category code and the ability to walk, the correlations between age and the ability to walk in both summer and winter were quite conclusive (Appendix 2 Tables 26-27). As well, people who live in retirement homes or apartments have, on average, greater impediments to walking in winter than people who live in their own house (Appendix 2 Tables 29). However, there was no apparent relationship between walking during the winter and marital status (Appendix 2 Tables 31).

If the city of London is divided into five sections, as described in the Methodology (Chapter 3), the areas of the city where the elderly face the most difficulties in walking can be isolated. Although it was assumed that seniors who lived in the centre of the city would have the greatest ease when walking, this was not the case (Appendix 2 Tables 32-33). Despite the availability of more services located in or near the centre of the city, getting to the service locations remains just as difficult for seniors.

4.65 Fear of Crime

Even though the elderly are not the most victimized group in our society, they are among the most vulnerable individuals. Fear of violence or victimization has physical, material, and psychological consequences that are more damaging to the elderly than for the rest of the population (Brillon 1987, 3). It was anticipated that Group 1 would have the least fear of crime and, as a result, be less restricted when walking outside. When the data were examined, these expectations were confirmed because Group 2 and Group 3 had a significantly higher fear of crime during the night than Group 1 (Appendix 2 Table 34). As such, fear of being victimized presented a strong barrier to those elderly who desired to walk outside at night. Because most survey participants responded that they felt safe or somewhat safe during the day, no significant correlation could be determined for this period.

A comparison of fear of crime with other independent variables yielded gender as a strong determinate. Almost two-thirds of the women remarked that they felt little or no safety at night; 42 percent of the men gave the same response (Appendix 2 Table 35). Perhaps, the men's response to this question was partly lower due to social stereotypes: specifically inability or resistance to admitting or articulating fears.

For the relationship between fear of crime and age, there was no correlation (Appendix 2 Table 36), This supports conclusions by Ferraro and LaGrange (1992, 242) and by Brillon (1987, 55) that gender is a critical factor in fear of crime, but that no correlation between age and fear of crime exists. Two other factors that exhibit

a moderate correlation were marital status and type of residence (Appendix 2 Tables 37-38). For women, seniors who are single or widowed and live in a retirement home, fear of crime is a serious impediment to walking. A few respondents noted that there was not enough lighting on the streets at night and that they felt "shut in". Contrary to prediction, there was no correlation between cohabitation and fear of crime (Appendix 2 Table 39). This unexpected finding may be explained in that the person(s) the respondents live with might not accompany them on walks sometimes.

When fear of crime was assigned to five sections of the city, there were no significant differences among regions (Appendix 2 Table 40). No matter where a senior lived, the fear of crime while walking was just as prevalent. Since this is contrary to the assumption that those elderly who lived downtown would have the greatest fear of crime, it shows that the fear of victimization is shaped by perceived vulnerability rather than by actual risk (Brillon 1987, 96). Both Ferraro and LaGrange (1992, 242) and Rittner and Kirk (1993, 370) observed that very few elderly have actually been victims of crime.

4.66 Problems Related to Health

Compared to the general population, changes in health can have greater repercussions on elderly mobility. It was suggested that Group 1 would have the fewest problems from poor health, while the other two groups would have more problems. Because slightly more than one-third of Group 1 had no problems with

health, this was the case (Appendix 2 Table 41). Only 7 percent of Group 2 and 9 percent of Group 3 had no problems with health. Also, as suspected, age was strongly related to overall health (Appendix 2 Table 42). To a lesser extent, residence type is moderately related to health problems (Appendix 2 Tables 43-44). In conclusion, it seems that health problems of older people imposed a powerful need for reliable transportation to meet their needs.

4.7 Restrictions on Activities

4.71 Mobility Constraints

Approximately half of the elderly indicated that there were activities outside their residence in which they could not participate. Approximately two-thirds of Group 2 and Group 3 reported that there were activities in which they could not participate, whereas slightly more than one-third of the first group returned the same information (Appendix 2 Table 45). These findings lend support to the hypothesis that Group 1 was the least restricted in activities in which they could engage. Clearly, the findings point out that current specialized transportation is far from suitable for meeting the needs of the elderly.

Health and marital status possess strong to moderate correlations with activities that seniors could not do (Appendix 2 Table 46-47). Surprisingly, gender, cohabitation, age, and type of residence did not play a part in determining if a respondent could participate in an activity (Appendix 2 Tables 48-51). Of the people unable to participate in activities, 19 percent indicated that they could not participate

in activities of a physical nature, 17 percent said that they were unable to participate in entertainment events, and 16 percent claimed that they were unable to engage in social activities. These figures notwithstanding, there was a pervasive belief among the respondents in being able to do what they want, regardless of age.

When asked about the most important factors restricting their activities, the respondents recounted problems with weather, no transportation, no time, and no companionship as the most obvious limitations (Appendix 2 Table 52). For those people who lived in retirement homes, about half of them indicated that they did not have transportation to enable participation in activities. Since the respondents mention they lack transportation to get to activities, maybe some people who live in retirement homes do not have access to information about alternative transportation sources, such as London Paratransit or the "Senior Transit Program".

Unlike Group 3, Group 2 expressed that they had no one to share or assist them in activities. Although specialized transportation can offer a means to get to an activity, at times, elderly are still unable to participate. If these seniors could have someone to assist them, it might enable them to take part in activities that they were previously unable or unwilling to join. Some respondents mentioned that there was no bus to take them to the grocery store and no access for wheelchairs at the store. Others found that taxi cabs were too expensive or not reliable during the night.

By assigning the respondents to five sections of the city, there was no correlation between where a senior lives and his or her ability to participate in activities (Appendix 2 Table 53). Overall, services tend to have a higher

concentration in the centre of the city. However, the assumption that elderly in this area of higher concentration would have the best access to transportation was not supported. Even though a service might be a few blocks away, the distance can still present a barrier to participation.

4.72 Further Assistance Required by the Elderly

To assure that planning proposals reflect the needs of the elderly, the potential demand for transportation and the transportation needs of the elderly must be assessed before making investments in specialized transportation services. For those people who live in retirement homes or use specialized transportation services, there was a strong indication that they would travel more frequently if suitable services were available (Appendix 2 Table 54), confirming the hypothesis that the two groups concerned would want to travel more.

Since over two-thirds of the seniors who use specialized transportation reply that they would like to travel more often if they could, it is surmised that the specialized transportation that is currently available is inadequate. Although only about one-third of Group 1 members expressed a desire to travel more often, it is likely that the entire group would benefit from more information about the options of specialized transportation. Possibly, the members of Group 1 could use the service, but they were unaware of its presence. Indeed, a number of survey participants remarked that they did not know that so many services were available.

As predicted, health, age, and who a person lived with were also related to

the need to travel more often (Appendix 2 Table 55-59). Yet, surprisingly, there was no significant correlation between gender and the need to travel more often (Appendix 2 Table 60). Hence, it seems that both males and females found that they were unable to travel as often as they wanted.

When asked "if you could get further assistance with transportation, what would you be interested in," 20 percent replied that they required financial assistance, 15 percent responded that they required someone to help them, and 11 percent wanted specialized vehicles. After responses were matched to the survey groups, elderly who used specialized transportation services related that their most important requirement was financial assistance (Appendix 2 Table 61). As this group also exhibited the highest rate of taxi cab use, it is assumed that they need financial assistance to pay for taxi cab services.

Seniors who live in retirement homes noted an urgent need for services to assist them, as well as specialized vehicles. Thus, they might not have information about those transportation services designed for the elderly and handicapped. As predicted, almost no one in Group 1 expressed a need for further assistance. Other suggestions offered by the respondents included taxi drivers who would help elderly in and out of the vehicle, drivers who understand the needs of seniors with disabilities, and more service from paratransit. Also, when comparing the desire to travel more often with location of residence in the city, it was observed that elderly who lived in the centre and northwest sections of the city wanted to travel more often than those in the other regions. No reasonable explanation for this observation was apparent.

4.8 The Role of Specialized Transportation

4.81 Services Used by the Elderly

As transportation services for the elderly become increasingly visible in the community, seniors who avail themselves of these services acquire a wide variety of perceptions and expectations about the services in question. Accordingly, this section provides a comparison of transit systems and more information about available services. A wide assortment of specialized transportation services are provided by non-profit taxi companies, concerned citizens, municipal transit departments, and private contractors. Additional services are funded by different levels of local and provincial governments or by private donations. Table 4.4 summarizes the information on specialized transportation services in the city of London, Ontario.

London paratransit is one of the largest providers in the city. Since November 1977, paratransit has provided services for people with physical disabilities that parallel conventional public transportation. At the current time, 18 lift-equipped vehicles and three modified Aerostar minivans provide over 126,000 one-way trips within the city every year. London Paratransit has an advisory committee of well-informed and concerned citizens, which works on developing policy. Specifically, the committee reviews service applications, selects the best operator, and sets service standards and operating policies. Given that a number of committee members use paratransit, they provide a lot of practical and insightful input.

At present, London Paratransit contracts the service out to a private firm that

Table 4.4: Comparison of Specialized Transportation Services in London, Ontario, 1995.

Service Provider	Hours of Operation	Dates	Area	Accessibility	Eligibility	Fees
London Paratransit	7:30-11:30 Mon.-Fri. 8:30-11:30 Sat, Sun. & Holidays	All Year	London	Wheelchair	Persons who are permanently or temporarily disabled and unable to use regular public transit	Initial registration $30 for three years $2.00 per trip
Senior Transit Program operated by Memorial Boys and Girls Club of London	-Administration 8-4 Mon.-Fri.	All Year	London	Wheelchair	Seniors and physically disabled who are unable to use regular transit vehicles	$6.00 per trip
Friendship in Action	9-5 Mon.-Fri.	All Year	London	Wheelchair	Seniors living independently at home	No fees at present, but planning to charge a fee in the future
London Department of Social Services: Seniors Day Program	11-4 Tues.-Thurs. Office 8:30-4:30	All Year	London	Wheelchair	Independent Seniors 60 years and older	Daily registration fee (meals included)
Meals on Wheels	8:30-4:30 Mon.-Fri.	All year	London	Anyone living at home	Ill, handicapped, house-bound, or frail persons who are unable to prepare their own meals or otherwise obtain them	$6.00 per meal
About Town Ltd.	All Day	All Year	London	Wheelchair	Anyone who uses a wheelchair	Taxi meter Rate
Canadian National Institute for the Blind (C.N.I.B.)	8:30-4:30 Mon.-Fri.	All Year	Middlesex, Elgin Perth, Lambton, and Huron	-	Visually impaired, blind, or deaf-blind persons and their families	None
London Food Services Training Center Inc.	8-4 Mon.-Fri..	All Year	London and Middlesex	-	Any elderly person, no age restriction	$7.50 for 4-5meals a week $7.00 for 2-3 meals a week
London Transit Commission	During regular bus hours	All year	London	have to be able to board the bus	Need senior identification card and proof of city residency	Reduce Bus Fares

Source: Personal Interviews by author and Information London (1995).

Table 4.4: Comparison of Specialized Transportation Services in London, Ontario, 1995 (cont.).

Service Provider	Application Process	Description
London Paratransit	-registration is necessary -medical certification is required -each trip must be pre-booked	-provides a specialized accessible-door-to-accessible-door public transportation service within the old city limits and to London Airport and the London Gardens
Senior Transit Program operated by Memorial Boys and Girls Club of London	-book 24 hours in advance by calling dispatcher	-special transportation service -equipped with a wheelchair lift -provides transportation to hospitals, clinics and doctor's appointments - priority is given to seniors attending day programs at Parkwood Hospital, McCormick McCormick Home, Dearness Home, and the Horton Street Senior Citizen Center
Friendship in Action	-self referrals -referrals by professionals	-assists older people to continue to live as 'independently as possible in their own home, offers special transportation for medical appointments for seniors 60 years of age or older, matches adult volunteers with elderly persons who act as friendly visitors on a long term bases
London Department of Social Services: Seniors Day Program	-self referrals	-recreational and leisure programs, personal care, noon meals, baths/whirlpool, physiotherapy, transportation, professional nursing services
Meals on Wheels	-referrals from self, family members, health agencies, home support programs and professionals -call to register	-volunteers deliver one hot meal a day during the noon hour Mon.-Fri. -aims to help eligible persons to continue to live independently in their own homes
About Town Ltd.	-need 15 min. notice, more during peak hours and during church 'hours, depending on location	-accessible taxi service for people who use wheelchairs -2 vans available
Canadian National Institute for the Blind (C.N.I.B.)	-medical certification required or direct services to the blind	-orientation and mobility: involves working with the clients 'to establish 'familiarity with their environment and developing 'the mobility skills required to move about independently
London Food Services Training Center Inc.	-self referral, just call the center -anyone who is not able to cook	-trains people to produce and deliver meals to frail, elderly, and physically disabled persons -also take care of the person during the visit
London Transit Commission	-need senior identification card and proof of city residency	-reduced bus fare with proof of age and city residency

Source: Personal interviews by author and Information London (1995).

is paid on a trip-by-trip basis. Because demand for this service has drastically increased, a person might not be able to obtain a ride unless they book at least a day in advance. Unfortunately, for those people who require daily rides through subscription booking, it is increasingly difficult to fulfill their needs (Dupee 1994). If the city follows through on their plan to cut back the number of trips provided by London Paratransit by 9.4 percent in 1997, the ability to get transportation to fulfill necessary trips will be reduced. Table 4.5 shows that fleet distribution has a peak time during 6-9 a.m. and 2-4 p.m., while there is reduced service during weekends and evenings.

Whereby London Paratransit is a large service provider that is mostly funded by the government, there are also more "grass roots" service providers in the city of London. An example is "Friendship in Action", which assists elderly people in living independently, arranges friendly visits, and provides specialized transportation for elderly to attend medical appointments. Funding for all of the services offered by "Friendship in Action" comes from United Way, fundraising dinners or auctions, the Ministry of Health, and a small grant from the municipal government. The drivers, who are paid per kilometer, often donate the money back to the provider. Since the drivers use their own vehicles, helping people who use wheelchairs is difficult for the organization. Even though there are over 55 volunteers to drive seniors to medical appointments, all demands are not met because many drivers have other commitments.

"Friendship in Action" also provides volunteers for house-bound seniors who want companionship, students to help with household tasks, or a reassuring voice

Table 4.5: Fleet Distribution for London Paratransit, 1992.*

	6-9 a.m.	9-11 a.m.	11-2 p.m.	2-4 p.m.	4-6 p.m.	6-9 p.m.	9-12 p.m.
Weekday	20	15	15	20	15	5	5
Sat. and Sun.	5	5	5	4	4	4	4
Holidays	4	4	4	3	3	3	3

*note: Based on number of vehicles

Source: Ministry of Transportation (1992, 78).

on the phone via their chat line. By means of a board of directors that consists of twelve people, "Friendship in Action" tries to help those elderly who cannot get help from other providers (Wax 1994). In addition to these transportation services, a number of companies and non-profit organizations offer seniors home delivery of groceries and other goods. In fact, the services listed in Table 4.6 represent a wide range of medical, food, and counseling services to the elderly.

4.82 Provincial Funding Policies

Overall, provincial programs have three major goals:

1) enable elderly to remain independent in the community;
2) to assist the elderly to afford the basic necessities of life; and
3) provide care for senior citizens when they are unable to live in the community (Task Force on Aging 1981, 7)

After much debate, the Ontario Provincial Government introduced Bill 173 on Long Term Care in 1994 and amended it in 1996. Essentially, the act covers a wide range of service providers including professional, personal support, homemaking, community, and community support services. Some purposes of the act include:

1) to ensure that a wide range of services is provided to allow people to remain in their homes;
2) to provide support for people who care for a person at home;
3) to promote the health and well being of people using these services and to improve the quality of services;
4) to recognize the importance of a person's preferences and needs in the delivery and management of services;
5) to encourage local community and volunteer involvement in the service agencies;

Table 4.6: Specialized Services Offered to Seniors in London, 1996.

Transportation:
- At Home Service
- Canadian Caregivers
- Errands Galore
- Family Care Providers
- Helping Hands Transit
- Mardam Health Care Services

Home Health Services:
- Non-Profit:
  - Public Health Nurse
  - Home Care
  - Victorian Order of Nurses
- Private:
  - Amity Caring Services
  - Bradson Home Health Service
  - Canadian Caregivers
  - Community Home Care and Rehabilitation
  - Dynacare Health Group
  - Family Care Providers
  - Mardam Health Care Service
  - Nurses' Care
  - Olsten Kimberly QualityCare
  - Ontario Home Health Professionals
  - Para-Med Health Services
  - We Care Homehealth Service

Meals:
- Para-Med Health Services
- Francine's Cuisine Roulante

Friendly Visits
- League of Mercy
- Anything is Possible with Pat
- Olsten Kimberly Telephone Contact

Home Making Services:
- Integrated Homemaker Service

Medical Equipment
- Canadian Cancer Society
- Canadian Red Cross
- Moose Lodge
- Odd Fellows and Rebekah Humanitarian Service
- Ontario March of Dimes
- St. John Ambulance
- Midwest Medical
- Silver Cross

Cleaning and Repairs
- At Home Services
- Casual Labour Centre
- Community Home Support Program
- Over 55 London
- Matthew's Multi Services
- Student Outreach to Seniors
- WOTCH Employment Services

Counseling:
- Third Age Outreach Program

Source: Information London (1996).

6) to promote the development of multi-service agencies to improve access to services; and
7) to implement uniform rules, procedures and eligibility requirements and to promote equitable access to service (Ontario Provincial Government 1994, 808-809).

Under this act, the ministry can provide community services and funding for community services (Ontario Provincial Government 1994, 815).

When calculating the price charged for a community service, the provider approved under this act must charge the customer the same amount as for a person who is not eligible under the act (Ontario Provincial Government 1994, 851). Consequently, disabled or frail seniors have the right to transportation at the same cost as a non-disabled person, thus allowing these seniors to be better able to afford transportation. As well, an approved agency is required to evaluate, monitor, and improve the quality of the service provided through a quality management system. These agencies must implement a plan to recruit, train, and supervise volunteers to provide some services to seniors. Encouraging the use of volunteers allows agencies to become more cost-efficient and use available volunteers more effectively.

The act may also designate multi-service agencies to provide a wide range of community services within a defined geographical area. Accordingly, this allows for improved cooperation between service providers and more efficient use of resources. To be designated a multi-service agency, one-third of the board of directors of the service provider must have received or is receiving services from the agency. Furthermore, the board has to include people experienced in the social service field or health services and reflect the diversity of the people receiving

assistance from the agency. As a result, the demands, preferences, and needs of the elderly are more fully reflected and better understood by the agency. Since the agency has to provide information about services in the designated geographical areas, this allows essential information to be more readily available to seniors (Ontario Provincial Government 1994, 821-822).

The Parliament of Canada passed the National Transportation Act in 1987, which states that no mode of transportation under federal jurisdiction "so far as practicable should allow an undue obstacle to the mobility of persons, including those who are disabled." Under this act, the National Transportation Agency seeks to "eliminate undue obstacles in the transportation network governed by this act to the mobility of disabled persons." Unfortunately, except for airline regulations, this act has not had much impact on eliminating inequalities in access to transportation.

To assist municipalities with providing services to those individuals who are unable to climb or descend stairs or walk 175 metres, Ontario's Ministry of Transportation allocates financial support to transportation services for physically disabled people (Ministry of Transportation 1992, pvi). By providing validation of a person's inability to board regular transit facilities, the eligibility of an individual passenger for alternative programs is determined. Also, the eligibility of a passenger for special services may be ascertained by a municipal official or an eligibility committee.

Via direct request, a municipality can obtain funding for special transportation services. When the provincial government awards the operating subsidy, a minimum amount of 50 percent to a maximum amount of 75 percent of the net cost

of the service is funded. More specifically, the operating subsidy is reduced to two components based on Basic Operating Subsidy and Passenger Based Subsidy. If the services are provided by vehicles that are purchased with provincial funds, the Basic Operating Subsidy is 25 percent of the operating cost. Otherwise, those services using vehicles acquired without provincial funds have 30 percent of the capital cost funded by the province.

After calculating the Basic Operating Subsidy, a Passenger Based Subsidy rate of $3.50 per eligible passenger trip is also funded. In the case of London Paratransit, which contracts out services and uses vehicles that are not purchased with provincial funds, the service receives 30 percent of its basic operating cost. To illustrate this, Table 4.7 shows the break-down of London Paratransit's operating costs.

As well, because London Paratransit is participating in the provincial funding program, eligible seniors can request services in other participating municipalities within the province of Ontario. Moreover, the provincial Ministry of Transportation recommends that fares for special transit services not exceed those fares for conventional transit services. Regardless of whether or not there is sufficient availability of service, transit providers are encouraged to register all persons who are eligible for special services (Ministry of Transportation 1992, vi-vii).

The Ontario Ministry of Health organizes a Home Care Program that, in turn, oversees in-home services for seniors (Ministry of Citizenship Office for Senior Citizen's Affairs 1993, 13-16). For seniors to receive this assistance, their doctor must apply for home care for the patient. Upon receiving the application, a home

Table 4.7: Financial Data on London Paratransit, 1992.

Base on Total Operating Cost:

	Dollar Amount	Percentage of Operating Cost
Operating Cost	$1 622 699	100.00%
Total Revenue	$155 743	9.60%
Net Operating Cost	$1 463 956	90.22%
Provincial Share	$917 013	62.64%
Municipal Share	$546 043	37.30%

Base on Cost per Trip:

Basic Operating Subsidy	$3.96	30.00%
Passenger Based	$3.50	32.64%
Sub Total	$7.46	62.64%
Municipality Cost	$5.73	37.30%
Total Cost Per Trip	$13.19	100.00%

Source: Ministry of Transportation (1992, 78-79).

care manager decides if a senior qualifies for the services or refers them to programs that are more appropriate for their needs. People who qualify for home care include those who are recovering from an operation at home, have a disability, or are frail and prone to accidents.

By providing essential care and giving emotional support to the patient and family, home care allows patients to become more self-sufficient in meeting their

daily care needs. In particular, services funded by the home care program cover visits from therapists, nurses, and homemakers. As of April 1, 1995, people enrolled in home care can receive up to 60 homemaker hours per month, and unlimited time for therapy sessions (Ontario Ministry of Health, 1995).

A statement made by the provincial government in 1992 encouraged all municipalities to provide low-floor buses to all customers. To promote this policy, 75 percent of the cost of low-floor buses was supplemented by the provincial government. By the end of 1993, all new buses purchased by a municipality in the province of Ontario are required to have low floors (Dupee 1994).

Removal of the physical barriers that limit access to services by those elderly with reduced physical mobility is yet another important area of provincial government policy. The Ontario Office for Disabled Persons and the Ontario Office for Senior Citizen's Affairs provides an access fund for non-profit organizations. A grant of up to 50,000 dollars can be obtained to improve physical access to existing public facilities and community meeting rooms. Similarly, funds can also be obtained through the Seniors Independence Program for projects to help seniors maintain their health and the ability to look after themselves. Finally, there are a number of small municipal and provincial grants for services to help seniors to live in the community.

4.83 Problems with Specialized Transportation

Although there are many services offered to seniors, bringing all of them together in pursuit of common goals is difficult. Contributing to the complications, transportation availability is tied to funding, eligibility requirements differ considerably, and there has been little success in forming a common policy. Regrettably, each agency acts in a highly independent manner.

Because five different provincial ministries fund transportation services, with Health, Education, and Community Social Services ministries as the main contributors, there is a large amount of overlap. As providers try to upgrade their level of services, they are anxious about losing funding by surrendering some of their decision-making authority to the general umbrella group. Likewise, individual groups are concerned about losing exclusive use of their vehicles. As funding sources are reduced, some groups have lost funding and transferred their customers to London Paratransit (Dupee 1994). Furthermore, a number of service providers, such as "Friendship in Action" have ceased driving the clients of other organizations because there is little or no communication between providers (Wax 1994). Unfortunately, some senior citizens' programs are unreachable to people who need their services. For example, the author repeatedly tried to contact Helping Hands Transit, but received an answering machine and the calls were not returned.

When considering individual problems with specialized transportation services, driver tardiness and inability to secure appointments were listed as the most pressing problems (Table 4.8). There is an immediate need to have accessible transportation that can be provided on short-term notice. Long waits to

Table 4.8: Problems Using Specialized Transportation Systems.

Problems with Specialized	Number of Respondents	
	n	%
Can not get Appointment	9	17.65
Drivers Late	12	23.53
Drivers Unhelpful	6	11.76
Other	6	11.76
Total with Problems	18	35.29
Total Using Specialized	51	100.00

Source: Survey by the Author, 1995.

get home, busy telephone lines, and misplaced or misunderstood bookings comprise some of the other service problems. But, in contrast to this catalogue of criticisms, a number of survey participants stated that transportation services had been very helpful and accommodating.

When asked about their expectations from specialized transportation services, there were comments about the vans being on time and the problems involved with submitting notice one week in advance. Also, there were requests for more frequent service and for drivers to come to the door and assist the customer when the pavement is slippery. In addition, a few people mentioned problems with service registration, and the need for a small bus to carry them to the grocery store. As one respondent noted, the service should be "courteous, safe, prompt, and friendly."

4.9 Conclusions and Summary

This chapter, based an on analysis of the researcher's survey, examined the constraints on transportation experienced by the elderly. Their specialized transportation needs, use, and activity participation were identified. Finally, government policies and problems with specialized transportation were reviewed.

While driving a car is the most popular form of transportation for respondents, seniors use a wide range of transportation modes. Based on a person's social and demographic characteristics, transportation use varies widely among the elderly. Overall, women, and those seniors with greater age, reduced health, or not married express more constraints when using various transportation services. Even though conventional public transportation and walking are considered accessible transportation for older people, very few respondents reported no trouble using either mode.

Both the fear of crime and seasonal differences also greatly influenced a person's ability to move about the city. Since women have a very significant fear of crime at night, this restricts the mobility of women more than men. In other cases, health affects the ability to use transportation services because of increased fragility, balance problems, and reduced sensory capability.

When almost one half of the elderly find their residence too far from necessary social and resource needs, constraints in obtaining these requirements severely influence their well being. Since everyone has a right to these necessities, constraints must be reduced so they can meet daily living requirements. Contrary to what was expected, there was no correlation between where a person lives and

problems in using different transportation modes. It would seem that the inability to move about the city is attributed mostly to personal limitations instead of location of residence. Though downtown offers more services, people who live in this area indicated activities they could not perform and a desire to travel more.

As anticipated, elderly who live independently in the community, and who do not use specialized transportation, had very few restrictions on mobility. On the other hand, for elderly who use specialized transportation services, there was a significant desire to be able to travel more and to participate in more activities. While difficulties experienced during winter time were reported most often, other restrictions, including health problems, reduced balance, and increased fragility, restricted mobility. People who live in retirement homes experience similar problems, but not to the same extent as elderly who use specialized transportation.

Although specialized transportation services aim to improve seniors' mobility, most elderly users of these services still have unsatisfied needs. In fact, a number of elderly mentioned that they were unable to get appointments and found drivers to be often late. Due to a lack of information on transportation options, people who live in retirement homes are not fully using the services that are available. Despite a wide range of specialized transportation services and government funding policies, the system tends to be disorganized and uncoordinated. With many overlapping government funding policies and transportation providers, some service needs of the elderly are not being met, while other areas may duplicate capital costs because of overlaps in services. Unfortunately, many elderly indicated that their necessities are not being satisfied by the transportation options available now.

Building on the literature review and analysis, the following chapter provides conclusions and recommendations. To this end, the results of each of the original research hypotheses will be considered. Lastly, the contribution of this study, critique, and directions for further study will be discussed.

Chapter 5 - Discussion and Conclusions

This chapter summarizes the findings and evaluates the three research hypotheses. In this process, recommendations to reduce or remove transportation barriers to the elderly are presented. Suggestions for future research on elderly transportation problems are also considered.

5.1 Conclusions about Elderly Transportation Needs

In examining the constraints on elderly mobility, this paper aimed to:

1) increase the reader's level of understanding about transportation modes used by the elderly;
2) investigate what transportation modes are being used by different sub-populations of the elderly;
3) isolate and examine the constraints that the elderly face when using different transportation modes;
4) compare different specialized transportation services and analyze how effectively they are addressing the needs of the elderly; and
5) suggest ways to optimize cost efficiency while maximizing service to the elderly.

For the city of London, a sizable portion of the elderly are dissatisfied with the lack of appropriate transportation. As stated earlier, since urbanization has

increasingly favoured participants in the automobile society, the elderly, without access to this mode of transportation, have become even more disadvantaged. By making facilities and services only accessible by car, the elderly are forced to spend a great amount of energy and time to satisfy their needs. By extension, the absence of transportation may result in a decline in a senior's level of activity and, in turn, their quality of life. Efforts to prevent these consequences are not only based on humanitarian motives, but have practical benefits by shifting the load from *a posteriori* hospitalization and treatment of the elderly to *a priori* preventive measures. Other less tangible benefits may also result from addressing the issues of elderly mobility.

5.11 Hypothesis One

As predicted, the first subject group, people who live independently in the community and do not use specialized transportation services, have the greatest access to transportation. Since most of them have access to a car, they have more freedom to move about the city and are able to meet most of their needs. Although other forms of transportation are accessible to this group, the car offers more flexibility. Thus, they do not have to rely on fewer suitable modes of transportation.

However, other subgroups of the elderly population have to depend on more inconvenient forms of transportation. As ability to drive decreases, reliance on other transportation modes reduces a person's ability to fulfill their requirements for social well being. Particularly for people who use specialized transportation, they have to

spend a portion of their often low disposable income on cabs, thereby reducing spending income. On the other hand, the majority of seniors who live in retirement homes walk on a regular basis. When use of transportation was compared to social and demographic characteristics, it was indicated that elderly who are married, male, and under the age of 70 are less likely to use public transportation. Therefore, women and older elderly are more likely to be more restricted in available options for transportation.

5.12 Hypothesis Two

Progressive aging, increasing fragility, fear of crime, and restrictions in winter time all contribute to reducing elderly ability to travel on a day-to-day basis. In general, the study indicates that a significant percentage of elderly transportation requirements are not being satisfied. This condition has important planning implications because everyone has a right to transportation for maintaining their social wellness.

As hypothesized, Group 1 mentions the least trouble fulfilling their daily travel needs, while Groups 2 and 3 expressed many restrictions on mobility. Although Group 1 had the least difficulty walking and using the bus, nearly three quarters of this group did have at least one problem walking and over half had problems using public transportation. In contrast, the other two groups had even greater difficulty in walking and using public transportation. As one respondent indicated, "seniors need more access to transportation that is efficient and dependable." According to

The Ontario Advisory Council on Senior Citizens and The Ontario Advisory Council on the Physically Handicapped, "both physical and psychological barriers must be removed, since inaccessibility of transportation services not only promotes a handicapping environment, it also perpetuates systematic discrimination and segregation of many people" (1987, I).

While the majority of independent community residents had few problems walking in winter time, the majority of the respondents in the other two populations communicated a range of difficulties. Furthermore, health problems severely restricted the ability of Group 2 and Group 3 to meet their transportation requirements. Counter to what was predicted, for both fear of crime at night and ability to walk in winter time, there was no correlation with location of residence within different sections of the city.

5.13 Hypothesis Three

Group 1, as anticipated, was least restricted in activities they could do; the other two groups indicated that they were severely restricted in their choice of activities and expressed strong feelings of isolation from friends and family. Thus, conventional and specialized transportation is not meeting all the needs of people in Group 2 and Group 3. When driving skill decreases for these groups, the ability to participate in activities is reduced and the need for transportation increases.

Particularly for Group 3, over half of its members indicated that they do not have appropriate transportation. It would appear some people who live in

retirement homes do not have available information on alternate transportation modes. Since age and gender did not produce a significant correlation with perception that their residence was too far from transportation and services, it would appear that a wide variety of seniors lack access services.

For Group 2, there was a strong need for someone available to assist them in walking and using public transportation. One can conclude that although specialized transportation may be available, if a person does not have someone to assist them, they still cannot participate in an activity. Also, health and gender contributed to the inability to participate in an activity, whereas age and type of residence did not produce a significant correlation.

5.2 Recommendations

Based on lengthy consideration of the transportation barriers that the elderly experience, the following recommendations are advanced. Although these proposals will not remove all the barriers experienced by the elderly, they will improve the lifestyles of many seniors. As well, most of the recommendations are realistic and relatively easy to introduce. Many of them were suggested by the respondents to the author's survey.

5.21 Conventional Modes of Transportation

Some bus stops have shelters, but fixed routes and schedules necessitate walking to the bus stop and waiting at the bus stop in the winter. To relieve some of the stresses caused by winter conditions, it is recommended that more bus shelters be constructed. Also, more benches are needed to reduce the strain of standing and waiting unreasonable amounts of time for the bus. At the bus stop, route numbers should be posted in large letters so that those elderly who are visually impaired can discern the numbers. In fact, large print information on all routes could be posted at retirement and nursing homes. Providing more bus and specialized vehicles on Sunday morning, would allow elderly to attend church services.

When embarking and disembarking a bus, the elderly need more hand bars for support. This need is especially apparent with the used buses that London Transit has recently purchased; in these buses there are few handrails to support the elderly. Likewise, good lighting and brightly coloured handrails could help visually impaired elderly. To prevent the elderly from falling while the bus is in motion, non-slip floor surfaces should be installed on all buses.

As many elderly have problems boarding and leaving buses, the provincial recommendation for low-floor buses should be implemented as soon as possible. Such buses are regular forty-foot buses designed to eliminate vertical steps by placing the floor of the bus close to the ground. With the aforementioned modifications, seniors would have more options and public transportation would become more accessible.

Though these buses will not replace specialized transportation services, they do reduce the demand for paratransit. Unfortunately, there is only one bus company in Ontario that currently manufactures low-floor buses, and they are having difficulty meeting the growing demand. Bus stops and sidewalks have to be upgraded so that the features of low-floor buses can be used to their full advantage. For each bus stop, an investment of three thousand dollars is needed to make low-floor buses more accessible. Considering these costs, the provincial government must help fund the bus stop upgrades and provide incentives for bus companies to produce low-floor buses.

Where there are bus stops near retirement homes or apartments for seniors, railings should be constructed at the sidewalks. To assist those elderly who have problems crossing the streets, crosswalks or longer traffic-light intervals at busy intersections near senior apartments would improve safety. Since graded curbs can be hazardous to blind people, physical warning strips that can be detected by visually impaired pedestrians should be installed at intersections that have slope curbs for wheelchairs. For those elderly who use bicycles as a means of transportation, more bicycle racks are required near those services that are frequented by elderly patrons. Lastly, volunteers are needed to assist and drive seniors to various services.

5.22 Specialized Transportation

Any evaluation of policy for specialized transportation services should take the following information into account:

1) Policies should meet all of the transportation needs of the elderly, while exacting the lowest cost from the public. As demand increases, problems of cost will become a more dominant factor with respect to policy development.
2) Each elderly client must have access to at least the minimum level of transportation that is needed to maintain physical health, social relationships, and mental well being.
3) As elderly needs change over time, programs need to be adaptable in order to match future requirements (Wachs 1979, 218).

With these goals in mind, a "user side" approach that uses taxis is recommended for elderly who need specialized transportation. This approach can reduce the cost to the customer and, in some cases, promote higher quality service. Through this proposal, seniors would be allowed to use existing transportation services at rates below those that are usually charged by the operator. With this approach, the difference between the collected revenue and the conventional fare would be reimbursed by the municipal agency that acts as sponsor. As such, this approach would also involve selling vouchers or tickets to eligible elderly at reduced cost. It is likely that such a program would substantially improve elderly mobility.

The benefits of the approach under consideration include:

1) a wider variety of health, social, and retail services available to the elderly;
2) accessible transportation offered 24 hours per day;
3) a larger portion of the population's needs can be served;

4) fewer demands on London Paratransit, thereby enabling them to better service those elderly who can not use taxis;
5) reduce capital outlay for specialized vehicles;
6) more choices and alternatives for the elderly when they are planning trips; and
7) an allowance for short-notice emergency trips.

In Ontario, a number of municipalities have implemented a policy of fare reimbursement. A comparison of 14 communities, with populations ranging from 50,000 to 1,000,000 inhabitants, using fare-reimbursement policies is shown in Table 5.1. Dedicated services are specialized vehicles provided by the municipality for the handicapped; non-dedicated services are a "user side" approach that relies on taxis.

In all cases, the cost for a "user side" approach was considerably lower than using specialized vehicles supplied by the municipality. Also, for communities where data are available, the overall percentage of unaccommodated trips was lower than the unaccommodated trips for London Paratransit. Indeed, there was no single service that had a higher rate of unaccommodated trips. However, the average cost per trip for dedicated services was lower in London, but the average trip distance was almost half that of other communities. Although there are many social and economical differences between these cities and London which might account for some of the differences in cost per trip, it still clearly shows a "user side" approach will provide service at a lower cost per trip. An economic study done by Battellino and Hensher (1993, 80) calculated that, for groups of fewer than 6 people,

Table 5.1: Comparison of Specialized Transportation Services in Ontario Municipalities, 1992.

City	Name of Service	Municipality Population	Annual Trips for				Cost			Unaccom. Trips*	Average km per trip **	Ownership
			Dedicated	Non-Dedi.	Total Trips	Percentage	Dedicated	Non-Dedi.	Percentage			
Ajax	Handi Transit	55 000	16539	553	17092	3.24%	$15.61	$5.24	33.57%	0.66%	10.63	Municipality
Barrie	B.A.C.T.S.	61 000	21638	16539	38177	43.32%	$14.13	$5.87	41.54%	2.57%	6.15	Municipality
Brantford	Operation Lift	85 000	37127	3446	40573	8.49%	$10.50	$6.00	57.14%	0.12%	5.57	Non-Profit
Cambridge	Cambridge Transit	92 000	7378	22144	29522	75.01%	$20.34	$6.37	31.32%	-	12.11	Municipality
Guelph	Mobility Service Inc.	87 000	35131	9896	45027	21.98%	$12.28	$5.03	40.96%	0.22%	5.11	Municipality
Hamilton	D.A.R.T.S.	520 000	175000	311000	486000	63.99%	$23.03	$8.28	35.95%	0.10%	10.19	Non-Profit
Kingston	Access Bus	89 000	75531	3021	78552	3.85%	$13.12	$5.18	39.48%	0.55%	5.87	Non-Profit
Kitchner	Project Lift Inc.	244 923	82502	38739	121241	31.95%	$20.51	$7.53	36.71%	1.90%	8.89	Municipality
Markham	Mobility Bus Service	150 000	12233	13942	26175	53.26%	$26.99	$12.33	42.53%	-	13.53	Munic./Contractor
Oakville	Care-A-Van	114 000	13873	4215	18088	23.30%	$17.80	$8.23	46.24%	0.03%	7.52	Municipality
Peel	Transhelp	763 000	111492	45053	156545	28.78%	$20.74	$15.75	75.94%	2.36%	10.19	Municipality
Richmond Hill	Mobility Bus	81 968	9425	4407	13832	31.86%	$17.55	$6.64	37.83%	-	5.76	Municipality
Sault Ste. Marie	ParaBus	80 000	37937	4836	42773	11.31%	$12.86	$8.21	63.84%	-	6.22	Municipality
Windsor	HandiTransit	197 000	50054	3244	53298	6.09%	$17.79	$6.63	37.27%	1.21%	8.54	Non-Profit
Average			48990	34360	83350	41.22%	$17.52	$7.15	41.36%	0.97%	8.31	
London	London ParaTransit	300 000	123000				$13.19			3.39%	4.57	Contractor

Source: Ministry of Transportation (1992).

Notes: * Percentage of Unaccomdated Trips

** Total annual km for all vehicles/Total number of Trips

taxi services were the most cost efficient way to provide transportation to the elderly.

The two services that have successfully implemented the "user side" policy are Hamilton's "Disabled Age Regional Transportation Service" known as DARTS and Cambridge Transit. In Hamilton, for $48 an eligible senior can purchase two books per month that contain $80 worth of taxi coupons. Presently, the dedicated service accommodates transportation needs of people who use walkers and wheelchairs; taxis provide transportation for the remainder of the physically disabled clients. Despite some complaints from people not being able to use the dedicated service, this system has effectively addressed elderly transportation needs.

Unlike the Hamilton service, Cambridge Transit charges a flat rate of $1.55 per eligible handicapped client to use taxi cabs anywhere in the city. When Deluxe Cabs submits their receipt for a fare, the municipality pays for the meter rate of the cab. Due to good communications between Cambridge Transit and the taxi company, customers can call either business for service. Two customized vans are provided by Cambridge transit for those people who are not able to use taxi cabs.

Owners of taxi companies should be subsidized when they purchase equipment such as vans with wheelchair lifts. Also, the cost of licensing these vehicles should be lowered. By following the Vancouver example, where all taxis are wheelchair-accessible, elderly mobility constraints can be reduced. Such measures would undoubtedly serve as incentives to offer more services to seniors.

Another alternative to vans is to provide a community bus that is smaller than a regular bus and travels on a semi-fixed route. If an elderly client calls for service, the bus can pick them up at their door. By running every hour and using malls as

terminal points, costs can be kept at a minimum. As well, these services may prove helpful to seniors who need to go grocery shopping or carry large packages. Recently, London Transit introduced the Cherryhill Community Bus that provides service to medical facilities and shopping centres. By phoning one hour in advance for pick-up service, seniors have access to small low-floor buses with no steps at regular transit rates. Unfortunately, the bus only operates in North-West and Central London and, except for a few places, does not take a person to their door step.

Different eligibility requirements concerning age, health, and disability problematize the coordination of resources among different groups. In addition, many services tend to duplicate resources in the same areas to customers. An inefficient use of personnel and vehicles results. For those locations outside of the old city boundary, but within the newly annexed areas, handicapped people cannot obtain paratransit service. Even though people in the annexed areas are taxpayers, the current agreement with the contractor does not extend to the annexed areas. Obviously, the current contract must be negotiated to cover the areas in question. Above all, the elderly must have more information about transportation services and available options. Making the necessary information available entails cooperation between different services.

5.23 Crime

Most seniors, especially those who are handicapped, are perceived by criminals as targets. In general, seniors are more vulnerable to crime than other

population groups. Increasing perceived competence through peer support groups or actual competence through better glasses, hearing aids, and other prosthetics, should reduce the risk of victimization. Using these methods, seniors become more aware of potential threats and build their self-confidence. Also, teaching the elderly not to carry large amounts of money or valuables on their person, reduces the likelihood of attack and minimizes the loss if a robbery occurs (Brillon 1987, 96). When the elderly receive large cheques, the money could be deposited in their bank accounts directly.

To ensure the safety of elderly people, transportation and shopping escorts can be used to protect clients. All senior citizens should have access to these services which, in turn, should be developed and advertised. When a senior goes out alone, they should tell someone where they are going and when they will be home. Also, traveling with friends and avoiding dark streets could reduce the chance of being victimized.

Providing well-lit areas at bus stops, and at services such as stores and retirement homes, can discourage criminal activities. Along with improved lighting, increased law enforcement presence at those areas frequented by seniors would make them feel more secure and reduce the possibility of crime. By showing an elderly person that they are not alone, their anxieties may be lessened. Especially for those elderly who live alone, a telephone check-in program would not only detect problems but reassure the participants.

Given that the fear of crime often exceeds the actual risk, it is important to discuss the concerns and fears of seniors. Such a discussion could be realized by

involving seniors in preventative action groups within their communities. Block watch and volunteer patrols could be set up to the mutual benefit of all those involved. These types of actions are inclusive and would make seniors feel that they can do something about local crime. One of the results would definitely involve empowerment of the elderly (Brillon 1987, 95-97). Furthermore, police and other protective agencies could give free lectures to the seniors in ways to protect themselves.

5.3 Critique and Directions for Further Study:

This research adds another building block to the knowledge concerning how people perceive the environment, the effects of this perception on movement patterns through space and time, and the influence of transportation constraints on social activity patterns. Since time-geography uses a contextual approach to discover the situations of different people, it has provided a very suitable framework to examine the constraints on elderly travel behaviour. With this approach, the connections between an individual's behaviour and the characteristics of different situations were investigated. Rather than arranging actions according to observable characteristics of their performance, the research has categorized events by the motivation to carry out the action. To comprehend elderly spatial behaviour, we must realize that decision and deliberation come before the response.

Using Hägerstrand's theory of constraints, it was observed that the choice of activities and transportation modes is based on barriers that the elderly experience.

To discover an individual's potential behaviour, planners must seek to identify all the constraints affecting this decision process. Compared to most of the general population, elderly experienced increased barriers and reduced ability to meet the necessary requirements for quality of life. Pragmatically, they evaluate the restrictions on their movements, and then decide what activities they will undertake. By studying the constraints the elderly experience, planners, governments, and all organizations that are concerned with the activity patterns of the elderly are able to understand elderly lifestyles better and to develop solutions to the problems they face. Society must provide adequate transportation to the elderly through an increased understanding of old people's activity patterns and needs.

With respect to the structure, procedure, and implementation of this study, a few problems were encountered. When implementing the survey, some of the questions could have been worded differently and other questions could have been added to give a more accurate understanding of elderly travel barriers. Regardless, considering the resources available to the researcher, the study results are reasonable.

Since elderly perceptions of crime might vary from the rest of the population, further information is needed on their fear of different types of crime. Also, a greater understanding is required of how specific medical problems, such as visual impairment, arthritis, and heart problems, might affect mobility patterns. Of particular importance, information on how designs of the man-made environment may be improved to increase access for the elderly is essential. Lastly, more information is needed on the demand for trips by the elderly during different periods

of the day.

There is not enough information on elderly mobility patterns and their problems in using different modes of transportation for planners to predict adequately the transportation needs of the elderly. If the planners do not have this knowledge, the proposals to improve elderly transportation access might be ill-conceived, incorrect, and waste valuable resources. It is important to understand the differences between elderly sub-population mobility patterns because planning policies that are designed to help the elderly might increase hardship and immobility for some old people. Therefore, it is important to understand elderly sub-populations' mobility patterns, transportation problems, and transportation needs. This study has attempted to provide a base of such understanding.

Bibliography

Anderson, J. 1971. "Space-Time Budgets and Activity Studies in Urban Geography and Planning", Environment and Planning. 3, pp. 353-368.

Battellino, H. And Hensher, D. 1993. "The Transport Disadvantaged: Community Transport of Mainstream", Transportation Planning and Technology. 19, pp. 73-87.

Brillon, Y. 1987. Victimization and Fear of Crime Among the Elderly. Butterworths: Toronto.

Burns, L. 1979. Transportation, Temporal, and Spatial Components of Accessibility. Lexington Books: Lexington, Massachusetts.

Carp, F. 1971. "Walking as a Means of Transportation for Retired People", The Gerontologist. 11(1), pp. 104-111.

Carp, F. 1974. "Testimony Before the Special Committee on Aging in the U.S. Senate", In Transportation and the Elderly: Problems and Progress. U.S. Government Printing Office: Washington, D.C., pp. 65-81.

Carp, F. 1980. "Environmental Effects upon the Mobility of Older People", Environment and Behaviour. 12(2), pp. 139-156.

Chapin, F. S. 1974. Human Activity Patterns in the City: Things People do in Time and Space. Wiley: New York.

Cullen, I. 1972. "Space, Time and the Disruption of Behaviour in Cities", Environment and Planning. 4, pp 459-470.

Cullen, I. 1977. "The treatment of Time in the Explanation of Spatial Behaviour" In Parks, D. and Thrift, N. (eds.) Timing Space and Spacing time in Socio-Economic Systems. Edwards Arnold: London pp. 27-38.

Dangschat, J., Dorth, W., Friedrichs, J., and Kiehl, K. 1982. "Action Spaces of Urban Residents: An Empirical Study in the Region of Hamburg", Environment and Planning A. 14, pp. 1156-1174.

Dupee, T. 1994. Personal Interview, Coordinator of Paratransit, London, Ontario.

Dunn, P. 1990. Barriers Confronting Seniors with Disabilities in Canada. Statistics Canada: Canada.

Ferraro, K. and LaGrange, R. 1992. "Are Older People Most Afraid of Crime? Reconsidering Age Differences in Fear of Victimization", Journal of Gerontology: Social Sciences. 47(3), pp. 233-244.

Freund, P. and Martin, G. 1993. The Ecology of the Automobile. Black Rose Books: Montréal, Canada.

Gilderbloom, J. and Rosentraub, M. 1990. "Creating the Accessible City: Proposals for Providing Housing and Transportation for Low Income, Elderly, and Disabled People", American Journal of Economics and Sociology. 49(3), pp. 271-282.

Golant, S. M. 1976. "Interurban Transportation Needs and Problems of the Elderly", In Lawton, M. P., Newcomer, R. J., and Byerts, T. O. (eds.) Community Planning for an Aging Society: Designing Services and Facilities. Dowden, Hutchinson, and Ross, Inc.: Strudsburg, Pennsylvania, pp. 282-308.

Golant, S. M. (ed.) 1979. Location and Environment of Elderly Population. New York: Wiley.

Golant, S. M. 1984. "Factors Influencing the Location Context of Old People's Activities", Research on Aging. 6(4), pp. 528-548.

Goodchild, M. and Janelle, D. 1984. "The City Around the Clock: Space-Time Patterns of Urban Ecological Structures", Environment and Planning A. 16, pp. 807-820.

Guess, G. M. 1990. Public Policy and Transit System Management. Greenwood Press, Inc.: New York.

Hägerstrand, T. 1970. "What About People in Regional Science?", Papers of the Regional Science Association. 24, pp. 7-21.

Hägerstrand, T. 1973. "The Domain of Human Geography", in Chorley R. (ed.) Directions in Geography. Methuen & Co. Ltd.: London, Great Britain, pp. 67-87.

Hägerstrand, T. 1975. "Space, Time and Human Conditions", In Karlquist, A., Lundquist, L., and Snickars, F. (eds.) Dynamic Allocation of Urban Space. Saxon House: Westmead, Farnborough, Hants, England, pp. 3-14.

Hanson, S. 1995. The Geography of Urban Transportation. The Guilford Press: New York.

Harvey, A. 1976. Urban Modelling and Time Budgets: A Behavioural Framework. Paper Presented at the Twenty-Third Annual Conference North American Regional Science Association.

Harvey, A. 1986. Canadian Activity Patterns Across the Life Span: A Time Budget Perspective. Paper Presented at the 15th Annual Scientific and Education Meeting of Canadian Association of Gerontology.

Harvey, D. 1990. "Between Space and Time: Reflections on the Geographical Imagination", Annals of the Association of American Geographers. 80(3), pp. 418-434.

Holly, B. 1976. "Conceptual Problems and Scale Considerations in Time-Space Research", In Holly, B. (ed.) Time-Space Budgets and Urban Research: A Symposium. Kentucky State University: Kentucky, pp. 98-120.

Illich, I. 1974. Energy and Equity. Calder and Boyars Ltd.: London, Great Britian.

Information London. 1995. Community Services Directory. London, Ontario.

Information London. 1996. Seniors Home Support Services. London, Ontario.

Janelle, D. and Goodchild, M. 1983. "Diurnal Patterns of Social Group Distributions in a Canadian City", Economic Geography. 59(4) pp. 403-425.

Jones, P.M., Dix, M.C., Clarke, M.I., and Heggie, I.G. 1983. Understanding Travel Behaviour. Gower Publishing Company Limited: Aldershot, Hampshire.

Kellerman, A. 1989. Time, Space, and Society: Geographical Societal Perspectives. Kluwer Academic Publishers: Dordrecht, The Netherlands.

Kingston, R., Reubern, D., Rogowski, J., and Lillard, L. 1994 "Sociodeomgraphic and Health Factors in Driving after 50 Years of Age", American Journal of Public Health. 84(8), pp. 1327-1329.

McLaren, M. L. and Fleming, M. S. 1985. Special Needs in Public Transportation: Some Survey Results. Canadian Transport Commission Research Branch: Canada.

Meier, R. L. 1962. A Communication Theory of Urban Growth. Massachusetts Institute of Technology: Cambridge, Massachusetts.

Ministry of Citizenship Office for Senior Citizens. 1993. Guide for Senior Citizens: Services and Programs. Ontario.

Ministry of National Health and Welfare. 1993. Ageing and Independence: Overview of a National Survey. Minister of Supply and Services Canada: Canada.

Ministry for Senior Citizens Affairs. September 1985a. Elderly Residents in Ontario: An Overview. Ontario.

Ministry for Senior Citizens Affairs. September 1985b. Elderly Residents in Ontario: Study Methodology. Ontario.

Ministry for Senior Citizens Affairs. September 1985c. Elderly Residents in Ontario: Their use of Transportation. Ontario.

Ministry of Transportation. 1992. Specialized Transit Services: 1992 Fact Book. Downsview, Ontario.

Moore, E. G. And Rosenberg W. M. 1997. Growing Old in Canada: Demographic and Geographic Perspectives. ITP Nelson: Scarborough, Ontario.

The Ontario Advisory Council on Senior Citizens and The Ontario Advisory Council on the Physically Handicapped. 1987. The Freedom to Move is Life itself: A Report on Transportation in Ontario. Ontario.

Ontario Ministry of Health. 1995. Ontario Home Care Program. North York.

Ontario Provincial Government. 1994. "An Act Respecting Long Term Care", In Status of Ontario: Third Session, Thirty-Fifth Legislature, Volume 2. Queen's Printer for Ontario: Toronto.

Parkes, D., and Thrift, N. 1980. Times, Spaces, and Places: A Chronogeographic Perspective. John and Wiley and Sons: Chichester.

Pred, A. 1977. "The Choreography of Existence: Comments on Hägerstrand's Time-Geography and Its Usefulness", Economic Geography. 53 (April), pp. 207-221.

Procos, D. and Harvey, A. 1977. "Modelling for Local Planning Decisions", Ekistics. 264, pp. 257-266.

Raj, D. 1972. The Design of Sample Surveys. McGraw-Hill Book Co.: New York.

Rea, L. M. and Parker, R. A. 1992. Designing and Conducting Survey Research. Jossey-Bass Publishers: San Francisco.

Rentchin, S. and Anapolle, J. 1993. "An overview of the Older Driver", Clinics in Geriatric Medicine. 9(2), pp. 279-296.

Rittner B. and Kirk, S. 1993. "Health Care and Public Transportation Use by Poor and Frail Elderly People", Social Work. 40(3), pp. 365-373.

Roper, T. and Mulley, G. 1996. "Caring for Older People", British Medical Journal. 313(17), pp. 415-418.

Rosenberg, M., Moore, E. and Bell, S. 1989. "Components of Change in the Spatial Distribution of the Elderly Population in Ontario, 1976-1986", The Canadian Geographer. 33(3), pp. 218-229.

Rosenbloom, S. 1993. "Transportation Needs of the Elderly Population", Clinics in Geriatric Medicine. 9(2), pp. 297-310.

Schaeffer, K. H. and Sclar, E. 1975. Access for All: Transportation and Urban Growth. Penguin Books Ltd.: Harmondsworth.

Scheaffer, R. L., Mendenhall W., and Ott, L. 1990. Elementary Survey Sampling. PWS-KENT Publishing Company: Boston, Massachusetts.

Schurer, G. 1978. Chrono-Geography: An Interpretative Review of Related Literature. Urban and Regional Planning Working Paper 6, The University of Adelaide: Adelaide, South Australia.

Smith, G. C. 1988. "The Spatial Shopping Behaviour of the Urban Elderly: A Review of the Literature", Geoforum. 19(2), pp. 189-200.

Smith, G. C. 1991. "Grocery Shopping Patterns of the Ambulatory Urban Elderly", Environment and Behaviour. 23(1) pp. 86-114.

Statistics Canada. 1971-1991. Census. Canada.

Szalai, A. (ed.) 1972. The Use of Time: Daily Activities of Urban and Suburban Populations in Twelve Countries. Mouton & Co.: The Hague, Netherlands.

Taaffe, E., Gauthier, H. and Morton, O. 1996. Geography of Transportation. Prentice Hall: New Jersey.

Task force on Aging. December 1981. The Elderly in Ontario: An Agenda for the 80's. Secretariat for Social Development: Ontario.

Thrift, N. 1977. An introduction to Time-Geography. Headley Brothers Ltd.: London, Great Britian.

Turton, B. and Knowles, D. 1992. "Urban Transportation Problems and Solutions", In Hoyle, B. S. and Knowles, R. D. (eds.) Modern Transport Geography. Belhaven Press: London, Great Britain, pp. 81-104.

Wachs 1979. Transportation for the Elderly: Changing Lifestyle, Changing Needs. University Press: Berkeley.

Wax, S. 1994. Personal Interview. Coordinator for Friendship in Action.

Whitelegg, J. (ed.) 1992. Traffic Congestion: Is there a Way Out?. Leading Edge Press and Publishing Ltd.: Hawes, North Yorkshire.

Whitelegg, J. 1993. Transportation for a Sustainable Future: The Case for Europe. Belhaven Press: London, United Kingdom.

Wilson, J. R. and Rennie, A. M. 1981. "Elderly Pedestrians and Road Safety", In Foot, H.C., Chapman, A. J. and Wade, F.M. (ed.) Road Safety: Research and Practice. Praeger Publishers: Eastbourne, East Sussex, pp. 143-150.

Appendix I: Survey and Cover Letter

Table of Contents for Appendix I

The UNIVERSITY of WESTERN ONTARIO
Department of Geography

14 November 1994

Dear Sir or Madam:

Steve Smeltzer is a graduate student at the University of Western Ontario. Under my supervision, he is conducting research on the travel problems faced by senior citizens of London, Ontario. It is hoped that his research will result in constructive suggestions for meeting their transportation needs.

Your cooperation is requested in providing information on how your organization services the needs of senior citizens. Mr. Smeltzer will be seeking background information from a number of private and public agencies in the city.

If it is possible for you to provide any assistance in distributing questionnaires to the population that you service, this would greatly enhance the quality of research. Anonymity of all respondents to the survey will be protected. Any specific commentary on your organization would be cleared with you for inclusion in his final report.

Mr. Smeltzer will be pleased to provide you with a report on the results of his research, which is expected to be completed by August 1995. Should you have questions about the research or need clarification on other related matters, please phone me at 661-3653.

Thank you very much for your cooperation.

Yours sincerely,

Donald G. Janelle
Professor and Chair

DGJ/jef

Social Science Centre • London, Ontario • Canada • N6A 5C2
Telephone: (519) 661-3423 • Fax: (519) 661-3730

The UNIVERSITY of WESTERN ONTARIO
Department of Geography
9 Brentwood Cres.
London, Ontario
N6G - 1X3
(519) 645-7995

Dear London, Ontario Resident

I need your help! I am a graduate student in geography at the University of Western Ontario. I am conducting a survey about the transportation problems of senior citizens in London, Ontario. The information you provide will be useful in helping to identify services and programs that are needed to assist elderly residents.

Please take time to complete the enclosed questionnaire. There are no correct responses, only your much-needed opinions. All responses will in no way be traceable to individual respondents once the survey process has been concluded. Your anonymity is assured. Please enclose the completed questionnaire in the attached postage-paid, pre-addressed envelope in the mail as soon as possible.

If you have questions about the survey and its use, you may telephone me at 657-5759, or you may speak with my advisor, the Head of the Geography department at University of Western Ontario, Professor Donald G. Janelle (661-3653). Thank you for your assistance and time. I care about what you think.

Sincerely,

Steven Smeltzer
M.A. student
University of Western
Ontario

Please check (✓) the response that best applies to your situation.

1. What type of residence do you live in?
   - __ own home
   - __ apartment
   - __ condominium
   - __ retirement home
   - __ nursing home
   - __ other, please specify _____

2. Who do you live with?
   - __ a spouse
   - __ friends
   - __ other, please specify _____
   - __ family
   - __ alone

3. Do you find that the location of your present residence is:
   (check as many as necessary)
   - __ too distant from services
   - __ too distant from family
   - __ too distant from friends
   - __ too distant from transportation

4. Which transportation modes do you use on a regular basis?
   (check as many as necessary)
   - __ drive a car
   - __ passenger in a car
   - __ cab
   - __ other, please, specify _____
   - __ bus
   - __ walk
   - __ bicycle

   _____

5. What problems do you have walking outside your residence?
   (check as many as necessary)
   - __ no problems walking
   - __ destinations are too far
   - __ problems walking in the winter time
   - __ have problems walking over hills
   - __ fear of crime
   - __ get tired or feet hurt from walking too far
   - __ takes too long to get where you want to go
   - __ health problems
   - __ have problems crossing streets
   - __ other, please specify _____

   _____

6. What assistance do you need to walk outside your residence?
   - __ no assistance required
   - __ crutches
   - __ help from another person
   - __ other, please specify _____
   - __ a cane
   - __ two canes
   - __ a walker

7. During the summer, do you have difficulty travelling outside your home?
   - __ a great deal
   - __ some trouble
   - __ a little
   - __ not at all

8. During the winter, do you have difficulty travelling outside your home?
   - __ a great deal
   - __ some trouble
   - __ a little
   - __ not at all

9. Do you feel safe walking in your neighbourhood during the day?
   - __ very safe
   - __ somewhat safe
   - __ not very safe
   - __ not safe at all

10. Do you feel safe walking in your neighbourhood during the night?
   - __ very safe
   - __ somewhat safe
   - __ not very safe
   - __ not safe at all

11. How would you rate your overall health at the present time:
   - __ excellent
   - __ good
   - __ fair
   - __ poor

12. How much do your health troubles stand in the way of doing the things you want to do?
   - __ not at all
   - __ a little
   - __ a great deal

13. What problems do you have using the bus?
   (check as many as necessary)
   - __ no problems using the bus
   - __ walking to the bus stop
   - __ get tired waiting for the bus
   - __ afraid at the bus stop
   - __ fear of falling while boarding
   - __ fear of being late
   - __ fear of the bus doors
   - __ problems keeping footing on the bus
   - __ missing the bus stop when you want to get off
   - __ drivers rude or unhelpful
   - __ have problems transferring
   - __ fear of falling while getting off
   - __ too tired to walk home
   - __ other, please specify _____

   _____

14. When travelling by public transportation, do you use the assistance of another individual?
   - __ always
   - __ never
   - __ occasionally

15. Do you drive a car?
__ yes __ no

16. What problems do you have using a car?
(check as many as necessary)
__ no problem driving
__ problems with vision
__ slowness in responding to traffic
__ nervousness
__ unable to drive due to physical problems
__ lack of confidence
__ other, please specify _____

_____

17. Within the past year, have you received assistance from:
(check as many as necessary)
__ London Paratransit
__ Senoirs' Transit Program
__ Helping Hands Transit
__ London Food Service Training Center Inc.
__ Friendship in Action
__ Meals on Wheels
__ Home delivery Service
__ no assistance required
__ Other transportation services for the elderly
Please specify _____

_____

18. Are there any activities outside your residence that you would like to do that you are not doing right now?
__ yes __ no
Please specify what activities _____

_____

_____

19. Why aren't you participating in these activities?
(check as many as necessary)
__ too expensive
__ no transportation
__ not sure how to go about it
__ problems with weather
__ facilities unavailable
__ no time
__ too far away
__ no one to do it with
__ no one to assist you
__ other, please specify _____

_____

20. Would you travel more often if suitable transportation was readily available?
__ yes __ no

21. If you could get further assistance with transportation, would you be interested in having the assistance of:
__ someone to assist you when you go by public transit or taxis
__ financial assistance for taxis or specialized transportation services
__ specialized vehicles, such as a van with a wheelchair lift
__ other, please specify _____

_____

22. To assist in planning, what services would you like to have available to help you or do you feel would be helpful to other seniors in the community?

_____

_____

_____

23. Please give the names of the streets that form the intersection closest to your place of residence.

_____

_____

24. What is your gender?
__ male __ female

25. Martial Status?
__ single __ married
__ divorced __ widowed

26. What is your age?
___under the age of 64 __ 65-69 __ 70-74
__ 75-79 __ 80-84 __ over the age of 85

Any other comments you like to mention?

_____

_____

_____

_____

Thank You for your assistance and time.
Sincerely,

Steven Smeltzer
M.A Student
University of Western Ontario

Appendix II: Statistics

Table of Contents for Appendix II

For the following tables
Group 1 - are independent community residents who do not use transportation services specifically provided for older people
Group 2 - are community residents who use at least one transportation service designated for older people
Group 3 - are retirement home and nursing home residents

Table 1: Category Code and Transportation Modes

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
Car	35	68.63	5	17.24	10	29.41	50	43.48
Passenger in a Car	18	35.29	15	51.72	14	41.18	47	40.87
Cab	6	11.76	20	68.96	8	23.53	34	29.57
Bus	14	27.45	15	51.72	13	38.24	42	36.52
Walk/Bicycle	12	23.53	13	44.83	19	55.88	44	38.26
Other	2	3.92	3	10.45	2	5.88	7	6.09
Total	51		29		35		115	

* Percentages do not add up to 100% because they are not mutually exclusive

Table 2: Marital Status and Use of Public Transportation

	Single		Divorced		Married		Widowed		Total	
	n	%	n	%	n	%	n	%	n	%
Yes	5	50.00	4	50.00	9	23.08	23	45.10	41	37.27
No	7	70.00	4	50.00	31	79.49	27	52.94	69	62.73
Total	12		8		40		50		110	

Chi-Square=26.830 Crammer's V=0.4939
Sign. at .95 level: Yes

Table 3: Gender and Use of Public transportation

	Male		Female		Total	
	n	%	n	%	n	%
Yes	8	22.86	34	43.04	42	36.84
No	27	77.14	45	56.96	72	63.16
Total	35		79		114	

Chi-Square=20.211 Crammer's V=0.4211
Sign. at .95 level: Yes

Table 4: Age and Use of Public Transportation

	60-69		70-79		80+		Total	
	n	%	n	%	n	%	n	%
Yes	3	11.11	21	42.86	17	45.95	41	35.96
No	24	88.89	28	57.14	20	54.05	72	63.16
Total	27		49		37		113	

Chi-Square=30.266 Crammer's V=0.5176
Sign. at .95 level: Yes

Table 5: Gender and Driving

	Male		Female		Total	
	n	%	n	%	n	%
Yes	21	60.00	29	36.71	50	43.86
No	14	40.00	50	63.29	64	56.14
Total	35		79		114	

Chi-Square=13.749 Crammer's V=0.3473
Sign. at .95 level: Yes

Table 6: Age and Driving

	60-69		70-79		80+		Total	
	n	%	n	%	n	%	n	%
Yes	21	77.78	19	38.78	9	24.32	49	42.98
No	6	22.22	30	61.22	28	75.68	64	56.14
Total	27		49		37		113	

Chi-Square=14.807 Crammer's V=0.3620
Sign. at .95 level: Yes

Table 7: Marital Status and Driving

	Single		Divorced		Married		Widowed		Total	
	n	%	n	%	n	%	n	%	n	%
Yes	5	50.00	3	37.50	28	71.79	13	25.49	49	44.55
No	7	70.00	5	62.50	12	30.77	37	72.55	61	55.45
Total	12		8		40		50		110	

Chi-Square=24.257 Crammer's V=0.4696
Sign. at .95 level: Yes

Table 8: Category Code and Location of Residence

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
Ok	31	53.45	12	41.38	15	42.86	58	50.43
Too Far	20	35.09	17	58.62	20	57.14	57	49.57
Total	51		29		35		115	

Chi-Square=3.941 Crammer's V=0.1851
Sign. at .95 level: Yes

Table 9: Gender and Location of Residences

	Male		Female		Total	
	n	%	n	%	n	%
Ok	21	60.00	36	45.57	57	50.00
Too Far	14	40.00	43	54.43	57	50.00
Total	35		79		114	

Chi-Square=1.441 Crammer's V=0.1124
Sign. at .95 level: No

Table 10: Age and Location of Residences

	60-69		70-79		80+		Total	
	n	%	n	%	n	%	n	%
Ok	15	60.00	25	49.02	17	44.74	57	50.00
Too Far	10	40.00	26	50.98	21	55.26	57	50.00
Total	25		51		38		114	

Chi-Square=1.441 Crammer's V=0.1124
Sign. at .95 level: No

Table 11: Category Code and Location of Residence *

	Group 1		Group 2		Group 3		Total	
Too Far from	n	%	n	%	n	%	n	%
Services	7	13.72	6	20.69	9	25.71	22	19.13
Family	8	15.67	9	31.03	12	34.29	29	25.22
Friends	5	9.80	8	27.59	4	11.43	17	14.78
Transportation	4	7.84	4	13.79	3	8.57	11	9.57
Nothing	31	60.78	12	41.38	15	42.86	58	50.43
Total	51		29		35		115	

* Percentages do not add up to 100% because they are not mutually exclusive

Table 12: Category Code and Problems Walking

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
None	14	27.45	2	6.90	4	11.43	20	17.39
Destinations too Far	11	21.57	11	37.93	13	37.14	35	30.43
Problems in Winter	24	47.06	22	75.86	23	65.71	69	60.00
Problems over Hills	12	23.53	14	48.28	13	37.14	39	33.91
Fear of Crime	11	21.57	9	31.03	19	54.29	39	33.91
Get Tired/Feet Hurt	11	21.57	16	55.17	16	45.71	43	37.39
Takes too Long	7	13.73	7	24.14	7	20.00	21	18.26
Health Problems	12	23.53	20	68.97	11	31.40	43	37.39
Problems Crossing Streets	3	5.88	11	37.93	10	28.57	24	20.87
Other	3	5.88	4	13.79	3	8.71	10	8.70
Total	51		29		35		115	

* Percentages do not add up to 100% because they are not mutually exclusive

Table 13: Category Code and Assistance Needed to Walk

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
None	40	78.43	6	20.69	19	54.29	65	56.52
Crutches/Walker	5	9.80	5	17.24	2	5.71	12	10.43
Another Person	4	7.84	13	44.82	3	8.57	20	17.39
Cane/Two Canes	6	11.76	15	51.72	12	34.29	33	28.70
Other	3	5.88	3	10.34	2	5.71	8	6.96
Total	51		29		35		115	

* Percentages do not add up to 100% because they are not mutually exclusive

Table 14: Health and Needing Assistance to Walk

	Excellent		Good		Fair		Poor		Total	
	n	%	n	%	n	%	n	%	n	%
No	15	93.75	35	74.47	15	34.09	0	0.00	65	56.52
Yes	1	6.25	12	25.53	29	65.91	8	100.00	50	43.48
Total	16		47		44		8		115	

Chi-Square=34.592 Modified Chi Square=29.585 *
Crammer's V=0.5484 Modified Crammer's V=0.5072
Sign. at .95 level: Yes

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 15: Age and Assistance Needed to Walk

	60-69		70-79		80+		Total	
	n	%	n	%	n	%	n	%
No	23	85.19	30	61.22	11	28.95	64	56.14
Yes	4	14.81	19	38.78	27	71.05	50	43.86
Total	27		49		38		114	

Chi-Square=21.177 Crammer's V=0.4310
Sign. at .95 level: Yes

Table 16: Residence and Assistance Needed to Walk

	Home		Apt./Condo.		Retire. Home		Total	
	n	%	n	%	n	%	n	%
No	30	78.95	16	38.10	19	54.29	65	56.52
Yes	8	21.05	26	61.90	16	45.71	50	43.48
Total	38		42		35		115	

Chi-Square=13.651 Crammer's V=0.3460
Sign. at .95 level: Yes

Table 17: Marital Status and Assistance Needed to Walk

	Single		Divorced		Married		Widowed		Total	
	n	%	n	%	n	%	n	%	n	%
No	8	72.73	3	37.50	26	65.00	24	47.06	61	55.45
Yes	3	27.27	5	62.50	14	35.00	27	52.94	49	44.55
Total	11		8		40		51		110	

Chi-Square=5.303 Crammer's V=0.2196
Sign. at .95 level: Yes

Table 18: Who do you Live with and Assistance Needed to Walk

	Spouse		Friends/Family		Alone		Total	
	n	%	n	%	n	%	n	%
No	26	68.42	11	73.33	27	44.26	64	56.14
Yes	12	31.58	4	26.67	34	55.74	50	43.86
Total	38		15		61		114	

Chi-Square=7.624 Crammer's V=0.2586
Sign. at .95 level: Yes

Table 19: Gender and Assistance Needed to Walk

	Male		Female		Total	
	n	%	n	%	n	%
No	22	62.86	43	54.43	65	57.02
Yes	13	37.14	36	45.57	49	42.98
Total	35		79		114	

Chi-Square=0.703 Crammer's V=0.0785
Sign. at .95 level: No

Table 20: Category Code and Problems Using the Bus

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
None	17	47.22	2	8.70	5	16.13	24	26.67
Walking to the Bus	6	16.67	9	39.13	16	51.61	31	34.44
Get Tired Waiting for Bus	10	27.78	12	52.17	10	32.26	32	35.56
Afraid at Bus Stop	3	8.33	3	13.04	0	0.00	6	6.67
Fear of Falling Boarding	6	16.67	10	43.48	14	45.16	30	33.33
Fear of Being Late	1	2.78	6	26.09	15	48.39	22	24.44
Fear of Bus Doors	4	11.11	5	21.74	4	12.90	13	14.44
Problems Keeping Footing	7	19.44	13	56.52	21	67.74	41	45.56
Missing Bus Stop	5	13.89	3	13.04	8	25.81	16	17.78
Drivers Rude	2	5.56	5	21.74	0	0.00	7	7.78
Problems Transferring	2	5.56	9	39.13	5	16.13	16	17.78
Fear of Falling	5	13.89	11	47.83	19	61.29	35	38.89
Too Tired to Walk Home	0	0.00	10	43.48	6	19.35	16	17.78
Other	2	5.56	7	30.43	4	12.90	13	14.44
Total	36		23		31		115	

**Percentages do not add up to 100% because they are not mutually exclusive

Table 21: Category Code and Assistance Needed to Use the Bus

	Group 1		Group 2		Goup 3		Total	
	n	%	n	%	n	%	n	%
All of the Time	3	6.98	5	19.23	5	17.24	13	13.27
Sometimes	7	16.28	13	50.00	12	41.38	32	32.65
No	33	76.74	8	30.77	12	41.38	53	54.08
Total	43		26		29		98	

Chi-Square=39.686 Crammer's V=0.4500
Sign. at .95 level: Yes

Table 22: Driving and Activities You can not do

	Driver		Non-Driver		Total	
	n	%	n	%	n	%
Yes	20	35.09	27	50.00	47	42.34
No	37	64.91	27	50.00	64	57.66
Total	57		54		111	

Chi-Square=21.057 Crammer's V=0.4355
Sign. at .95 level: Yes

Table 23: Driving and Would you Travel More Often

	Driver		Non-Driver		Total	
	n	%	n	%	n	%
Yes	12	21.82	29	60.42	41	39.81
No	43	78.18	19	39.58	62	55.86
Total	55		48		103	

Chi-Square=23.426 Crammer's V=0.4769
Sign. at .95 level: Yes

Table 24: Category Code and Walking in Summer

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
A Great Deal	3	6.00	3	10.34	0	0.00	6	5.31
Some Trouble	5	20.00	12	41.38	13	38.24	30	26.55
A Little	5	10.00	7	24.14	7	20.59	19	16.81
Not at all	37	74.00	7	24.14	14	41.18	58	51.33
Total	50		29		34		113	

Chi-Square=25.005 Modified Chi Square=11.701 *
Crammer's V=0.3326 Modified Crammer's V=0.3218 *
Sign. at .95 level: Yes

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 25: Category Code and Walking in Winter

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
A Great Deal	9	18.37	16	55.17	13	38.24	38	33.93
Some Trouble	8	16.33	8	27.59	12	35.29	28	25.00
A Little	15	30.61	4	13.79	5	14.71	24	21.43
Not at all	17	34.69	1	3.45	4	11.76	22	19.64
Total	49		29		34		112	

Chi-Square=24.566 Modified Chi Square=21.690 *
Crammer's V=0.3312 Modified Crammer's V=0.4401 *
Sign. at .95 level: Yes

*Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 26: Age and Walking during Summer

	60-69		70-79		>80		Total	
	n	%	n	%	n	%	n	%
A Great Deal	0	0.00	2	4.17	4	10.81	6	5.36
Some Trouble	4	14.81	8	16.67	18	48.65	30	26.79
A Little	2	7.41	10	20.83	7	18.92	19	16.96
Not at all	21	77.78	28	58.33	8	21.62	57	50.89
Total	27		48		37		112	

Chi-Square=26.056 Modified Chi Square=19.100 *
Crammer's V=0.3411 Modified Crammer's V=0.4130 *
Sign. at .95 level: Yes

*Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 27: Age and Walking in Winter

	60-69		70-79		>80		Total	
	n	%	n	%	n	%	n	%
A Great Deal	2	7.69	13	27.66	23	60.53	38	34.23
SomeTrouble	7	26.92	13	27.66	8	21.05	28	25.23
A Little	7	26.92	14	29.79	3	7.89	24	21.62
Not at all	10	38.46	7	14.89	4	10.53	21	18.92
Total	26		47		38		111	

Chi-Square=26.184 Modified Chi Square=15.946 *
Crammer's V=0.3426 Modified Crammer's V=0.3790 *
Sign. at .95 level: Yes

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 28: Residence and Walking in Summer

	Own Home		Apart./Condo.		Retire. Home		Total	
	n	%	n	%	n	%	n	%
A Great Deal	2	5.26	4	9.76	0	0.00	6	5.31
SomeTrouble	7	18.42	10	24.39	13	38.24	30	26.55
A Little	2	5.26	10	24.39	7	20.59	19	16.81
Not at all	27	71.05	17	41.46	14	41.18	58	51.33
Total	38		41		34		113	

Chi-Square=15.142 Modified Chi Square=1.905 *
Crammer's V=0.2588 Modified Crammer's V=0.1298 *
Sign. at .95 level: No

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 29: Residence and Walking in Winter

	Own Home		Apart./Condo.		Retire. Home		Total	
	n	%	n	%	n	%	n	%
A Great Deal	8	21.62	17	41.46	13	38.24	38	33.93
SomeTrouble	4	10.81	12	29.27	12	35.29	28	25.00
A Little	10	27.03	9	21.95	5	14.71	24	21.43
Not at all	15	40.54	3	7.32	4	11.76	22	19.64
Total	37		41		34		112	

Chi-Square=20.978 Modified Chi Square=16.087 *
Crammer's V=0.3060 Modified Crammer's V=0.3790 *
Sign. at .95 level: Yes

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 30: Marital Status and Walking in Summer

	Single		Divorced		Married		Widowed		Total	
	n	%	n	%	n	%	n	%	n	%
A Great Deal	1	10.00	0	0.00	1	2.56	4	7.84	6	5.56
SomeTrouble	2	20.00	0	0.00	8	20.51	19	37.25	29	26.85
A Little	1	10.00	5	62.50	4	10.26	9	17.65	19	17.59
Not at all	6	60.00	3	37.50	26	66.67	19	37.25	54	50.00
Total	10		8		39		51		108	

Chi-Square=21.836 Modified Chi Square=9.162 *
Crammer's V=0.2596 Modified Crammer's V=0.2913 *
Sign. at .95 level: Yes

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 31: Marital Status and Walking in Winter

	Single		Divorced		Married		Widowed		Total	
	n	%	n	%	n	%	n	%	n	%
A Great Deal	3	30.00	2	25.00	11	28.21	21	42.00	37	34.58
SomeTrouble	3	30.00	3	37.50	10	25.64	12	24.00	28	26.17
A Little	2	20.00	2	25.00	6	15.38	14	28.00	24	22.43
Not at all	2	20.00	1	12.50	12	30.77	3	6.00	18	16.82
Total	10		8		39		50		107	

Chi-Square=11.814 Modified Chi Square=1.370 *
Crammer's V=0.1918 Modified Crammer's V=0.1132 *
Sign. at .95 level: No

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 32: Residence Code and Walking in Summer

	Central		Northwest		Northeast		Southeast		Southwest	
	n	%	n	%	n	%	n	%	n	%
A Great Deal	1	6.67	0	0.00	1	5.88	0	0.00	2	9.09
SomeTrouble	5	33.33	8	30.77	4	23.53	9	40.91	4	18.18
A Little	3	20.00	7	26.92	0	0.00	2	9.09	6	27.27
Not at all	6	40.00	11	42.31	12	70.59	11	50.00	10	45.45
Total	15		26		17		22		22	

Chi-Square=14.608 Modified Chi Square=1.426 *
Crammer's V=0.2185 Modified Crammer's V=0.1182 *
Sign. at .95 level: No

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 33: Residence Code and Walking in Winter

	Central		Northwest		Northeast		Southeast		Southwest	
	n	%	n	%	n	%	n	%	n	%
A Great Deal	5	35.71	7	26.92	5	29.41	9	42.86	7	30.43
SomeTrouble	4	28.57	10	38.46	4	23.53	3	14.29	7	30.43
A Little	5	35.71	7	26.92	1	5.88	3	14.29	5	21.74
Not at all	0	0.00	2	7.69	7	41.18	6	28.57	4	17.39
Total	14		26		17		21		23	

Chi-Square=17.857 Modified Chi Square=0.849 *
Crammer's V=0.2428 Modified Crammer's V=0.0917 *
Sign. at .95 level: No

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 34: Category Code and Walking at Night

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
Very Safe	13	27.08	0	0	3	8.57	16	14.29
Somewhat Safe	18	37.50	9	31.03	6	17.14	33	29.46
Not Very Safe	9	18.75	9	31.03	12	34.29	30	26.79
Not Safe at all	8	16.67	11	37.93	14	40.00	33	29.46
Total	48		29		35		112	

Chi-Square=20.105 Modified Chi Square=14.997 *
Crammer's V=0.2996 Modified Crammer's V=0.3659 *
Sign. at .95 level: Yes

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 35: Gender and Walking at Night

	Male		Female		Total	
	n	%	n	%	n	%
Very Safe	10	28.57	6	7.89	16	14.41
Somewhat Safe	10	28.57	22	28.95	32	28.83
Not Very Safe	9	25.71	21	27.63	30	27.03
Not Safe at all	6	17.14	27	35.53	33	29.73
Total	35		76		111	

Chi-Square=9.865 Modified Chi Square=14.997 *
Crammer's V=0.2981 Modified Crammer's V=0.3676 *
Sign. at .95 level: Yes

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 36: Age and Walking at Night

	60-69		70-79		>80		Total	
	n	%	n	%	n	%	n	%
Very Safe	8	29.63	3	6.25	5	13.51	16	14.29
Somewhat Safe	8	29.63	16	33.33	9	24.32	33	29.46
Not Very Safe	5	18.52	16	33.33	9	24.32	30	26.79
Not Safe at all	6	22.22	13	27.08	14	37.84	33	29.46
Total	27		48		37		112	

Chi-Square=10.205 Modified Chi Square=2.751 *
Crammer's V=0.2134 Modified Crammer's V=0.1567 *
Sign. at .95 level: No

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 37: Marital Status and Walking at Night

	Single		Divorced		Married		Widowed		Total	
	n	%	n	%	n	%	n	%	n	%
Very Safe	2	20.00	1	12.50	7	17.50	4	8.16	14	13.08
Somewhat Safe	2	20.00	5	62.50	13	32.50	12	24.49	32	29.91
Not Very Safe	4	40.00	1	12.50	10	25.00	14	28.57	29	27.10
Not Safe at all	2	20.00	1	12.50	10	25.00	19	38.78	32	29.91
Total	10		8		40		49		107	

Chi-Square=9.708 Modified Chi Square=6.319 *
Crammer's V=0.1739 Modified Crammer's V=0.2430 *
Sign. at .95 level: Yes

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 38: Residence Type and Walking at Night

	Own Home		Apart./Condo.		Retire. Home		Total	
	n	%	n	%	n	%	n	%
Very Safe	9	25.00	4	9.76	3	8.57	16	14.29
Somewhat Safe	15	41.67	12	29.27	6	17.14	33	29.46
Not Very Safe	6	16.67	12	29.27	12	34.29	30	26.79
Not Safe at all	6	16.67	13	31.71	14	40.00	33	29.46
Total	36		41		35		112	

Chi-Square=13.500 Modified Chi Square=12.681 *
Crammer's V=0.2455 Modified Crammer's V=0.3365 *
Sign. at .95 level: Yes

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 39: Who do You Live with and Walking at Night

	With Someone		Alone		Total	
	n	%	n	%	n	%
Very Safe	11	21.15	5	8.47	16	14.41
Somewhat Safe	15	28.85	18	30.51	33	29.73
Not Very Safe	13	25.00	16	27.12	29	26.13
Not Safe at All	13	25.00	20	33.90	33	29.73
Total	52		59		111	

Chi-Square=3.892 Modified Chi Square=1.361 *
Crammer's V=0.1862 Modified Crammer's V=0.1107 *
Sign. at .95 level: No

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 40: Residence Code and Walking During the Night

	Central		Northwest		Northeast		Southeast		Southwest	
	n	%	n	%	n	%	n	%	n	%
Very Safe	1	6.67	2	7.69	3	16.67	2	9.09	4	18.18
Somewhat Safe	6	40.00	5	19.23	6	33.33	8	36.36	6	27.27
Not Very Safe	3	20.00	5	19.23	5	27.78	10	45.45	5	22.73
Not Safe at All	5	33.33	14	53.85	4	22.22	2	9.09	7	31.82
Total	15		26		18		22		22	

Chi-Square=15.904 Modified Chi Square=3.252 *
Crammer's V=0.2269 Modified Crammer's V=0.1777 *
Sign. at .95 level: No

* Modified Chi Square is based on collapsing the ordinal scale to two categories divided by the dotted line

Table 41: Category Code and Problems from Health

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
Not at all	19	38.00	2	6.90	3	8.57	24	21.05
A Little	20	40.00	10	34.48	22	62.86	52	45.61
A Great Deal	11	22.00	17	58.62	10	28.57	38	33.33
Total	50		29		35		114	

Chi-Square=23.314 Crammer's V=0.3198
Sign. at .95 level: Yes

Table 42: Age and Problems from Health

	60-69		70-79		>80		Total	
	n	%	n	%	n	%	n	%
Not at all	11	40.74	8	16.33	4	10.53	23	20.35
A Little	14	51.85	26	53.06	12	31.58	52	46.02
A Great Deal	2	7.41	15	30.61	21	55.26	38	33.63
Total	27		49		38		113	

Chi-Square=21.310 Crammer's V=0.3071
Sign. at .95 level: Yes

Table 43: Marital Status and Problems from Health

	Single		Divorced		Married		Widowed		Total	
	n	%	n	%	n	%	n	%	n	%
Not at all	3	27.27	2	25.00	9	23.08	7	13.73	21	19.27
A Little	6	54.55	4	50.00	19	48.72	22	43.14	51	46.79
A Great Deal	2	18.18	2	25.00	11	28.21	22	43.14	37	33.94
Total	10		8		39		51		109	

Chi-Square=4.586 Crammer's V=0.2051
Sign. at .95 level: No

Table 44: Residence Type and Problems from Health

	Own Home		Apart./Condo.		Retire. Home		Total	
	n	%	n	%	n	%	n	%
Not at all	14	36.84	7	17.07	3	8.57	24	21.05
A Little	15	39.47	15	36.59	22	62.86	52	45.61
A Great Deal	9	23.68	19	46.34	10	28.57	38	33.33
Total	38		41		35		114	

Chi-Square=14.107 Crammer's V=0.2487
Sign. at .95 level: Yes

Table 45: Category Code and Activities You can not do

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
Yes	19	38.78	19	67.86	20	57.14	58	51.79
No	30	61.22	9	32.14	15	42.86	54	48.21
Total	49		28		35		112	

Chi-Square=6.621 Crammer's V=0.2431
Sign. at .95 level: Yes

Table 46: Problems from Health and Activities You can not do

	Not at all		A little		A great deal		Total	
	n	%	n	%	n	%	n	%
Yes	3	13.64	23	47.92	30	90.91	56	54.37
No	19	86.36	25	52.08	3	9.09	47	45.63
Total	22		48		33		103	

Chi-Square=33.278 Crammer's V=0.5684
Sign. at .95 level: Yes

Table 47: Marital Status and Activities You can not do

	Single		Divorced		Married		Widowed		Total	
	n	%	n	%	n	%	n	%	n	%
Yes	2	18.18	4	50.00	21	53.85	28	56.00	55	50.93
No	9	81.82	4	50.00	18	46.15	22	44.00	53	49.07
Total	11		8		39		50		108	

Chi-Square=5.370 Crammer's V=0.2230
Sign. at .95 level: Yes

Table 48: Gender and Activities You can not do

	Male		Female		Total	
	n	%	n	%	n	%
Yes	15	44.12	43	54.43	58	52.25
No	17	50.00	36	45.57	53	47.75
Total	34		79		111	

Chi-Square=0.521 Crammer's V=0.0685
Sign. at .95 level: No

Table 49: Who do You Live with and Activities You can not do

	With Someone		Alone		Total	
	n	%	n	%	n	%
Yes	24	48.00	34	55.74	58	52.25
No	26	52.00	27	44.26	53	47.75
Total	50		61		111	

Chi-Square=0.659 Crammer's V=0.0771
Sign. at .95 level: No

Table 50: Age and Activities You can not do

	60-69		70-79		>80		Total	
	n	%	n	%	n	%	n	%
Yes	14	53.85	23	47.92	21	56.76	58	52.25
No	12	46.15	25	52.08	16	43.24	53	47.75
Total	26		48		37		111	

Chi-Square=0.689 Crammer's V=0.0788
Sign. at .95 level: No

Table 51: Residence Type and Activities You can not do

	Own Home		Apart./Condo.		Retire. Home		Total	
	n	%	n	%	n	%	n	%
Yes	18	48.65	20	48.78	20	57.14	58	51.33
No	19	51.35	21	51.22	15	42.86	55	48.67
Total	37		41		35		113	

Chi-Square=0.687 Crammer's V=0.0780
Sign. at .95 level: No

Table 52: Category Code and Why Aren't You Participating

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
Too Expensive	12	23.53	4	13.79	8	22.86	24	20.87
No Transportation	16	31.37	7	24.14	17	48.57	40	34.78
Not sure how	12	23.53	4	13.79	1	2.86	17	14.78
Problems with Weather	16	31.37	11	37.93	14	40.00	41	35.65
Facilities not Available	8	15.69	4	13.79	0	0.00	12	10.43
No time	24	47.06	2	6.90	4	11.43	30	26.09
Too far away	8	15.69	4	13.79	4	11.43	16	13.91
No One to do it With	20	39.22	7	24.14	2	5.71	29	25.22
No One to Assist You	0	0.00	6	20.69	2	5.71	8	6.96
Other	5	9.80	4	13.79	1	2.86	10	8.70
No Need to	26	50.98	6	20.69	11	31.43	43	37.39
Total	51		29		35		115	

* Percentages do not add up to 100% because they are not mutually exclusive

Table 53: Residence Code and Activities You can not do

	Central		Northwest		Northeast		Southeast		Southwest	
	n	%	n	%	n	%	n	%	n	%
Yes	8	53.33	16	64.00	9	52.94	9	42.86	10	43.48
No	7	46.67	9	36.00	8	47.06	12	57.14	13	56.52
Total	15		25		17		21		23	

Chi-Square=2.819 Crammer's V=0.1671
Sign. at .95 level: No

Table 54: Category Code and Would You Travel more Often

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
Yes	11	26.19	20	68.97	25	75.76	56	53.85
No	31	73.81	9	31.03	8	24.24	48	46.15
Total	42		29		33		104	

Chi-Square=21.968 Crammer's V=0.4596
Sign. at .95 level: Yes

Table 55: Health and Would You Travel more Often

	Excellent		Good		Fair		Poor		Total	
	n	%	n	%	n	%	n	%	n	%
Yes	4	28.57	14	33.33	32	78.05	6	85.71	56	50.45
No	10	71.43	28	66.67	9	21.95	1	14.29	48	43.24
Total	14		42		41		7		104	

Chi-Square=23.234 Modified Chi Square=22.997 *
Crammer's V=0.4727 Modified Crammer's V=0.4702
Sign. at .95 level: Yes

Table 56: Age and Would You Travel more Often

	60-69		70-79		>80		Total	
	n	%	n	%	n	%	n	%
Yes	9	34.62	20	50.00	27	72.97	56	54.37
No	17	65.38	20	50.00	10	27.03	47	45.63
Total	26		40		37		103	

Chi-Square=9.559 Crammer's V=0.3046
Sign. at .95 level: Yes

Table 57: Who do You Live with and Would You Travel more Often

	With Someone		Alone		Total	
	n	%	n	%	n	%
Yes	19	39.58	37	66.07	56	53.85
No	29	60.42	19	33.93	48	46.15
Total	48		56		104	

Chi-Square=7.297 Crammer's V=0.2649
Sign. at .95 level: Yes

Table 58: Marital Status and Would You Travel more Often

	Single		Divorced		Married		Widowed		Total	
	n	%	n	%	n	%	n	%	n	%
Yes	5	45.45	3	42.86	15	40.54	32	71.11	55	55.00
No	6	54.55	4	57.14	22	59.46	13	28.89	45	45.00
Total	11		7		37		45		100	

Chi-Square=8.667 Crammer's V=0.2944
Sign. at .95 level: Yes

Table 59: Residence Type and Would You Travel more Often

	Own Home		Apart./Condo.		Retire. Home		Total	
	n	%	n	%	n	%	n	%
Yes	10	30.30	21	55.26	25	75.76	56	53.85
No	23	69.70	17	44.74	8	24.24	48	46.15
Total	33		38		33		104	

Chi-Square=13.766 Crammer's V=0.3638
Sign. at .95 level: Yes

Table 60: Gender and Would You Travel more Often

	Male		Female		Total	
	n	%	n	%	n	%
Yes	16	47.06	40	57.97	56	54.37
No	18	52.94	29	42.03	47	45.63
Total	34		69		103	

Chi-Square=1.093 Crammer's V=0.1030
Sign. at .95 level: No

Table 61: Category Code and Further Assistant Needed

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
Someone to Assist	1	1.96	6	20.69	11	31.43	18	15.65
Financial	4	7.84	10	34.48	9	25.71	23	20.00
Specialized Vehicles	0	0.00	3	10.34	10	28.57	13	11.30
Other	1	1.96	5	17.24	1	2.86	7	6.09
None	45	88.24	10	34.48	17	48.57	72	62.61
Total	51		29		35		115	

* Percentages do not add up to 100% because they are not mutually exclusive

Appendix III: Ethics Approval

THE UNIVERSITY OF WESTERN ONTARIO

DEPARTMENT OF GEOGRAPHY - GRADUATE RESEARCH - MASTERS

STUDENT INVESTIGATOR: Steven R. Smeltzer

STATUS: Full-time M.A. Student

COURSE: Thesis, Geog 589,590

ADDRESS: 9 Brentwood Cres., London Ontario N6G 1X3

TELEPHONE: (519) 657-5759

RESEARCH PROJECT TITLE:

An Examination of Physical, Economic, and Social Constraints on Elderly's Daily Travel Behaviour - Case Study: London, Ontario

NAME OF FACULTY ADVISOR:

Prof. Donald G. Janelle

NAMES OF ALL CO-INVESTIGATORS, IF ANY:

Signature of Principal Investigator attesting that all co-investigators have reviewed the protocol contents and are in agreement with the contents as submitted; and that the Graduate Coordinator is aware of this research.

SIGNATURE: 

***** THIS IS A COVER PAGE ONLY, COMPLETE ALL SECTIONS INSIDE *****

1. HISTORY OF THIS PROTOCOL:

(a) New ✓

Modification ___ Annual Review ___ Previous No. ___

Does this protocol differ in any way from previously approved protocol?

YES NO

Explain any differences:

(b) Any restrictions on publication of this research?

YES (NO)

(Describe any restrictions)

(c) Is this research funded or applied for:

FUNDED APPLIED FOR

Agency: _____

Number: _____

Date Proposal Due in Agency: _____

(d) Projected completion date: June 1995

Date of Anticipated Completion of Use of Subjects: December 1994

(e) Does this Study Involve any Procedures or Therapies of a Medical Nature?

YES (NO)

(Describe any medical procedures or therapies)

2. SUMMARY OF PROPOSED RESEARCH (Insert pages as required):

The summary shall include: a short descriptive title; the study design; specific manipulations; the nature of questionnaires, tests, interviews, etc. Attach a copy of questionnaires or tests to be used. Address the scholarly/scientific validity of the study, and the appropriateness of utilizing human subjects. Include selected references where appropriate.

(a) No. of subjects: 475

Sources: Mail Survey

Compensation: None

Place where research is carried out: London, Ontario

(b) Describe the method of recruiting subjects, who will be contacting them. Provide copy of any advertisement.

During the survey, there will be two different methods of contacting potential respondents. For the first two subject groups, the researcher will advertise for voluntary participants in local seniors newsletters, at seniors community centers, public libraries, church groups, and any other public place frequented by senior citizens. These postings will advertise for individuals over the age of 65 who are interested in completing a survey. The advertising will list a phone number to call and the amount of time it would take to complete the survey. Athough this is not an ideal way to obtain a sample population, there is no listing of citizens in the city by age.

(c) Describe the subjects to be included in the study and any exclusion criteria. (continued on the back)

Will the Study Involve:

Minors?	YES	(NO)
Incompetent Subjects?	YES	(NO)

Summary of Proposed Research

b) The other subject group will be sampled at retirement and nursing homes. Because of time and budget limitations, a clustered sample technique will be used. A radom sample of retirement and nursing homes will be identifed. Then, the adminstration of the home will be contacted to see if the researcher can pass out a questionaire to a random selection of individulas or have one of the staff do it. If they adminstration refuses, the next closest home will be contacted.

3. RISKS AND BENEFITS (Insert pages as required):

(a) Discuss the risks and benefits of the proposed research to all parties, specifying the particular risks associated with each procedure, test, interview, or other aspect of the protocol.

Risks: There are no risk to any subject
Benefits: The completed study will provide information to planners and agencies that service elderly people in London. Indirectly, the thesis could suggest ways of improving transportation-related servicies. Selected agencies will recieve copies the completed thesis.

(b) Please indicate if deception will be involved in this study. If yes, please justify its use and explain the debriefing procedures.

There will be no deception.

(c) Describe the procedures for preserving confidentiality of subjects. Explain how written records, videotapes, recordings, questionnaires, and tests will be kept, and disposed of, after the study is completed. Describe any condition in which confidentiality or anonymity cannot be guaranteed or must be breached.

Each questionaire will contain an identification number that will be used for follow-up purposes only, Respondents will in no way be traceable to individual respondents once the survey process is complete, all filled-out questionnaires will be destroyed. There will be no situation where confidentiality or anonymity will be breached.

4. SUBJECT INFORMATION AND INFORMED CONSENT (Insert pages as required):

NOTE: A COPY OF THE LETTER OF INFORMATION AND CONSENT FORM MUST BE ATTACHED.

(See "Checklist of Essential Components in Submissions for Ethical Review" and "Instructions for Preparing Letters of Information and Consent Forms" -- 1991 Review Board Guidelines)

(a) Describe the procedure for informing subjects about the research, including the information imparted to them.

During the survey, each respondent will be given a cover letter (attached) outlining the purpose of the research, assuring their their anonymity, and how to connected me for more information.

(b) Are the subjects competent to consent?

(YES) NO

If not, describe the alternative source of consent.