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**PERCEPTIONS, ATTITUDES, AND SUBJECTIVE NORMS
INFLUENCING SENIORS' DECISIONS TO ACCEPT OR REJECT
MOBILITY AIDS IN FALL PREVENTION: AN APPLICATION OF
THE THEORY OF PLANNED BEHAVIOR**

By

FARANAK AMINZADEH

**Thesis submitted to the School of Graduate Studies and Research
in partial fulfilment of the requirements for the
degree of Master of Science in Nursing**

University of Ottawa

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ABSTRACT

Falls among seniors have become an increasingly well recognized public health problem. Many risk factors for falls are modifiable with appropriate interventions. Educational strategies to improve the use of mobility aids have been an important component of some recent fall prevention programs. However, literature and clinical observations point to poor acceptance of these devices by seniors.

Guided by the Theory of Planned Behavior (TPB), this study was an exploratory investigation of attitudinal, normative, and perceptual determinants of cane use among community residing older adults. The objectives of the study were: 1) to develop valid and reliable measures of the TPB constructs as they relate to the use of canes in fall prevention; 2) to determine the relationships between various components of the model and cane use behaviors in a sample of community-dwelling older adults aged 65 and over; and, 3) to examine the differences between “cane-users” and “non-users” with respect to the TPB variables and selected sociodemographic and health-related characteristics.

This descriptive comparative study involved two phases: 1) instrument development to measure TPB constructs and pilot testing on a purposive sample of 10 seniors; and, 2) a cross-sectional survey of a convenience sample of 98 community-dwelling seniors in Ottawa-Carleton. Subjects were recruited from a variety of community settings, using both direct (in-person) and indirect (key informant) approaches. Data were collected through self- and interviewer- administered techniques.

The findings provided some evidence for the validity and reliability of the instrument and confirmed the utility of the TPB in its application to a new domain of behavior. “Cane-users” were significantly older, reported greater mobility difficulties, and had more negative evaluations of their activity level compared to “non-users”. However, the two groups did not significantly differ with respect to other sociodemographic characteristics, fall history and frequency, and self-rated health. As hypothesized, there were significant differences between “cane-users” and “non-users” on all components of the TPB model, even after stratifying the sample by age and mobility level. The findings bear important implications for a renewed approach to assistive device screening and training and provide some direction for the design of more effective fall prevention interventions for seniors.

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LIST OF ABBREVIATIONS

ADL- Activities of Daily Living

CCM- Cane Use Cognitive Mediator Instrument

FPBQ- Fall Prevention Behavior Questionnaire

HCW- Health Care Worker

KIWG- Kellogg International Work Group

OARS- Older American Research Service Centre Instrument

PBC- Perceived Behavioral Control

SD- Standard Deviation

SN- Subjective Norm

SPSS- Statistical Package for Social Science

TPB- Theory of Planned Behavior

CHAPTER ONE

INTRODUCTION

This chapter introduces the problem of falls as a major health concern among seniors, provides the rationale for the study, and describes its contribution to addressing gaps in the literature.

1.1 Problem and Purposes

Falls are a major cause of functional disability, morbidity, increased health care utilization, and mortality among seniors (Alexander, Rivara, , & Wolf, 1992; Dunn, Rudberg, Furner, & Cassel, 1992; Grisso, Schwarz, Wishner, Weene, Holmes, & Sutton, 1990; Kellogg International Work Group [KIWG],1987; Rice & MacKenzie, 1989; Riley, 1992; Riley & Paddon, 1989). Age-related functional declines, a variety of chronic disabilities, attitudinal and environmental factors predispose older adults to the risks of falling (Campbell, Borrie, & Spears, 1989; Graafman, Ooms, Hofstee, Bezemer, Bouter, & Lips, 1996; Nevitt, Cummings, Kidd, & Black, 1989; O'Loughlin, Robitaille, Bovin, & Suissa, 1993; Studenski, Duncan, Chandler, Samsa, Prescott, Hogue, & Bearon, 1994).

Prescribing appropriate devices for safe mobility and transfer has been a component of many recent fall prevention programs (Edwards, Céré, & Leblond, 1993; Hornbrook, Stevens, Wingfield, Hollis, Greenlick, & Ory, 1994; McCabe, 1985; Ploeg, Black, Hutchison, Walter, Scott, & Chambers, 1994; Tinetti, Baker, McAvay, Claus, Garrett, Gottschalk, Koch, Trainor, & Horwitz, 1994; Wolf-Klein, Silverstone, Basavaraju, Foley, & Pascaru, 1988). Despite their potential value, clinical observations and empirical literature point to low

motivation to use and poor acceptance of mobility aids by many community-living seniors (Edwards, 1990; Edwards & Aminzadeh, 1996; Edwards et al., 1993; Tinetti & Powell, 1993). The underutilization of safety devices has broad individual and societal consequences. The Ottawa-Carleton Fall Prevention Coalition has identified, as a priority, the design of strategies to change seniors' attitudes towards the use of assistive devices (Ottawa-Carleton Health Department, 1995).

Our knowledge about barriers to the use of assistive devices among seniors is limited. Those few studies that have examined predictors of device use have almost exclusively focused on sociodemographic characteristics and medically defined aspects of disease and disability (Forbes, Hayward, Agwani, 1993; Giltin, Schemm, Landsberg, & Burgh, in press; Sonn & Grimby, 1994; Zimmer & Chappell, 1994).

In recent years, a small body of qualitative research has explored personal experiences of device users and shed light on many physical and psychosocial consequences of device use (Bates, Spencer, Young, & Rintala, 1993; Edwards & Aminzadeh, 1996; Giltin, 1995a; Luborsky, 1993; Scheer & Luborsky, 1991). More research is needed to examine these factors in a more systematic and theoretical manner. The improved knowledge is critical in guiding the design of more effective fall prevention interventions.

Community health nurses often play a key role in the design and implementation of fall prevention programs. As a holistic profession, it is critical that nurse researchers fill in some of the gaps in our knowledge of the complex interactions between objective and subjective evaluations of need and acceptability of mobility aids in fall prevention. Guided by the Theory of Planned Behavior (TPB) (Ajzen, 1988, 1991), this study explored attitudinal,

normative, and perceptual determinants of cane use among community-living older adults.

1.2 Organization of Thesis

This thesis is divided into six chapters. Chapter Two provides an overview of the relevant empirical and theoretical literature and concludes with an outline of the study objectives and hypotheses. The methods employed in this study are described in Chapters Three and Four. More specifically, Chapter Three presents the methods and procedures for the main survey, and Chapter Four details the methods and qualitative findings of the instrument development and pilot testing phase. The results of the main survey are presented in Chapter Five. Finally, Chapter Six discusses study findings and their implications for theory, clinical practice and future research.

CHAPTER TWO

LITERATURE REVIEW¹

This chapter is divided into three sections. First, an overview of the empirical research on falls and the use of assistive devices among community-living seniors is presented. Next, the theoretical framework is discussed. Finally, the study objectives and hypotheses are outlined.

2.1 Review of Empirical Literature

2.1.1 Background: Falls among seniors carry high individual and social costs. Evidence from large scale community-based studies indicate that about one-third of community living seniors report at least one fall each year (see Table 2.1). Fall rates and related morbidity and mortality increase with advanced age (Alexander et al., 1992; Baker & Harvey, 1985; Svensson, Rundgren, & Landahl, 1992) and are higher among elderly institutionalized populations (Baker & Harvey, 1985; Luukinen, Koski, Honkanne, & Kivela, 1995; Rubenstein, Robbins, Schulman, Rosado, Osterweil, & Josephson, 1988).

In Canada, falls are the leading cause of fatal and nonfatal injuries among seniors. Injuries, in turn, are the fifth leading cause of death in older adults (Riley, 1992; Riley &

¹ Most papers cited in this review were identified by an English language literature search of the Medline, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, and Health databases from 1980 to date, using the following keywords: aged, accidental falls, assistive technology, self-help devices, mobility aids, self-care, Theory of Planned Behavior, and Theory of Reasoned Action. The reference sections of individual publications were also used to identify relevant studies. Finally, the unpublished work of researchers in related areas was included.

Table 2.1 Fall Rates in Community-Based Studies of Older Adults

Study	Location	Study Population	N	Data Collection	Response Rate	% Fallers (1 year)
Cross-Sectional Studies:						
Prudham & Evans (1981)	England	Total population in a defined community, age > 65	2,497	Self reports of falls in the past 12 months	89%	28%
Campbell et al. (1981)	New Zealand	A stratified random sample, age >65	553	As above	95%	34%
Blake et al. (1988)	England	A national sample, age >65	1,042	As above	80%	35%
Robbins et al. (1989)	United States	Clients of an outpatient clinic, age >65	761	As above	30%	31%
Cwikel (1992)	Israel	An stratified random sample, age >65	3,494	As above	91%	24%
Lord et al. (1993)	Australia	A random sample of women, age >65	704	As above	54%	44%
Prospective Studies:						
Tinetti et al. (1988)	United States	A random sample of ambulatory seniors, age >75	336	Self reports of falls during 12 months follow-up	73%	32%
Nevitt et al. (1989)	United States	A convenience sample of seniors with a history of falls, age >65	325	Self reports of falls during 52 weeks follow-up	-	57%
Campbell et al. (1989, 1990)	New Zealand	Seniors registered at a health center in a rural community, age >70	761	Self reports of falls during 12 months follow-up	92%	35%
O'Loughlin et al. (1993)	Canada	A random sample, age >64	417	Self reports of falls during 48 weeks follow-up	75%	29%
Sorock & Labiner (1992)	United States	Tenants of 6 senior citizen housings	169	Self reports of falls during 22 weeks follow-up	-	34%
Graafmans et al. (1996)	Netherlands	Seniors living in 13 residential homes for the elderly, age >70	354	Self reports of falls during 28 weeks follow-up	80%	36%

- Information not reported

Paddon, 1989). In 1989, for persons aged 65 and older, falls accounted for nearly two thirds of all accidental deaths in Canada (Riley, 1992).

The nonfatal sequelae of falls include physical injury, psychological trauma, functional decline, and permanent institutionalization. The findings of community-based studies indicate that between 20% to 69% of falls among older adults result in injuries, with serious injuries occurring in less than 12% of fall events (Cwikel, 1992; Nevitt, Cummings, & Hudes, 1991; Hale, Delaney, & McGaghie, 1992; O'Loughlin, 1991; Speechley & Tinetti, 1991; Tinetti, Doucette, Claus, & Marottoli, 1995; Tinetti, Speechley, & Ginter, 1988). Fractures are among the most common serious injuries associated with falling. By the age of 90, one third of women and one sixth of men will have sustained a hip fracture (Melton, Ilstrup, Riggs, & Beckenbaugh, 1982) and over 90% of these fractures are the result of a fall (Grisso, Kelsey, Strom, Chiu, O'Brien, Hoffman, & Kaplan, 1991).

Falls are associated with increased health care utilization and costs (Alexander et al., 1992; Rice & MacKenzie, 1989; Riley & Paddon, 1989). In 1989, for persons aged 65 and older, falls accounted for 65% of all accident-related hospital separations and 72% of accident-related days of hospital care in Canada (Riley, 1992). Fall survivors experience a greater risk of permanent institutionalization than nonfallers (Kiel, O'Sullivan, Teno, & Mor, 1991; KIWG, 1987). American studies indicate that over 40% of elderly persons admitted to an acute care hospital for fall-related trauma are discharged to a nursing home, while an additional 10% require increased home care services (Alexander et al., 1992; Sattin, Lanbet, De Vito, Rodriguez, Ros, Bacchelli, Stevens, & Waxwiller, 1990). Falls are the leading cause of over one-third of nursing home admissions, reflecting the potentially profound social

impact of fall events (KIWG, 1987; Smallegan, 1983).

Although few falls actually result in injuries that require medical attention, the psychological shock of a fall can have severe functional consequences resulting in loss of confidence, self-imposed activity limitation, and increased dependence (Cwikel, Kaplan, & Vita, 1990; Tinetti & Powell, 1993; Vellas, Cayla, DePemille, Albarede, 1987). Research indicates that fear of falling and the consequent activity restrictions are not limited to fallers, but are also common experiences among community-dwelling seniors who do not have a history of falls (Arfken, Lach, Brige, Miller, 1994; Tinetti, Mendes de Leon, Doucette, & Baker, 1994; Walker & Howland, 1990).

2.1.2 Risk Factors for Falls: Over the past decade, community-based epidemiological studies have identified major risk factors for falls (see Tables 2.2 to 2.4). Most falls among seniors are multifactorial, resulting from the convergence of several health related, behavioral, and environmental factors (KIWG, 1987). As presented in the tables, empirical evidence supporting a relationship between some health-related risk factors and falls is relatively consistent across the studies. These include indicators of declining health status, history of falls, mobility impairments, gait and balance disorders, and chronic disabilities and medications that affect cognitive, neurosensory and musculoskeletal functions. Among the sociodemographic factors, evidence is stronger for the association between older age and falls.

Fall research has largely focused on medical risk factors. Remarkably little has been documented on the psychosocial and lifestyle factors which may predispose elderly

Table 2.2 Association Between Sociodemographic Factors and Risk of Falls in Community-Based Studies of Older Adults

Study	Age (Older)	Gender (Female)	Marital Status (Not Married)	Living alone	Race (White)	Reduced Physical Activity	Social Isolation
Cross-Sectional Studies:							
Prudham & Evans (1981)	+	+		0		+	
Campbell et al. (1981)	+♀*		+♂*	0			
Blake et al. (1988)	0	+					
Robbins et al. (1989)							
Cwikel (1992)	+	+	+	+	0		+
Lord et al. (1993)	0					+*	
Prospective Studies:							
Tinetti et al. (1988)	+	0			0	+	
Nevitt et al. (1989)	+	0		+	+*	+	+
Campbell et al. (1989, 1990)	+♀	+				+♂	
O'Loughlin et al. (1993)	+	+	+	+	+	+	+
Sorock & Labiner (1992)	0	0					
Graafmans et al. (1996)	0	+*					0

Blank Association not studied/reported

0 No association detected

+ Association was detected in bivariate analysis

+* Significant predictor in multivariate analysis

+♂ Association was detected only in men

+♀ Association was detected only in women

Table 2.3 Association Between Specific Health Problems and Risk of Falls in Community-Based Studies of Older Adults

Study	History of Falls	Poor Self-Rated Health	Visual Problems	Cognitive Impairment	Depression/Anxiety	Polypharmacy	Psychoactive Drugs	Cardiovascular Disorders
Cross-Sectional Studies:								
Prudham & Evans (1981)			+	+		+	+	+
Campbell et al. (1981)			+♀	+♂*	+♂*	0	0	0
Blake et al. (1988)			0		0	+	+	
Robbins et al. (1989)			0	+*	0	0	0	0
Cwikel (1992)			+				+	
Lord et al. (1993)		+	+*	0		+	+	
Prospective Studies:								
Tinetti et al. (1988)	+		+	+*	+		+*	0
Nevitt et al. (1989)	+*		+	+	+		+	
Campbell et al. (1989, 1990)	+		+	0		+♀*	+♀*	
O'Loughlin et al. (1993)	+	+	+			+	+	0
Sorock & Labiner (1992)				0			+	0
Graafmans et al. (1996)	+*		0	+*	+*		+	0

Blank Association not studied/reported

+ Association was detected in bivariate analysis

+♂ Association was detected only in men

+* Significant predictor in multivariate analysis

+♀ Association was detected only in women

0 No association detected

Table 2. 4 Association Between Specific Neuro-Musculo-Skeletal Disorders and Risk of Falls in Community-Based Studies of Older adults

Study	Arthritis	Foot Disorders	Restriction in ADL	Impaired Mobility	Use of Mobility Aids	Impaired Balance	Impaired Gait	Muscular Weakness	Chair Stand
Cross-Sectional Studies:									
Pradhan & Evans (1981)			+	+					
Campbell et al. (1981)			+		+♀*				
Blake et al. (1988)	+	+	0	+				+	
Robbins et al. (1989)	0		+	+	+	+	+	+	
Cwikel (1992)				+					
Lord et al. (1993)			+			+			
Prospective Studies:									
Tinetti et al. (1988)	0	+	+	+	+	+	+		
Nevitt et al. (1989)	+		+	+	+	+	+	+	+
Campbell et al. (1989,1990)	+			+	+		+	+	+
O'Loughlin et al. (1993)	0		+	+	+				+
Sorock & Labiner (1992)	0				+			+	
Graafmans et al. (1996)				+	+	+	+	+	+

Blank Association not studied/reported

0 No association detected

+ Association was detected in bivariate analysis
 +* Significant predictor in multivariate analysis

+♂ Association was detected only in men
 +♀ Association was detected only in women

persons to falls (Cwikel & Fried, 1992). As shown in Table 2.2, reduced physical activity and social isolation have been positively associated with falls. The denial of limitations imposed by the aging process has also been suggested as a risk factor which may result in the refusal to take proper preventive actions (Tideksaar, 1989).

In a prospective cohort study of 306 male veterans aged 70 or older, recurrent falls were 4.8 times more likely to occur in subjects who were mobile but unstable compared with those who were either immobile or mobile and stable. Interestingly, within the high risk group the probability of recurrent falls was significantly affected by risk-avoidance attitudes (Studenski et al., 1994).

2.1.3 Benefits of Mobility Aids in Fall Prevention: Research evidence has shown the mechanisms by which age-related changes in the neurosensory and musculoskeletal systems can lead to balance and mobility impairments among older adults (Maki & McIlroy, in press). Large scale studies of noninstitutionalized elderly persons indicate that between 10% to 43% of this population experience some degree of mobility restriction (Fulton, Katz, Jack, & Hendershot, 1989; Lundgren-Lindquist, 1990; Lundgren-Lindquist, Grimby, & Landah, 1983; Norburn, Bernard, Konard, Woomert, DeFriese, Kalsbeek, Koch, & Ory, 1995; Zimmer & Chappell, 1994). The rates vary considerably according to study samples, measurement techniques, and definitions of impairment used.

In the light of such statistics, prescribing appropriate devices for safe mobility and transfer has been a component of many recent fall prevention programs for seniors (Edwards et al., 1993; Hornbrook et al., 1985; Ploeg et al., 1994; Tinetti et al., 1994; Wolf-Klein et al.,

1988). However, most of these programs have adopted multifaceted strategies, making it impossible to evaluate the effectiveness of each individual intervention component in reducing the incidence of falls.

The benefits of mobility aids in fall prevention are two-fold. Walking aids increase stability for an individual while transferring and walking. They widen the base of support, decrease weight bearing on the lower extremities, and provide extra sensory and proprioceptive feedback regarding body position and changes in the walking surface. Thus, these devices are especially important for older adults with balance and mobility deficits, muscular weakness, painful joints, visual impairments, and diminished sensations of the lower extremities (Axtell & Yasuda, 1993; Deathe, Hayes, & Winter, 1993; Friedmann & Capulong, 1984; Joyce & Kirby, 1991). Mobility aids also increase feelings of safety and confidence, resulting in improvements in activity levels (Edwards & Aminzadeh, 1996; Sonn & Grimby, 1993; Tinetti, 1986; Tinetti & Powell, 1993).

Although seniors may be reluctant to use mobility aids, they readily acknowledge the benefits of these devices. In a recent qualitative study of 30 community-living seniors in Ottawa-Carleton, participants identified many benefits of cane use, including: improvement in mobility, balance, and gait; pain reduction in back and lower extremities; enhanced feelings of safety and security; and prevention of falls and injuries (Edwards & Aminzadeh, 1996).

Similarly, in a longitudinal Swedish study of community-dwelling elderly persons, mobility device users (N=166) identified feelings of safety, reduced dependence on personal assistance, increased ease in performing the activity, and improved function as important benefits of mobility aids (Sonn & Grimby, 1994).

In a cross-sectional study of a convenience sample of 144 community-dwelling seniors in Canada, cane use was associated with improved functional ability (Dean & Ross, 1993). The primary reasons for using canes cited by subjects were joint problems (39%), general balance difficulties (30%), a combination of joint and balance problems (15%), and neurological conditions (10%). Participants reported being able to perform five functional ability activities "a little" to "a lot better" with their canes (on a three-point scale, scores ranged from "no difference" to "a lot better"). However, there was no relationship between functional ability with a cane and self-reports of falling frequency. While 76% of cane-users denied that their canes prevented falls, 24% reported falling less with their canes. Ironically, 30% of subjects expressed apprehension that their canes could actually cause them to fall. The design limitations of this study require cautious interpretation of the findings. Longitudinal studies are needed to assess seniors for their functional ability and falling frequency before and after cane prescription.

2.1.4 Patterns and Predictors of Device Use Among Community-Living Seniors:

The fairly extensive rehabilitation literature concerning assistive technology has focused primarily on utilization rates. Much less attention has been devoted to the study of users' perceptions and attitudes that may facilitate or inhibit device use. Moreover, current research has mostly sampled adults with disabilities. To date few published studies have investigated the patterns and predictors of device use among the general older population.

Table 2.5 summarizes the patterns of device use among community-living seniors reported in studies that differed vastly in design, sample characteristics, the types of devices

examined, and the definitions of utilization. As illustrated in the table, the average number of devices owned ranged from 1.2 devices per person (in a study of the general older population) to 13.7 devices per person (in a sample of seniors with mixed disabilities). Mobility aids and devices used in bathing and personal hygiene were the most commonly owned assistive devices. The proportion of subjects owning one or more devices varied from 21% (in the general older population) to 100% (in the studies of elderly persons with disabilities). Finally, depending on the type of devices and disabilities examined, between 53% and 90% of the devices owned were regularly used. To better understand the patterns of device use, a more detailed discussion of the findings of these studies is warranted.

In Sonn and Grimby's longitudinal Swedish study (1994), a representative sample of community-living older adults was interviewed on two occasions, at the ages of 70 and 76 (N=371). The use of assistive devices increased with age. While only one-fifth of the participants at the age of 70 owned assistive devices, six years later, almost half of the population had devices, most frequently to assist with bathing and mobility. At age 76, participants owned an average of 1.2 devices per person, with mobility aids comprising 24% of the devices owned. Of the latter, 64% were used regularly, 20% were used sometimes, and 16% were never used. All subjects who reported using mobility aids indoors (14% of the sample) also used these devices for outdoor activities, and an additional 16% used mobility aids only outdoors. In this study, a higher proportion of females and subjects living alone used assistive devices compared to men and cohabitants.

Table 2.5 Patterns of Device Use among Community-living Older Adults

Study	Country	Population	Design	Aids per Person (Mean)	Type of Aids Owned (%)	Subjects Owning Aids (%)	Aids Used Regularly (%)
Forbes et al. (1993)	Canada	A representative sample of seniors with mobility, vision, and hearing disabilities, age >55	Cross-sectional design	-	-	Subjects with Mobility impairment 35%	-
George et al. (1988)	U.K.	A random sample of 140 community-living seniors, age > 75	Cross-sectional design	-	-	42%	-
Giltin et al. (in press)	U.S.	A convenience sample of 86 rehabilitation patients, age >55	Prospective study; follow up at 1, 2, and 3 months post-discharge	8.0	Mobility: 32% Dressing: 30% Bathing: 26% Other: 12%	100%	Month 1: 53% Slight decline from month 1 to 3
Lundgren-Lindquist et al. (1983)	Sweden	A representative sample of 205 community-living seniors, at age 79	Cross-sectional design	-	-	Bathing: 70% Mobility: 29%	-

- Information not reported

Table 2.5 Cont'd

Study	Country	Population	Design	Aids per Person (Mean)	Type of Aids Owned (%)	Subjects Owning Aids (%)	Aids Used Regularly (%)
Mann et al. (1993)	U.S.	157 non-institutionalized seniors with mixed impairments, age>60	Cross-sectional survey	13.7	-	-	79%
Parker & Thorslund (1991)	Sweden	A representative sample of 57 seniors with mixed disabilities, residents of a rural community, age>74	Cross-sectional design	7.4	Mobility: 29% Hygiene: 20% Environmental adaptations: 16% Other: 36%	100%	All aids: 75% Mobility aids: 66%
Sonn & Grimby (1994)	Sweden	A random sample of 595 community-living seniors, at ages 70 and 76	Longitudinal study; interviews at ages 70 and 76	1.2	Bathing: 45% Mobility: 24% Transfer: 8% Other: 24%	Age 70: 21% Age 76: 45%	All aids: 90% Mobility aids: 64%
Zimmer & Chappell (1994)	Canada	A random stratified sample of 607 seniors with mobility problems, age >65	Cross-sectional survey	-	-	62%	-

- Information not reported

In another longitudinal population study of 205 Swedish seniors at age 79, subjects were first interviewed about their need for assistive devices and later examined for their functional ability (Lundgren-Lindquist et al., 1983). Balance and mobility problems were found to be common among the participants. Seniors' self-reports indicated that climbing into and out of a bathtub (30%) and going up and down stairs (20%) were the most common mobility problems. Twenty-nine percent of the sample used walking aids.

Studies of older adults with disabilities suggest higher rates of device utilization among this group of seniors. In Parker and Thouslund's Swedish study (1991) of a random sample of 57 seniors with mixed disabilities, an average of 7.4 devices per person was reported. In this study, 79% of subjects had mobility problems, 80% of whom had aids to assist with their limitations. Finally, 66% of mobility aids owned were regularly used.

Consistent with the Swedish studies, data from the Canadian Health and Activity Limitation Survey (Forbes et al., 1993) indicate that the use of assistive devices increases with age. In this survey, the proportion of seniors with mobility impairments who used appropriate aids ranged from 18.4% for the 55-64 age group to 48.2% for subjects 85 and over. Lower education and income, rural residence, social isolation, living alone, and fewer impairments were associated with non-use among subjects with mobility restrictions.

Zimmer and Chappell (1994) in another cross-sectional Canadian survey examined the prevalence of mobility problems and the use of assistive devices in a representative sample of 1,406 older adults. Forty-three percent of the sample reported at least "a little difficulty" with one of the four common mobility tasks. Among the latter, 62% used a device for at least one of their mobility problems. Canes were the most commonly used devices. Logistic regression

analysis revealed that the number of mobility difficulties, number of chronic conditions, age, and rural residence were the most significant predictors of device use. While only 35% of seniors with one mobility problem used a device, 89% of those with all four problems were device users. Although the severity of the mobility problem affected the type of devices used, it was not a predictor of being a device user. Authors concluded that when the sheer number of functional health problems mount, but not necessarily the severity of those problems, individuals begin to feel they can no longer cope without the assistance of a device.

In a recent American national study of 3,485 non-institutionalized older adults, seniors' self-care coping strategies were investigated (Norburn et al., 1995). Difficulty in walking was the most frequently reported mobility problem, with over 26% of the participants reporting some degree of impairment. The most frequently reported self-care practices involved modifications in the patterns of behavior (75.4%), and the most common behavioral changes were doing things less often and more slowly (50%). In this sample, less than half of the participants (43.2%) used equipment and devices to deal with their limitations, and about one-third (31%) made adaptations in their living environments. Finally, 70% of older adults received help from others in coping with their functional limitations. Multivariate analysis indicated that the level of impairment, advanced age, living alone, and receiving assistance from another person were predictors of device use for mobility-related disabilities. The relationship between level of impairment and device use was not consistently linear and tended to diminish when disability was severe.

Although the majority of the devices owned by seniors are consistently used, a significant proportion are abandoned or used ineffectively. George, Binns, Clayden, and

Mulley (1988), in a random sample of 140 seniors over 75 in an urban general practice in the United Kingdom, found that many of the aids owned by the participants were faulty or abandoned. For instance, one in two canes were faulty and one in three were not used. The problems most commonly identified with canes were: worn, loose, or missing rubber tips; damaged or too pliable shafts; and, incorrect length. The authors emphasized the importance of a careful evaluation of supplied devices and an adequate training for use.

In another British study of a convenience sample of 60 community-living seniors, only 15 out of 62 canes assessed were of the correct length (Sainsbury & Mulley, 1982). Twenty-six of these canes had dangerous features, such as badly worn, loose, or missing rubber tips. Subjects reported that 35 of these devices were not prescribed by health care workers (HCW) and were obtained from relatives or friends, or purchased from shops.

Dean and Ross (1993) in a cross-sectional study of a convenience sample of 144 community-dwelling cane users in Canada found that canes provided by non-HCWs exceeded the recommended length. While for 60% of the subjects, a HCW recommended the use of a cane, only 33% of the canes were prescribed or fitted by HCWs. Among the latter, only 73% were shown how to use the cane. Of the canes prescribed by non-HCWs, 31% were self-prescribed and 7% were recommended by a family, friend or neighbour.

Finally, the findings of a longitudinal study of a non-probability sample of 86 rehabilitation older patients revealed that many devices are abandoned shortly after prescription (Giltin et al., in press). Interviews one day prior to discharge indicated that subjects uniformly valued issued devices and perceived instructions as adequate. However, by one month post-discharge, 47% of devices issued were seldom or never used. Multivariate

analysis revealed that positive attitudes towards devices and the intention to use devices were the most significant predictors of use. Interestingly, the type of impairment rather than the actual functional level was associated with device acceptance and use.

To summarize, the patterns of device utilization among community-living seniors vary considerably according to the nature and extent of functional impairments and the type of devices examined. Although many seniors with disabilities own and utilize devices to assist with daily activities, a substantial proportion of the general older population with declining mobility and balance do not use safety devices. Moreover, many technical aids owned by seniors are faulty, ineffectively used, or abandoned. Mobility aids are the devices most frequently associated with incorrect use, poor maintenance, and non-use.

A number of health and sociodemographic characteristics have been associated with device utilization. Table 2.6 summarizes the correlates of device use in the studies reviewed. With the exception of age and indicators of physical impairment, evidence supporting an association between various sociodemographic factors and device use has been inconsistent. The effect of age on device use may be two-fold; advanced age may increase use both by contributing to need and influencing normative acceptance of devices. Younger seniors, despite some mobility restrictions, may perceive themselves to be too young to use assistive devices and attempt to cope without them (Zimmer & Chappell, 1994). As shown in the table, the only psychological variables investigated in these studies (i.e., positive attitudes towards the device and the intention to use) were found to be strong predictors of device use. The following section provides a more detailed discussion of the barriers to the use of assistive devices among older adults.

Table 2.6 . Correlates of Device Use Among Community-living Older Adults

Variable	Norburna et al. (1995) *	Forbes et al. (1993) *	Gilkin et al. (in press)	Zimmer & Chappell (1994) *	Soan & Grimsby (1994)
Age (Older)	++	++	0	++	+
Gender (Female)	0		0	+	+
Education (Lower)	0	-♂*	+	0	
Income (Lower)	0	-♀*		0	
Marital Status (Not Married)		-♀*		+	
Rural Residence	0	-♂*		++	
Living Alone	++	-♀*	0	+	+
Social Isolation		-♀*			
Personal Assistance Available	++			+	
Severity of Disability	++				
Number of Disabilities		+♀*	0	++	
Number of Chronic Conditions				++	
Type of Impairment			+		+
Positive Attitudes			++		
Intention to Use			++		

a Findings relate to seniors with mobility impairment

Blank Association not studied/reported + Positive association in bivariate analysis

0 No association detected - Negative association in bivariate analysis

* Significant predictor in Multivariate analysis

♀ Association found only in women

♂ Association found only in men

2.1.5 Barriers to Device Use Among Seniors: A small body of qualitative research has provided insight into the personal experience of device use and factors that may influence users' perceptions of devices (Bates et al., 1993; Edwards & Aminzadeh, 1996; Giltin, 1995a; Scheer & Luborsky, 1991). These studies suggest that the use of assistive devices presents dramatic compromises in self-identity and imposes many cognitive, behavioral and pragmatic adaptations. Device utilization is often evaluated in the context of one's life course stage, the wider socio-cultural meaning of device use, and functional gains. The desire to avoid social stigmas and preserve one's self-esteem as a capable and independent person are powerful influences (Luborsky, 1993).

In Giltin's study (1995a) of 103 older stroke patients, the use of mobility aids was associated with many physical, personal and social outcomes. The responses of the participants to open-ended questions revealed their feelings of ambivalence about the benefits and costs of mobility aids. On one hand, using a mobility device enabled participation in fundamental life tasks and preserved a sense of independence and continuity in personal identification. On the other hand, it generated feelings of loss and personal disruption. Using mobility aids required that the person obtain a balance between physical needs and psychological and social consequences. Participants began to test new definitions and vision of their "self" as mobility device users. They used language associated with stigma and disability such as "cripple" and "handicap" to describe their situation.

In Edwards and Aminzadeh's qualitative study (1996) of 30 community-living older adults, participants used similar language to describe how cane-users are labelled: "handicapped", "half-gone", and "invalid". The comments made by some seniors reflected the

underlying perceptions of canes as symbols of frailty and lost function: “the image of cane relegates you to be older and senior citizens don't like the image of walking around with a cane. You are relegated to be over the hill or old”, “I am not ready yet. I imagine if I were crippled, or when I reach a time when I really need a cane, I'll take the damn thing”. Seniors identified feelings of embarrassment and fear of stigma as powerful motivations to reject mobility aids.

The users' evaluations of assistive devices are linked to the attitudes of the broader society. Ageism and negative socio-cultural values concerning loss of independence, functional decline, and device use have been recognized as powerful influences. This is particularly true for mobility aids which are often used in public settings (Brook, 1991; Giltin 1995a; Giltin & Levine, 1992; Webster, 1992).

Seniors' evaluations of devices as supporting or detracting from their sense of independence may also be influenced by their functional level and perceived need for devices. When the person is able to perform an activity without a device, even if with difficulty, the device is more likely to appear to be restrictive (Brook, 1990). Similarly, the denial of physical limitations imposed by the aging process and the lack of perception of need for safety devices have been identified as major reasons for device rejection among seniors (Edwards & Aminzadeh, 1996).

The incorporation of new equipment into one's life requires many pragmatic adaptations (Bates et al., 1993). The use of an assistive device modifies the way an activity is performed. The individual may therefore need to adjust to using an aid by relinquishing previously valued ways of carrying out daily activities (Giltin, 1995b). In the Edwards and

Aminzadeh study (1996), seniors readily identified many pragmatic barriers to the use of canes. These included learning how to walk with a cane and incorporating the device into their daily activities (e.g., getting around home, going up and down stairs, shopping, getting in a car, etc.).

Giltin, Levine, and Geiger's pilot study (1993) of 13 older adults with disabilities revealed the importance of the context of device use. In this study, 45% of devices valued in hospital were abandoned one month after discharge. Among reasons cited for non-use were the awkwardness of using a device when performing daily activities at home and the presence of a caregiver who performed the task. In the same study, a survey of 31 home care therapists indicated that they perceived low usage rates to be a consequence of the therapists' inadequate knowledge of a patient's home environment and their failure to include caregiver and patient goals in training.

Additionally, many device-related barriers have been cited by seniors as reasons for non-use, including: failure of devices to achieve their intended purpose, poor aesthetic quality, cumbersome nature of devices, difficulty or risky use, and cost (Edwards & Aminzadeh, 1996; Giltin et al., 1993; Mann et al., 1993; Mann, Granger, Hurren, Tomita, & Charvat, 1995; Parker & Thorlund, 1990; Sonn & Grimby, 1994).

In a recent American survey of 333 non-institutionalized seniors with mobility problems, participants identified more problems with canes than any other category of assistive devices (Mann et al., 1995). About one third of the sample had experienced some problems with the 119 canes they owned (of these canes, 89 had been abandoned and 30 were still in use). The problems cited encompass many of the barriers identified in this review: 1)

difficult or risky use (e.g., clumsy, heavy, and awkward to handle in moving about; does not fold up out of the way; tripping or getting tangled up); 2) insufficient support (e.g., unsteady balance, poor support from the cane; fear of falling); 3) stigma (feeling embarrassed, use is demeaning, unappealing looks); and 4) other (concerns about becoming dependent on the cane; preference for personal assistance; prefer to assume the risk of falling). Table 2.7 provides a summary of the barriers to device use cited in studies of older adults.

2.1.6 Summary: Large scale epidemiological studies have consistently identified deficits in mobility, gait, balance, and muscular strength as risk factors for falls among seniors. The use of mobility aids to promote safe ambulation and transfer is one of the strategies commonly used in fall prevention programs. Despite their potential value, mobility aids tend to be underutilized or used ineffectively.

Our knowledge about the predictors of device use among seniors is limited. Quantitative studies have primarily focused on usage rates with few scattered attempts to elucidate sociodemographic correlates of device use. Overall, empirical evidence supporting an association between age or indicators of functional impairments and the use of assistive devices is fairly consistent. However, the effect of other sociodemographic characteristics, such as gender, education, income, marital status, and living arrangements is not well understood.

A growing body of qualitative research has identified factors that may influence seniors' perceptions of devices. Personal beliefs and attitudes, the physical and social context of use, and the effectiveness of devices are factors identified in the literature. Additional

Table 2.7 Barriers to Device Use Cited in Studies of Older Adults

Barriers to Device Use	Edwards & Amazeedah (1996)	Soan & Grimby (1994)	Gilkin et al. (1993)	Gittin (1995a)	Mann et al. (1993)	Mann et al. (1995)	Parler & Thorshand (1991)
D) Psychosocial Barriers:							
Lack of perception/denial of need	✓		✓				
Ability to function without the device				✓			✓
Rejection for being dependent on a device	✓			✓		✓	
Availability/preference for personal assistance			✓			✓	
Fear of stigma/feelings of embarrassment	✓			✓		✓	
Lack of awareness of how to obtain/use the device	✓						
II) Device-Related Barriers:							
Device failed to fulfill intended purpose		✓	✓		✓	✓	✓
Difficulties in use/cumbersome nature	✓	✓	✓	✓		✓	✓
Risky use/fear of falls							✓
Poor aesthetic quality/called unwanted attention	✓				✓	✓	✓
Cost	✓						✓

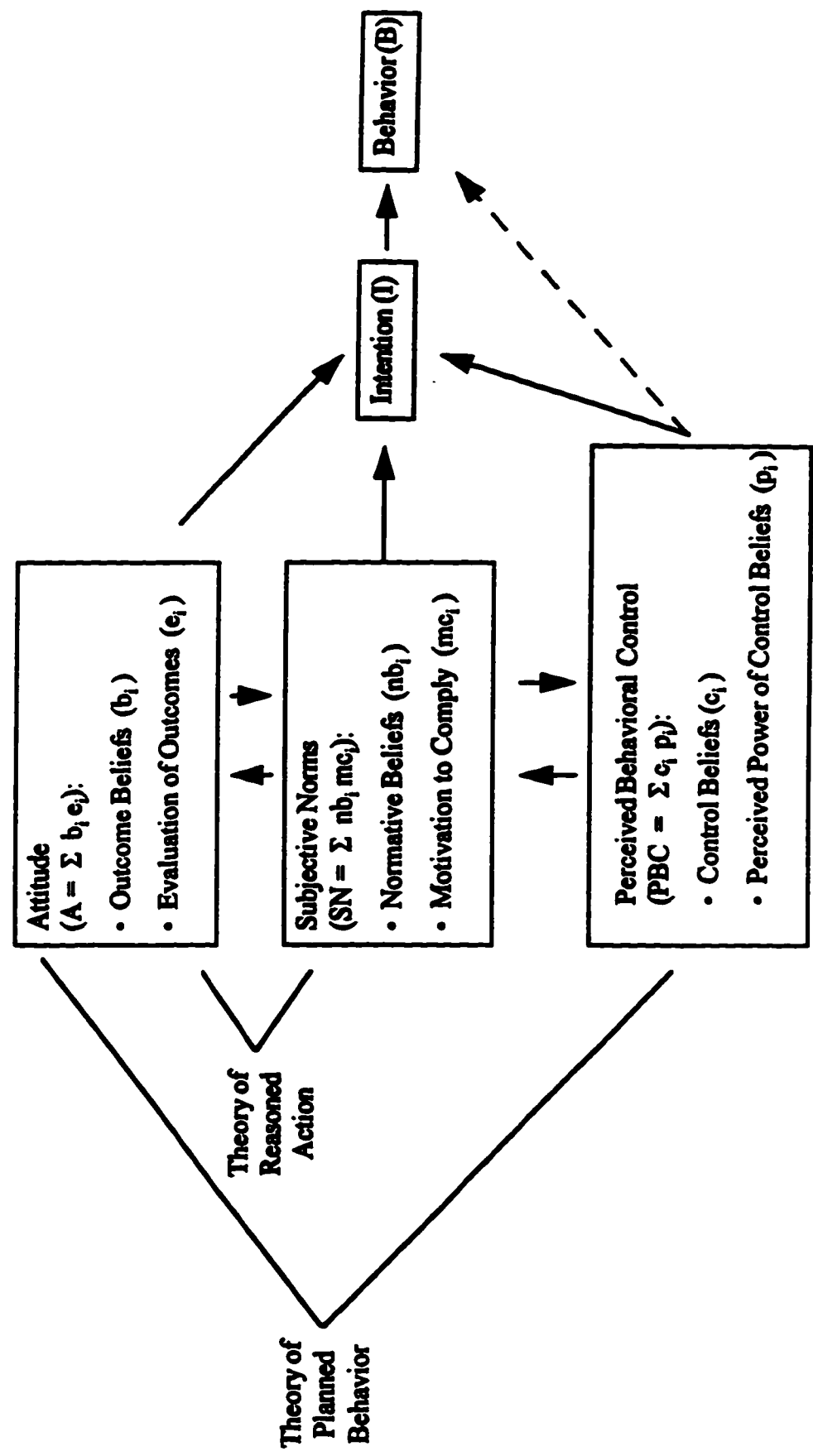
research is needed to examine these variables in a more systematic and theoretical manner. This improved knowledge would be critical in guiding more effective fall prevention interventions.

2.2. Conceptual Framework: The Theory of Planned Behavior

2.2.1 Description: The TPB, which is an extension of the Theory of Reasoned Action, aims to understand and predict the determinants of social behaviors (see Figure 2.1). Both theories are based on the assumption that human beings make rational choices and consider the implications of their actions before they decide to engage or not engage in a given behavior. However, in contrast to the Theory of Reasoned Action, the TPB recognizes that actions of social relevance are not always under complete volitional control and that real or perceived obstacles may significantly inhibit performance of a given behavior (Ajzen, 1988, 1991; Ajzen & Fishbein, 1980).

Consistent with this view, the TPB suggests that performance of a behavior (B) is a joint function of intention (I) and perceived behavioral control (PBC). Intention to perform a behavior, in turn, is determined by three conceptually independent variables: attitude toward the behavior (A), subjective norm (SN), and perceived behavioral control (PBC). Thus, PBC, which refers to the perceived ease or difficulty of performing the behavior, can influence the behavior directly as well as indirectly by influencing intention. Attitude is defined as the degree to which a person has a favourable or unfavourable evaluation of performing the behavior. Finally, subjective norm refers to the perceived social pressure to perform or not perform the behavior. The weights (w) or relative importance of the three components in

Figure 2.1 Schematic Representation of Theory of Planned Behavior and Theory of Reasoned Action



determining intention may vary across behaviors and situations (Ajzen, 1988, 1991). The discussion to this point can be summarised as follows: $B \approx I = w_1A + w_2SN + w_3PBC$. Thus, according to the TPB, an older person will have a greater intention to use a cane if his attitude towards using a cane is positive, he perceives social pressures to use a cane, and he anticipates fewer difficulties in becoming a successful cane user.

Antecedents of attitudes, SN, and PBC are three types of beliefs which in the final analysis determine intentions and behaviors. These are outcome beliefs, normative beliefs, and control beliefs. Attitudes are assumed to be a function of salient beliefs about the outcomes of performing the act (b_i) weighted by the person's evaluation of those outcomes (e_i). This expectancy-value relationship can be summarized as: $A = \sum b_i e_i$. Subjective norms are determined by the person's beliefs that salient referents approve or disapprove of performing the behavior (nb_i) weighted by the person's motivation to comply with the referents (mc_i). This relationship can be expressed as: $SN = \sum nb_i mc_i$. Finally, PBC is a function of beliefs about resources and opportunities, known as control beliefs (cb_i), weighted by the perceived power of the particular control factor to facilitate or inhibit performance of the behavior (p_i). A mathematical illustration of this relationship would be: $PBC = \sum cb_i p_i$. External variables, such as demographics have an effect on behavior only to the extent that they influence the three determinants of intention (Ajzen, 1988, 1991).

Thus, for example, if an elderly person believes that using a cane makes him look old and he negatively evaluates this image, his attitudes towards using a cane would be negative. Conversely, if he believes that using a cane would prevent him from falling and that preventing falls is important, he is more likely to have positive attitudes towards using a cane.

Similarly, to the extent that he believes his significant others (e.g., family members, physician, and peers) would approve of his using a cane and their opinion is important to him, he is more likely to consider using a cane. Finally, the more resources and opportunities the person thinks he possesses, and the fewer obstacles he anticipates in incorporating the device into his daily private and public activities, the stronger his intentions should be to use a cane.

2.2.2 Previous Applications: Although there has been no known prior application of the TPB to the use of assistive devices, the theory has shown utility in the prediction of a broad range of health-related behaviors. Godin and Kok (in press) in a comprehensive review of literature, reported 58 applications of the TPB in the domain of health. These applications were classified in seven behavioral categories: a) exercising (n=18); b) addictive (cigarette, alcohol, and drugs) (n=11); c) HIV/AIDS (n=10); d) clinical and screening (cancer screening and health check) (n=8); e) eating (n=5); f) oral hygiene (n=3); and, g) driving (n=2). Overall, the model proved helpful in understanding the decision-making processes underlying these behaviors and the findings supported the conceptual relationships among various components of the model.

The theory performed well for the explanation of intention, with an arithmetic average explained variance of $R^2=.41$ (explained variance ranged from 32% for eating behaviors to 46.8% for oral hygiene behaviors). In general, the contribution of SN in explaining the variance in intention was less important than attitude and PBC. This construct reached significance levels less often, and in situations where it did contribute to prediction, its weight was lower than the other two constructs. While PBC and attitudes were significant predictors

of intention in 85.5% and 81.6% of the analyses reported, SN was significant in only 47.4% of these applications. The overall average correlations between intention and attitude, SN, and PBC were .46, .34, and .46, respectively.

The prediction of behavior varied across behavioral categories and yielded an averaged $R^2 = .34$ (this value varied from 15.6% for clinical and screening behaviors to 42.3% for HIV/AIDS-related behaviors). The overall average correlations between behavior and intention and PBC were .46 and .39, respectively. Although, intention was the most important predictor of behavior (66.2% of the explained variance was attributed to intention), in half of the studies reviewed, PBC significantly added to the prediction. When significant, the additional contribution of PBC, above intention, averaged 11.5%, and reached its highest for addictive behaviors at 19.7%.

In summary, the review of health related applications of Ajzen's TPB indicates that about a third of the variation in behavior can be explained by the combined effect of intention and PBC. For most behavioral categories, intention remains the most significant variable for the prediction of behavior. The exceptions are addictive and clinical/screening behaviors where PBC plays a more important role than intention. As pointed out by Godin and Kok (in press), this may be explained by the fact that the latter are more likely to be affected not only by personal motivation, but also by other internal and external resources and opportunities. The literature supports the efficacy of the model in explaining intention ($R^2 = .41$), with PBC and attitude being equally important across health-related behavioral categories. The contribution of subjective norms in explaining intention, however, seems to be less significant.

2.2.3 Rationale for Selection: The TPB is an empirically supported theory that has strongly influenced attitude-behavior research in the past decade (Ajzen, 1991; Carter, 1991; Godin & Kok, in press; Sheppard, Hartwick, & Warshaw, 1988). It incorporates some of the central concepts in the behavioral sciences which help identify the major determinants of performance and nonperformance of any given behavior. Although originally developed in the discipline of social psychology, considerable research evidence supports the explanatory and predictive power of the theory across a variety of health related behaviors (Godin & Kok, in press). In addition, in recent years an increasing number of nurse researchers have explored and supported the utility of the theory in nursing situations (Champion, 1994; Goldenberg & Laschinger, 1991; Janke, 1994; Montano & Taplin, 1991; Powell-Cope, Lierman, Kasprzyk, Young, & Benoliel, 1991).

Consistent with the philosophies of holistic nursing care, the theory takes into consideration the influence of personal values, perceived social pressures, and perceived control in predicting the performance of a given behavior. These salient beliefs and social influences can then be targeted by appropriate nursing interventions (Young, Lierman, Powell-Cope, Kasprzyk, & Benoliel, 1991).

Finally, specific guidelines are available for the application of the model in instrument development (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980; Ajzen, 1988; Godin & Kok, in press). One major strength of the measurement approach recommended is that salient beliefs about a behavior are not selected intuitively and a priori, but are developed during in-depth interviews with members of the target population (Carter, 1991; Liska, 1984; Weinstein, 1993). This enhances content validity and ensures the relevance of the items to

both the study population and the target behavior (Young et al., 1991).

2.2.4 The Theory's Limitations: The TPB, like most other behavioral theories, does not account for all the variance in behavior. Furthermore, the models' predictive power is stronger in explaining intention than actual behavior. The inability to enact on one's intention is one explanation of the model's lower efficacy in predicting actual behavior (Godin & Kok, in press). In fact, adding the PBC construct has significantly improved the predictive utility of the model.

Weak predictive power of the social norm component has been related to difficulties in operationalizing this construct (Grube, Morgan, & McGee, 1986; Miniard & Cohen, 1981). Social influences may exert their impact via different routes. To assess these influences, the measurement of additional variables such as perceived behaviors of others and perceived behavioral norms has been recommended (Godin & Kok, in press). Moreover, a few recent applications of the theory have reported the contribution of constructs of personal and moral norms in explaining significant portions of variance in intention and, in a few cases, in behavior (Boissonneault & Godin, 1990; Boyd & Wandersman, 1991; Sparks & Shepherd, 1992). Further studies are needed to confirm the contribution of these new constructs to the model.

The conceptual distinctions between various components of the TPB and their causal relationships, although necessary and useful, are not always supported by research (Liska, 1984). For instance, although intention is a better predictor of behavior than its determinants, the latter's effect on the behavior is not always mediated by intention. Additionally, research

suggests that the two independently defined constructs of attitudes and subjective norms may reflect similar and interactive beliefs (Liska, 1984; Miniard & Cohen, 1981). Finally, the unidirectional causal structure of the model fails to account for the reciprocal effect of behavior on intention and its precursors (Liska, 1984).

2.2.5 Conclusion: The TPB is an extensively tested psychological model which has proved helpful in understanding the decision-making processes involved in performance or nonperformance of a variety of health behaviors. The model suggests that in order to effectively change or reinforce a behavior, it is imperative to determine the attitudinal, normative, and control beliefs underlying the decisions. These salient beliefs could then be targeted by appropriate educational messages and interventions. Currently, fall prevention programs are based on untested hunches about factors influencing the use of mobility aids among seniors. These interventions are likely to be more effective if they are based on a solid foundation of an empirically tested theory.

2.3 Study Objectives and Hypotheses

2.3.1 Objectives: The objectives of this study were:

1. To develop valid and reliable measures of the TPB constructs (i.e., attitudes, subjective norms, perceived behavioral control, and intentions) as they relate to the use of canes in fall prevention.
2. To determine the relationships between a) attitudes, subjective norms and perceived behavioral control, with b) the intentions to use a cane and self-

reported use of a cane in a sample of community-dwelling older adults aged 65 and over.

3. To examine the differences between “cane-users” and “non-users” with respect to the TPB variables and selected sociodemographic and health-related characteristics (e.g., age, gender, marital status, living arrangements, education, self-rated health and activity levels, mobility and balance impairment, fall history, etc.).

2.3.2 Hypotheses: Based on the TPB predictions and empirical evidence, it was hypothesized that “cane-users” would:

1. Report lower functional and health status.
2. Have more positive attitudes towards cane use.
3. Perceive more social pressures to use a cane.
4. Anticipate fewer difficulties in successfully using a cane compared to “non-users”.

The following two chapters describe the methods used to research these aims and hypotheses.

CHAPTER THREE

METHODS

This research involved three phases: 1) instrument development to measure TPB constructs and pilot testing of the draft questionnaire; and, 2) a cross-sectional survey. This Chapter will focus on the methods for the cross-sectional survey. More specifically, the research design, study population, subject recruitment and data collection procedures, variables studied, and methods of data analysis are described. The instrument development and pilot testing phases will be discussed in Chapter Four.

3.1 Research Design

The design of this study was comparative descriptive (Burns & Grove, 1993). Data were collected in a cross-sectional survey of a convenience sample of community-living seniors. Descriptive and inferential statistical analyses were conducted to examine differences between “cane-users” and “non-users” with respect to the study variables.

3.2 Sample

The target population for this study consisted of all community-living seniors residing in Ottawa-Carleton region who had some degree of mobility and balance impairments. A non-probability, convenience sampling technique was used. The inclusion criteria were: a) age 65 or older; b) community resident of Ottawa-Carleton region; c) able to read or speak English; d) no apparent cognitive impairment²; e) ambulatory with or without the use of a cane; f)

² No standardized cognitive assessment tool was used. Rather, at the end of screening, the investigator decided whether or not there was any evidence of cognitive impairment based on the subject's ability to answer to the screening questions (See Appendix A).

score ≥ 2 on a mobility screening tool (see 3.6 Measurement); g) not an exclusive walker-user; and h) consent to participate in the study.

3.3 Sample Size and Power

Sample size estimate was based on the feasibility constraints of completing data collection in a three month period. Using the approach of Cohen (1977), Table 3.1 presents a range of powers of independent t-tests for small to large effect sizes. As illustrated in the table, the power of this study to detect the hypothesized differences between “cane-users” and “non-users”, assuming a medium to large effect size, was adequate (alpha=.05, two tailed).

Table 3.1 Power of T-Tests for Independent Groups (Two-Tailed, Alpha=.05)

Sample size	Small Effect ($d=.2$)	Medium Effect ($d=.5$)	Large Effect ($d=.8$)
N=100	.17	.70	.98

3.4 Subject Recruitment and Data Collection Procedures

Subjects were recruited from multiple and diverse community settings using two approaches (Appendix B presents the letters of approval from the participating agencies):

a) Direct Approach: Seniors attending selected community programs (i.e., three health promotion drop-in centres and four outreach blood pressure and foot care clinics in Ottawa-Carleton region) were approached by the investigator and the purpose of the study was explained. The investigator then obtained subjects' verbal permission to be screened (see Appendix A). Eligible subjects received more detailed explanations about the study and what

their participation involved (see 3.5 Ethical Considerations). After obtaining verbal consent of eligible seniors and if privacy and comfort afforded by the setting was adequate, the questionnaire was administered. Otherwise, arrangements were made for a later interview at the same community setting or at the respondent's home. Seniors also had the option of taking the questionnaire home for self-completion.

In order to account for heterogeneity of an older population in terms of physical, mental and literacy capabilities, all respondents were given the choice of a self-completed or interviewer-administered questionnaire. Although more time consuming than a self-administered technique, face-to-face interviews result in higher response rates, minimize cognitive demand, ensure inclusion of illiterate seniors, and most importantly allow the interviewer to account for the visual or other sensory-motor and functional deficits experienced by some older adults (Dilman, 1978; Gueldner & Hanner, 1989; Mcauley, 1987; Zimmer, Calkins, Hadley, Ostfeld, Kaye, & Kaye, 1985). To be consistent, in face-to-face interviews, questions were read to the subjects exactly as they were worded.

b) Indirect Approach: Case managers of the Home Care Program, Ottawa-Carleton Health Department, approached their clients and obtained their permission to release their names and telephone numbers (see Appendix C). The investigator then called referred seniors to further explain the study and assess their eligibility. Arrangements were made with consenting subjects to complete the questionnaire. The questionnaire was either mailed to the participants (along with a letter of information, presented in Appendix D, and a postage-paid envelope) or an appointment was made for a face-to-face interview in the respondent's home.

Figure 3.1 Subject Recruitment and Data Collection Procedure

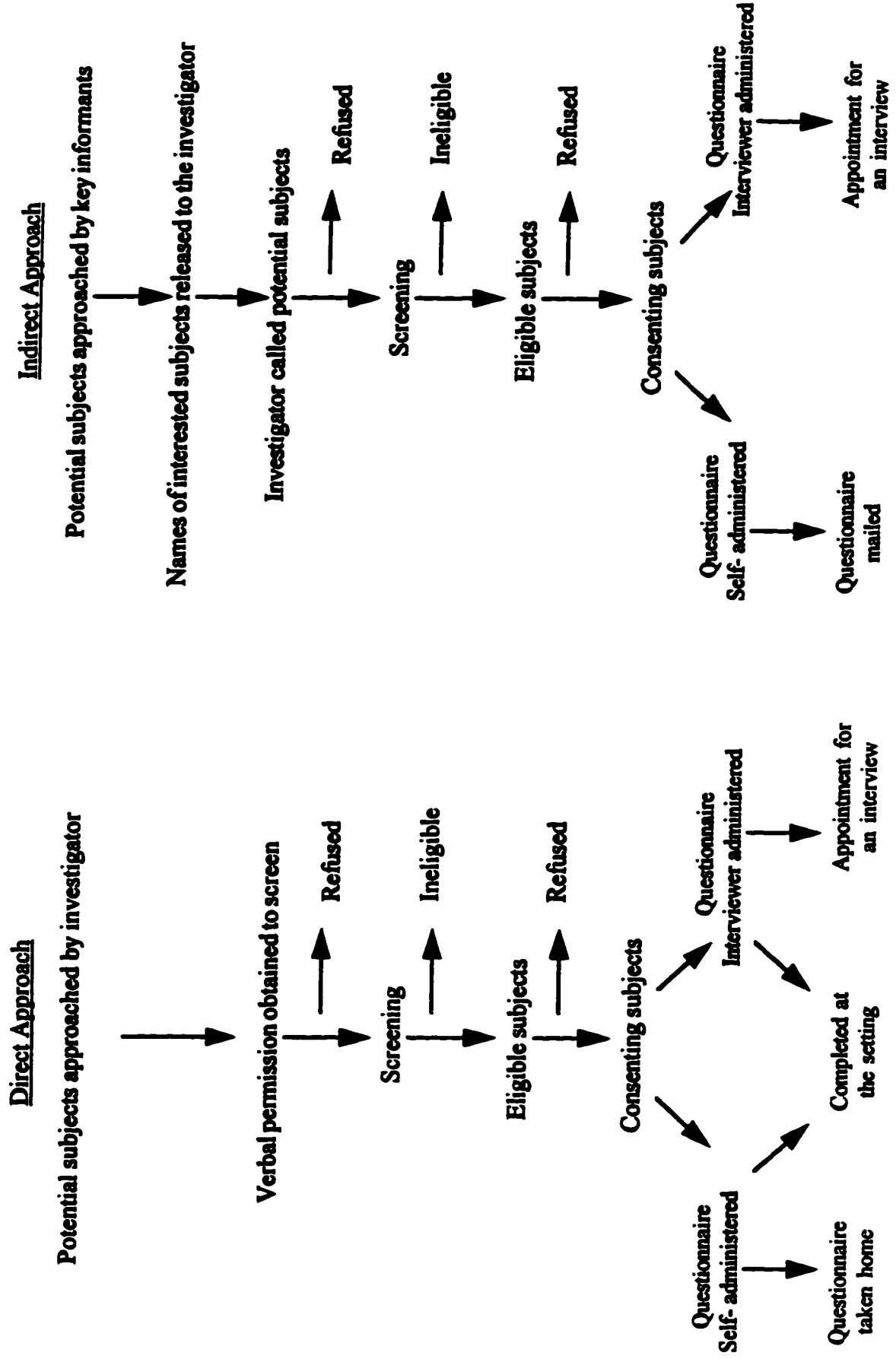


Figure 3.1 presents a flow-chart of the subject recruitment and data collection procedures.

This study received financial support from Registered Nurses Association of Ontario Foundation (see Appendix E). Therefore, it was possible to hire a research assistant to conduct 35 interviews. To ensure consistency, the research assistant received an orientation and a two-hour practice session, using a role playing approach. Furthermore, all returned questionnaires were carefully reviewed by the investigator and ongoing debriefing sessions were held.

3.5 Ethical Considerations

Ethical approval for this study was obtained from the Ottawa-Carleton Health Department Research Ethics Committee (see Appendix F). Before administering the questionnaire, seniors received a written and verbal explanation of the study purpose and procedures, and of their rights (clarity and comprehensiveness of the consent form was verified with the participants in the pilot study). Seniors received a copy of the consent form signed by the investigator (see Appendix G). Concern about signing a semi-legal document has been reported as a major reason for seniors' refusal to participate in research projects (Guedner & Hanner, 1989; Kelsey, O'Brien, Grisso, & Hoffman, 1989; Noble, 1985; Oberst, 1985; Zimmer et al., 1985). Thus, to avoid generating undue fear of signing a consent form, verbal consent was accepted.

Throughout the interviews appropriate steps were taken to compensate for seniors' functional deficits (similar considerations were made in the design of the questionnaire). To reduce response burden, the questionnaire was designed to take an average of 20-30 minutes

for completion. Following administration of the questionnaire, participants were provided with an information package on fall prevention and the correct use of canes. Seniors who were interested in having further information were directed to the Safety Program, Ottawa-Carleton Health Department. For seniors who self-administered the questionnaire at home, follow up telephone contacts were made to monitor subjects' progress and enquire about any issues raised. After the completed questionnaires were returned to the investigator, the information package was mailed to the respondents.

Confidentiality was maintained, using anonymous identifiers. Names and addresses of the seniors who expressed an interest in receiving a summary of the results were stored separately from the study data.

3.6 Measurement

The Questionnaire began with the measurement of the TPB variables, followed by questions on health and sociodemographic characteristics (see Appendix I). This arrangement ensured that questions of a personal nature and health-related items which may be anxiety provoking, would not affect the participants' mood and responses to the attitude-intention questions (Fry, 1986).

a) TPB Variables (Sections A to D of Appendix I): The Cane Use Cognitive Mediators Instrument (CCM), composed of eight subscales, was developed for this study to elicit the constructs of the TPB model. Chapter Four provides a detailed description of the scale items and the instrument development process.

b) Cane Use Behaviors (Section E of Appendix I): Questions on frequency and circumstances of cane use were extracted from the Fall Prevention Behavior Questionnaire (FPBQ), developed and tested in a randomized clinical trial on a sample of over 1500 seniors in Ottawa-Carleton region (Edwards, Birkett, Murphy, Nair, & Coristine, 1993). The questionnaire was developed through a review of literature and with the input of a multidisciplinary team of health professionals.

c) Indicators of Frailty: Various measures of frailty were included to tap mobility and balance impairments faced by seniors and identify their perceived and objective need for mobility aids.

Perceived health compared to peers is a subjective measure of health status extracted from the Older Adult American Research Service Centre Instrument (OARS) (Duke University Centre, 1978). Subjects were asked to rate their health compared to other people the same age. Responses included “excellent”, “very good”, “good”, “fair”, and “poor” (question F1). This question has been extensively utilized in various large scale gerontological surveys (Davis, 1989; Government of Canada, 1993; Health & Welfare Canada, 1988). The convergent validity of the question has been established by its associations with physicians’ ratings of the health of older adults (LaRue, Bank, Jarvik, & Hetland, 1979), self-reports of objective health measures (Fillenbaum, 1979), and a composite index using both clinicians’ and subjects’ reports (Mossey & Shapiro, 1982). The measure was found to be a predictor of mortality in a representative sample of 3,128 community-living seniors in Canada (Mossey

& Shapiro, 1982).

Perceived physical activity compared to peers was measured using a question developed for Canada's Health Promotion Survey (Health & Welfare Canada, 1988). This question refers to self-rating of physical activity compared to other people the same age. Responses included “a lot more active”, “a little more active”, “about the same”, “a little less active”, and “a lot less active” (Question F2 in Appendix I).

The questions on fall history and fall frequency were also extracted from FPBQ (Edwards et al., 1993). These questions incorporate some of the strategies recommended to improve the recall and accuracy of fall reports in cross-sectional surveys. This includes asking subjects to report falls they had since some memorable event, and using a broad definition of falls (Cumming, Kelsey, & Nevitt, 1990; Cummings, Nevitt, & Kidd, 1988; Nevitt, 1991). In the current study, the two questions on falls asked seniors to report any falls, slips or trips they had had since “Thanksgiving, October 1995 up to today” (Section G of Appendix I).

Mobility and balance impairment was measured using a subset of self-care capacity questions originally developed for OARS Multidimensional Functional Assessment Questionnaire (Duke University Centre, 1978). These questions have been gradually modified in several large scale North American studies, including the Canadian Health and Activity Limitation Survey, Canadian Aging Research Network Needs Assessment, and the United States National Health and Interview Survey (Fitti & Kovar, 1987; Forbes et al., 1993; Zimmer & Chappell, 1994). The precursor instrument had undergone extensive reliability and validity testing (Fillenbaum, 1988; Fillenbaum, Michael, & Smyer, 1981; Ernst & Ernst, 1984; McDowell & Newell, 1987). Criterion validity was established by comparing subjects' self-

care capacity ratings with those obtained by physical therapists ($r=.89$, $p<.001$, $N=30$). Test-retest reliability was evaluated over three to eight weeks ($r=.82$, $p<.01$, $N=30$) and inter-rater reliability was tested on 11 researchers and clinicians ($r=.87$, $p<.001$, $N=30$) (Fillenbaum, 1988; Fillenbaum, Michael, & Smyer, 1981).

The scale contains 15 items related to various physical activities of daily living. Zimmer and Chappell (1994), in their study of a representative sample of 1,406 Canadian seniors, selected four of these activities to identify seniors with mobility problems. Subjects were asked if they had any difficulties performing four common mobility tasks, imagining that they were doing these activities without the assistance of a person or an aid: 1) walking a city block, 2) walking up and down a flight of stairs, 3) getting in and out of a bath, and 4) getting in and out of a car. Adding the next most problematic mobility task of “getting in and out of a bed” increased the sample size by only four more cases. The authors did not report the reliability of the mobility subscale. However, Penning and Strain (1994) in another investigation on the same data set reported a Cronbach’s alpha of .89 for the total scale.

In the present study, the four mobility questions were used as a screening tool to exclude ineligible seniors with high mobility. Cronbach’s alpha for this measure was .89. Responses to the four questions were scored as follows: “no difficulty=0”, “a little difficulty=1”, “a lot of difficulty=2”, and “cannot do it=3”. Mobility impairment was calculated by summing the number of difficulties reported. The scores ranged from zero to 12, with higher scores indicating more disability. A cut-point of two was chosen as the minimum score for inclusion (see Appendix A). This corresponds to “a lot of difficulty” with at least one mobility task or “a little difficulty” with a minimum of two mobility activities.

d) Sociodemographic Characteristics: Data on age, gender, marital status, living arrangements, mother tongue, education, and income were collected using questions from the OARS and FPBQ (Section H of Appendix I).

3.7 Data Preparation and Analysis

3.7.1 Data Preparation: A data set was constructed in Statistical Package for Social Sciences (SPSS) for Windows (6.1) and data were entered directly from the coded questionnaires onto the computer. Following data entry, a two step data verification was completed: 1) all data were re-entered, and 2) data cleaning was conducted to detect errors through a review of the frequency distributions and descriptive analyses for each variable. Prior to analyses, the following procedures were performed: 1) the normality of distributions was established by examining frequency histograms, normal probability plots, and skewness and kurtosis statistics; 2) as appropriate, categories were collapsed for chi-square test statistics to ensure a minimum expected frequency of five for each cell (Polit, 1996); 3) a mean substitution imputation technique (Cohen & Cohen, 1983; Tabachnick & Fidell, 1989) was used to replace missing values for the CCM scales' items (see 5.4 Missing Values).

3.7.2 Data Analysis: The following analyses were conducted using the SPSS, release 6.1 (Norusis, 1993, 1994a, 1994b):

1. Descriptive statistics (mean, standard deviations, frequencies, and percents) were used to describe the sociodemographic, health and mobility

characteristics of the total sample, as well as the two subgroups of “cane users” and “non-users”.

2. Pearson and point-biserial correlations were calculated to determine the associations among various components of the TPB model.
3. Differences between “cane-users” and “non-users” with respect to all study variables were examined using chi-square tests for categorical variables and independent t-tests for continuous measures. Bonferroni’s approach was used for the main analyses to correct for multiple testing and preserve the overall alpha of .05 (Polit, 1996).

CHAPTER FOUR

INSTRUMENT DEVELOPMENT AND PILOT TESTING

The instrument development process comprised a combination of qualitative and quantitative methods. This chapter describes the qualitative approaches used in developing and pretesting the instrument. The findings of the empirical testing are described in Chapter Five.

4.1 Instrument Development Process

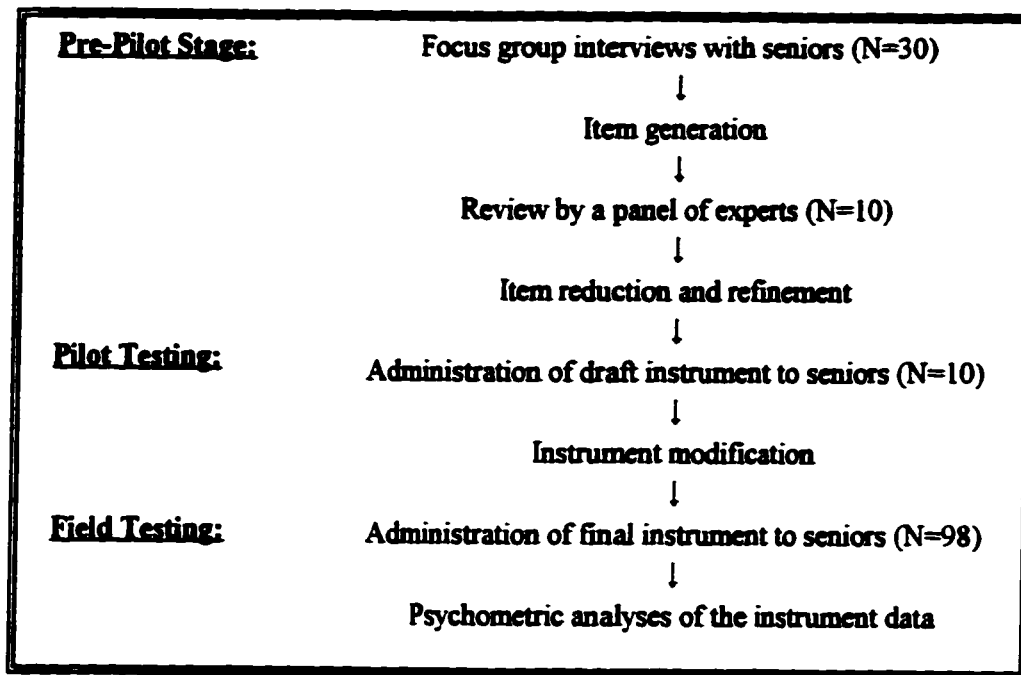
The Cane use Cognitive Mediator Instrument (CCM) was developed by the author to operationalize the constructs of the TPB model. The instrument development process followed three stages: 1) Instrument formation in the pre-pilot stage, 2) pilot testing of the draft instrument, and 3) field testing and psychometric analyses of the instrument data in the main survey. A flow-chart of the sequential activities is presented in Figure 4.1.

4.2 Pre-Pilot Stage

The pre-pilot stage consisted of item generation and panel review of the instrument to establish its face and content validity.

4.2.1 Item Generation: Considerations of the theoretical model and the procedure to develop quality measures guided item generation. A pool of potential items was drawn from focus group interviews with seniors residing in Ottawa-Carleton, and previous empirical and theoretical literature.

Figure 4.1 Flow-Chart of Instrument Development Process



As part of an earlier research initiative (Edwards & Aminzadeh, 1996), four focus group interviews were conducted with a convenience sample of 30 community-dwelling seniors who self-reported English, Irish, Scottish, or Italian backgrounds. The sample consisted of 9 men and 21 women, aged 60 and over, clients of a health promotion drop-in centre and a community health centre. Four seniors were cane-users and the remaining 26 were ambulatory without the use of mobility aids. Among the latter, three respondents expressed the intention to start using a cane.

The focus group interviews were facilitated by the author. The group size ranged from five to nine seniors per group and each session lasted about 60 to 90 minutes. A list of open-ended questions guided the groups' discussions. The first few questions elicited comments about seniors' attitudes and perceptions towards fall prevention and the use of

assistive devices. Later, participants were asked more specific questions about: 1) the advantages and disadvantages of using canes, 2) the type of seniors who would most benefit from using canes, 3) seniors' perceptions of their own need to use a cane, 4) people who might approve or disapprove of their decision to use a cane, and 5) difficulties they anticipated in using a cane. The sessions were tape-recorded and the transcripts were content analysed by the author. The data were used to develop items relevant to the assessment of attitudinal, normative, and control beliefs with respect to cane use.

In addition to the qualitative data from the focus groups, empirical and theoretical literature was reviewed to validate the dimensions of each construct and develop additional items. To reduce measurement error, attempts were made to construct items that were: 1) clear, short, and direct; 2) referred to specific rather than general behaviors; 3) asked only one question or made only one statement; 4) avoided double negative statements; 5) were pertinent to all participants, irrespective to their cane use behaviors; and 6) provoked powerful responses. Leading, biased, and offensive items were avoided. Finally, to make the questions less obvious and minimize response set-acquiescence (i.e., agreeing with items regardless of content), approximately equal numbers of positive and negative items were generated (Kline, 1993; Streiner & Norman, 1995; Velicer, 1995; Woodward & Chambers, 1980).

4.2.2 Item Reduction and Refinement: The initial pool of 100 items was evaluated by a panel of 10 experts composed of researchers and clinicians with expertise in the areas of fall prevention, gerontology, and health behavior measurement. Panel

members were provided with specific instructions to evaluate items' accuracy, relevance, and completeness, as well as any technical item construction flaws and appearance biases (Burns & Grove, 1993).

Panel members were asked to identify confusing, poorly worded, and ambiguous items and provide suggestions for revisions. They were also asked to rate the content relevance and completeness of each scale using a 4-point rating scale (1= minimally, 4= to a large extent). In addition, panel members selected the top 5 to 12 items in each scale which best measured the construct of interest. Finally, to ensure that all dimensions of each construct were covered, panel members were asked to supply additional items related to the measured constructs. These new items were then content analysed and added to the initial pool of items.

Based on the panel's evaluations, 60 items were retained for the pilot study. A minimum of one item was retained for each dimension of the measured constructs (Streiner & Norman, 1995).

4.3 Pilot Testing

The draft questionnaire was pretested to determine: 1) content validity, completeness, clarity and comprehensiveness of items; 2) effectiveness of instructions; 3) completeness of response sets; 4) time required to complete the questionnaire; and 5) success of data collection methods (Burns & Grove, 1993).

4.3.1 Sample: A purposive sample of 10 seniors, clients of a health promotion drop-

in centre was recruited for the pilot study. Inclusion criteria were identical to that described for the main survey with the following exception: subjects with scores <2 on the mobility tool were not excluded from the pilot study (see 3.2 Sample). Attempts were made to recruit a heterogeneous group of seniors with respect to: age, gender, educational level, mobility restrictions, and other functional limitations that may affect the method of data collection (e.g., hearing and visual impairments). With the exception of one man, all subjects approached met the inclusion criteria and consented to participate. Table 4.1 summarizes sociodemographic and health characteristics of the sample.

4.3.2 Subject Recruitment and Data Collection Procedures: With few exceptions, subject recruitment and data collection methods followed the steps described for the main study (see 3.4 Subject Recruitment and Data Collection Procedures). To test the success of data collection methods, half of the questionnaires were self-administered in the presence of the investigator and the other half were interviewer-administered. Prior to the interviews, subjects were informed that the study was a pretest (see Appendix H) and received instructions about the purpose and method of interviewing.

To further establish content validity and completeness of the CCM instrument, prior to the completion of the questionnaire, subjects were presented with three open-ended questions on: 1) the advantages and disadvantages of using canes, 2) important referents who might approve or disapprove of their using a cane, and 3) difficulties participants anticipated in using canes. Responses to these open-ended questions were coded and content analysed by the author.

Table 4.1 Sociodemographic and Health Characteristics of the Pilot Sample (N=10)

Variable	(N)	Mean (SD)	Range
Gender:			
Male	3		
Female	7		
Mean age (range)		75.8 (4.8)	67-84
Marital Status:			
Single	2		
Married/common law	3		
Divorced/separated	1		
Widowed	4		
Education:			
Primary school	3		
Secondary school	3		
Post-secondary or higher	4		
Income:			
completely adequate	6		
somewhat adequate	3		
somewhat inadequate	1		
Mother tongue:			
English	8		
French	1		
Other	1		
Mobility impairment		5.4 (3.6)	0-12
Cane use:			
yes	3		
No	7		
Fall history (past year):			
Yes	4		
No	6		

Subsequently, the questionnaire was administered. Various cognitive interviewing techniques were utilized to: 1) determine cognitive burden, 2) verify interpretability of instructions, items and scaling format, and 3) identify problems with the survey questions that would result in data of poorer quality (see Table 4.2). Throughout the interviews,

subjects' verbal and non-verbal reactions (e.g., response latency, answer-changing, or other indications of confusion) to the questions were monitored. If problems were identified, in a "debriefing" session after completion of the questionnaire, respondents were asked to think aloud, indicating the thought processes they used in arriving at an answer. Probes and paraphrasing techniques were also used to further clarify the problem. These techniques were reported to be effective in identifying problems with the survey questions for older respondents (Jobs & Mingay, 1990).

Table 4.2 Description of Cognitive Interviewing Techniques

Name of Technique	Description
1. Response latency	Considerations of elapsed time between the questions and respondents' answers.
2. Retrospective think-aloud interview	Respondents are asked to think aloud, indicating how they arrived at their answers.
3. Probes	Follow-up questions used to gain more information about respondents' strategies for answering questions.
4. Paraphrasing	Respondents repeat the questions in their own words.

Source: Jobs & Mingay, 1989.

4.3.3 Measurement of the TPB Variables: The CCM Instrument consists of eight subscales eliciting constructs of the TPB (see 2.2 Conceptual Framework). Scale development followed the methods recommended by Ajzen and Fishbein (1980), Ajzen (1988), Ajzen and Mandane (1991), and Godin and Kok (in press). The questionnaire began with instructions concerning the use of 5-point Likert scales. Subsequently, the constructs of the TPB were assessed as follows:

Attitude was measured in two ways, using both direct and indirect approaches. An indirect (or belief-based) measure of attitude was assessed by obtaining a summative score

of the products of 15 outcome beliefs (b_i) and the corresponding evaluations (e_i). Subjects' belief strengths with respect to the 15 salient health, social, and personal consequences of using a cane were assessed (see Table 4.3). Response options ranged from very unlikely (-2) to very likely (+2). Subsequently, participants were asked to evaluate these outcomes. The previous applications of the model have used two different formats for outcome evaluation questions (Ajzen & Fishbein, 1980; Boyd & Wandersman, 1991; Manstead, Proffitt, & Smart, 1983). In this study, both formats were pretested. The first measurement procedure asked subjects to evaluate the outcome beliefs on a 5-point scale from very bad (-2) to very good (+2) (e.g., looking old is very bad...very good). In the second format, subjects were presented with declarative statements about the importance of the 15 outcome beliefs (e.g., it is important to me to avoid looking old). Response options ranged from strongly disagree (-2) to strongly agree (+2). A belief-based attitude toward using a cane was calculated by summing over the 15 products of belief strength times the corresponding evaluation ($A = \sum b_i e_i$).

A more direct (or global) measure of attitude was obtained by means of 4 Likert-type items (see Table 4.3). Responses to each item were scored from -2 (very unlikely) to +2 (very likely), with negative items having reverse scoring. Values from each item were summed to obtain a single score for the attitude scale.

Subjective norms were also assessed using both direct and indirect approaches. The indirect measure was based on normative beliefs (nb_i) concerning the expectations of four groups of referents: family, friends, doctor, and other health care workers (see Table 4.4).

Table 4.3 Direct and Indirect Attitude Items

a) Indirect Attitude
Outcome Beliefs

1. Using a cane would make me feel like I am giving up my independence.
2. Using a cane would make walking easier for me.
3. Using a cane would keep me from falling.
4. Using a cane would make me look old.
5. Using a cane would help me keep my balance.
6. Using a cane would make me feel old.
7. Using a cane would make me feel safe from falling.
8. Using a cane would allow me to do my daily activities.
9. Using a cane would hurt my pride.
10. Using a cane would give me extra support I need.
11. Using a cane would make me feel embarrassed.
12. Using a cane would keep me from slipping on ice in winter.
13. Using a cane would make me look handicapped.
14. Using a cane would isolate me from other people
15. Using a cane would interfere with my daily activities.

b) Direct Attitude

1. Using a cane would be a nuisance for me.
 2. Using a cane would be awkward for me.
 3. It would be to my benefit to use a cane.
 4. It would be wise for me to use a cane.
-

On 5-point scales, respondents indicated the likelihood that these referents think they should use a cane, with endpoints labelled very unlikely (-2) and very likely (+2). The corresponding motivation to comply (mc_j) was evaluated by asking subjects to indicate to what extent they were inclined to act according to the recommendations made by the four referents. On 5-point Likert scales, response options ranged from very little (1) to a great deal (5). Consistent with the guidelines, this was the only scale that adopted a unipolar scoring technique (Ajzen & Fishbein, 1980). Finally, each measure of normative belief was multiplied by the score for corresponding motivation to comply and the products were summed ($SN = \sum nb_i mc_j$).

Table 4.4 Direct and Indirect Subjective Norms Items

a) Indirect Subjective Norm

Normative Beliefs

1. Most members of my family think I should use a cane.
2. Most of my friends think I should use a cane.
3. My doctor thinks I should use a cane.
4. Other health care workers (example: my nurse, my therapist, etc.) think I should use a cane.

Motivation to Comply

1. Generally speaking, to what extent do you want to do what your family think you should do?
2. Generally speaking, to what extent do you want to do what your friends think you should do?
3. Generally speaking, to what extent do you want to do what your doctor thinks you should do?
4. Generally speaking, to what extent do you want to do what your health care workers (other than your doctor) think you should do?

b) Direct Subjective Norm

1. Most people who are important to me think I should use a cane.
-

The second measure was a direct indication of perceived social pressure. The statement, "most people who are important to me think I should use a cane" was rated on a 5-point Likert scale, with end points ranging from very unlikely (-2) to very likely (+2).

The indirect measure of perceived behavioral control over using a cane was constructed by summing over nine control beliefs dealing with specific difficulties involved in using a cane ($PBC = \sum c_i$). Respondents stated their beliefs with respect to each factor on a 5-point Likert scale. Response options ranged from very unlikely (+2) to very likely (-2). This method of indirect measurement of PBC is not in strict accordance with the recommendations made by Ajzen (1991) (see 2.2 Conceptual Framework). However, it has been used in some previous applications of the model (Ajzen & Madden, 1985; Courneya, 1995; Godin, Valois, & Lepage, 1993) and is recommended by Godin and Kok (in press). The direct measure of PBC was obtained by assessing the degree to which participants

believed they had control over using a cane. Scaling format and scoring were similar to that for indirect measure of PBC (items 3 and 4 were reverse coded). Table 4.5 presents items for PBC scales.

Table 4.5 Direct and Indirect Perceived Behavioral Control Items

a) Indirect Perceived Behavioral Control

Control Beliefs

1. Difficulty learning how to walk with a cane, would discourage me from using it.
2. Difficulty shopping with a cane, would discourage me from using it.
3. Difficulty going up and down stairs with a cane, would discourage me from using it.
4. Difficulty getting around my home with a cane, would discourage me from using it.
5. Difficulty getting in a car with a cane, would discourage me from using it.
6. Difficulty in getting on/off a bus with a cane, would discourage me from using it.
7. The cost of a cane, would discourage me from buying one.
8. Not knowing how to get the right cane, would discourage me from buying one.
9. Forgetting to carry my cane, would discourage me from using it.

b) Direct Perceived Behavioral Control

1. It would be difficult for me to get used to a cane.
2. It would be inconvenient for me to use a cane.
3. If I wanted to, I could easily use a cane inside my home.
4. If I wanted to, I could easily use a cane outdoors.

Considering the possibility of seasonal differences in cane use practices, two intentions were measured. The first measure asked seniors about their intention to use a cane within the next month. For the second measure, participants were asked about their intention to use a cane next winter. The responses for each measure of intention were recorded on a 4-point Likert scale, ranging from very likely (+2) to very unlikely (-2), with no neutral point.

One additional variable (not included in the TPB) was considered on the basis of previous studies indicating that this may play an important role in explaining behavioral intentions (Godin & Kok, in press). Role belief, or the perceived appropriateness of

performing the behavior for a member of a reference group, was measured by two items: 1) It is appropriate for a person of my age to use a cane; and 2) It is appropriate for a person of my sex to use a cane. These items were scored from -2 to +2 on a 5-point Likert scale with endpoints labelled strongly disagree/strongly agree. Scores on the two role belief items were combined into one composite measure. The format and wording of these two items are consistent with the recommendations of Godin and Kok (in press).

4.3.4 Findings and Revisions

a) Questionnaire Length: The average time to administer the questionnaire (excluding the time to complete the open-ended questions and the final debriefing session) was 35 minutes for both interviewer- and self-administrated techniques. However, the time ranged from 25 to 40 minutes for the face-to-face interviews, and from 15 to 45 minutes for the self-administered method. While no participant in the face-to-face group commented on the length of the questionnaire, three seniors who self-completed the questionnaire found it lengthy. This may be an indication that the self-completion method was more demanding than face-to-face interviews. One-to-one interviews are reported to be less anxiety producing and better tolerated by seniors (Gueldner & Hanner, 1989; Zimmer et al., 1985). Subjects who commented on the length of the questionnaire were also more likely to express negative attitudes towards the use of a cane and show signs of boredom. Therefore, it is likely that lack of interest in (or rejection of) the topic was also a contributing factor to the perceived length of the questionnaire.

Consistent with previous reports (Kelsey et al., 1989), keeping respondents on topic

was a challenge that required patience and tactful handling by the interviewer. Some participants had difficulty recognizing the type of information needed and had a tendency to provide unnecessary details which further prolonged the interview.

b) Comprehensiveness of Scale Format: Past research points to the difficulty of some seniors in responding to scale formats requiring a choice among multiple options. It has been reported that some seniors react to the ambiguity created by these types of scales by either answering with a simple “yes” or “no” or by restricting their choices to extreme responses (Andrews & Herzog, 1986; Coristine & Edwards, 1994; Drevenstedt, 1975; Gueldner & Hanner, 1989). To reduce complexity, in the present study, the questions were divided into two parts, with each part probing for a more refined answer (Streiner & Norman, 1995). For example, subjects were first asked whether an outcome was likely or unlikely. Then, the next question tapped the strength of the endorsement. This method was successful with respondents who received a face-to-face interview.

Although, seniors who self-completed the questionnaire, had no difficulty understanding the format, they made occasional errors in marking accurate responses. This was in part due to the fact that to avoid “yea-saying” bias, the order of successive question responses was varied (that is, for some response options, “very unlikely” was presented on the right and for others on the left side of the page) (Streiner & Norman, 1995). Based on the pilot results, for the main survey, the order of response options was kept consistent to minimize response error and cognitive burden.

c) Completeness of Response Options: In the pilot study, with the exception of intention questions, all scales had an odd number of response options with the midpoint representing “neither likely nor unlikely answers”. This arrangement in bipolar scales allows subjects to maintain a neutral position (Streiner & Norman, 1995). For the purposes of comparative analyses concerning subjects' intentions, it was desirable to eliminate the neutral position and force subjects to commit themselves to one side or the other (Burns & Grove, 1993; Streiner & Norman, 1995). Participants in the pilot study had no difficulty selecting a response option for the intention questions.

Most previous applications of the model have excluded a “don't know” response alternative. However, some authors have treated “don't know” responses as neutral answers, corresponding to “neither likely nor unlikely” (Montano & Taplin, 1991). Since “don't know” and mid-scale responses may carry different meanings for respondents, lack of a separate coding can make the interpretation of the findings difficult (Schuman & Presser, 1981). In this study, to minimize the frequency of “don't know” answers, this alternative was not included as a response option. However, if participants insisted that they did not know the answer, this was recorded and regarded as a missing value.

d) Considerations of the Quality of Responses to Scale Items: With respect to normative beliefs, some seniors had difficulty answering questions pertaining to the beliefs of specific referents. These participants stated that they were unaware of what their friends, their physicians, or other health care workers might think about their use of a cane. Conversely, all participants could readily answer the one-item direct measure of SN:

"Generally speaking, most people who are important to me think I should use a cane". Therefore, it was assumed that "don't know" answers to these questions indicated genuine lack of information rather than a refusal to answer the questions.

The most problematic scales in the pilot study were the role belief and outcome evaluation scales. The two items in the role belief scale were characterized by high response latency and ambivalence. Think aloud techniques revealed that seniors had both difficulty understanding the questions and deciding on an answer. The role belief scale was eliminated from the final questionnaire.

As discussed earlier, to measure outcome evaluations, two formats were pretested. One format used "good-bad" bipolar scale options, and the other adopted "it is important to me" statements with which seniors could agree or disagree. Consistent with the predictions of Ajzen and Fishbein (1975), the two formats, elicited different responses, suggesting that they were measuring different constructs. According to Ajzen and Fishbein (1980), "importance" measures obtain ratings of each attributes' importance for the respondents, while the "good-bad" scales attach a value to the attribute.

In the current study, both scales performed poorly. These questions were characterized by high response latency and high rates of "don't know", "no opinion", and "it depends" answers. Respondents had difficulty making absolute and acontextualized evaluations of the outcome belief items. Seniors' hesitations were particularly evident with evaluative statements of a more sensitive nature, such as "looking old", "looking handicapped", and "feeling embarrassed". Participants' reactions to these questions raised concerns about the possibility of "satisficing" effects. The latter is defined as giving an

answer which is satisfactory but not optimal, characterized by endorsing status quo, neutral points, or “don’t know” answers (Streiner & Norman, 1995; Velicer, 1995).

Additionally, some seniors had difficulty making a conceptual distinction between outcome expectancy and evaluation items. For instance, in reply to the question “it is important to me to avoid looking old”, a few participants answered “no, using a cane, doesn't make me look old”. The problems encountered with the evaluation component of the TPB model are consistent with findings of some previous applications of the model (Mullen, Hersey, & Iverson, 1987; Young et al., 1991). In light of these findings, for the final questionnaire, the outcome evaluation scale was omitted. The total score for the indirect attitude scale was obtained by summing over 15 outcome beliefs ($A = \sum b_j$). Items 1, 4, 6, 9, 11, and 13 to 15 were assigned a negative value and were reverse coded (see Table 4.3).

A few questions in the indirect PBC scale seemed less salient for cane-users who had already overcome some of the barriers presented, such as “difficulty learning how to walk with a cane would discourage me from using it”, “the cost of a cane would discourage me from buying one”, and “not knowing how to get the right cane would discourage me from buying one”. However, most participants correctly selected the response option, “very unlikely” to express their beliefs. During the pre-pilot stage (i.e., focus group interviews with seniors and panel evaluation) these items were identified as salient barriers for prospective users. Because of the potential contribution of these items to the content validity of the PBC scale, these items were retained for the main study.

Finally, no items were found to be offensive and only one question needed minor changes in the wording. Coding of the open ended questions validated the relevance and

completeness of the existing items and no additions were deemed necessary.

e) Seniors' Responses to Other Study Questions: In addition to testing the items of the CCM Instrument, the pilot study provided an opportunity to identify problems with the health-related and sociodemographic questions. Subjects appeared to have no difficulty understanding and answering questions requiring subjective reports about their overall health and activity levels. Similarly, seniors had no hesitation in revealing demographic information of a personal nature.

Some participants, however, had problems with the four-item balance and mobility screening tool (see 3.6 Measurement). A few seniors had problems answering these questions if they felt the items did not apply to their daily activities. For instance, if the participant was used to taking a shower and was asked about the difficulties in getting in and out of a bath, he would have difficulty answering the question. Similarly, if he was used to holding a grab bar to get in and out of the bath, he would have difficulty imagining how he would perform without the use of a device. For some seniors, classifying their level of difficulty in performing mobility tasks was problematic. One respondent got up and demonstrated how he usually gets in a car, requesting that the interviewer decide whether he had "a little" or "a lot of difficulty" in performing the task.

Consistent with the literature, some of the respondents who compensated for their functional limitations, denied having any problems with mobility activities. However, when probed closely, their limitations and compensation were obvious. It is reported that seniors tend to assume that only a level of difficulty beyond what they would expect at their age

warrants an affirmative answer (Jobe & Mingay, 1990). In this study, the following probes were particularly useful in obtaining more accurate information: "do you use any special equipment or aids ...?", "is this all the time?", "do you use anything else to help you...?", "do you receive help from another person ...?", "how much difficulty would you have if you were not having any help?", etc. (see Appendix A, Screening Tool).

4.4 Discussion

This chapter described qualitative approaches used to ensure face and content validity of the CCM Scale. Scale items were drawn from various sources, a strategy which limits the biases inherent in each individual source and ensures relevance and completeness of items generated (Streiner, 1993). The first draft of the instrument was evaluated by a panel of 10 clinicians and researchers. Subjecting the items to the judgement of experts before item trials is reported to be a sound and sensible approach to obtain the best possible item content (Burns & Grove, 1993; Kline, 1993). Finally, the draft instrument was pretested on a purposive sample of 10 seniors and its content validity was further verified through the analysis of the open-ended questions.

In constructing the CCM Instrument, it was necessary to make a number of modifications to the scale format recommended by Fishbein & Ajzen (1980) and Ajzen (1991). For instance, semantic differential scales are usually used to operationalize the constructs of the TPB model. In this type of scale, seven-point response options are inserted between the bipolar adjective pairs, with each item requiring a different pair of adjectives (Ajzen and Fishbein, 1975). To reduce cognitive burden and maintain consistency, in the

current study, 5-point bipolar Likert scales were used. The latter is the most extensively used scaling technique designed to measure opinion or attitude (Burns & Grove, 1993). Despite the existing differences in the format, there is evidence suggesting that the Likert and semantic differential attitude scales yield comparable results (Fishbein & Ajzen, 1975).

Furthermore, in most applications of the model, the indirect measure of attitude is obtained through multiplicative composite scoring. In this type of scoring, rather than the researcher assigning a negative or positive value to the outcome beliefs, participants determine the value of the attribute under investigation (Fishbein & Ajzen, 1975). Despite its conceptual appeal, this type of scale significantly adds to the complexity of the measurement. Streiner & Norman (1995) state that the use of multiplicative composite scores is ill-advised. In addition to increasing the questionnaire length and sample size requirements, many technical problems could arise with this type of scoring. For instance, when multiplying two values together to yield one score, even if the ratings are kept the same but simply transformed from one weighting scheme to another (e.g., changed from a bipolar scoring of -2 to +2 system to a unipolar scoring of 1 to 5 point scheme), the scale's correlations with another construct can alter dramatically (Streiner & Norman, 1995).

Furthermore, some combinations of belief strength and their evaluations may have unusual implications. For instance, disagreement (-2) that a behavior leads to a negative outcome (-2) contributes positively to the attitude toward the behavior (+4). The bipolar scale treats this as equivalent to agreement (+2) that a behavior will lead to a positive outcome (+2). However, disagreement (-2) that a behavior leads to a neutral outcome (0), will have zero contributions to the total score (Ajzen and Fishbein, 1980). An example will

further illustrate the conceptual difficulties that may arise with this approach. A participant who believes that using a cane is very unlikely to make him look old (-2) and that looking old is neither good or bad (0) will have a total score of zero for this item. On the other hand, a subject who believes using a cane is very unlikely to make him look old (-2) and evaluates looking old as something negative (-2) will have a total score of +4 for this item (higher scores indicate more positive attitudes). Yet, this product score is conceptually unjustified. Most clinicians would argue that the latter participant is no more likely to consider using a cane than the former.

Fishbein and Ajzen (1975) maintain that attitude can be estimated more accurately by considering both belief strength and evaluation of associated attributes, except for when the evaluations are all in one direction. However, some later applications of the model do not support the superiority of the composite scores compared to the summative measures (Mullen et al., 1987). In light of the difficulties identified during the pretesting of the outcome evaluation scale and the technical problems related to the multiplicative scoring, for the final questionnaire, the evaluative component was omitted. Thus, the indirect attitude scale was constructed by summing over the outcome belief items to which the investigator assigned positive or negative values.

Finally, consistent with the previous applications of the model, with the exception of the intention and direct measure of SN, a minimum of four items were used to measure each construct. Generally, it is recommended to assess social cognitive constructs with a minimum of three items to allow the use of a more stable averaged score (Godin & Kok, in press). However, to measure highly reliable constructs such as intention, single item scales may be

used (Ajzen & Fishbein, 1980; Godin & Kok, in press; Valois, Godin, & Bertrand, 1992).

To conclude, the instrument development process has largely followed the recommended procedures and guidelines. A few modifications were necessary to tailor the instrument to the specific characteristics of the target population and ensure quality measures. Overall, with the exception of one item that required minor changes in the wording and the deletion of the “role belief” and “outcome evaluation” scales, no further modifications were made to the pilot questionnaire. Sections A to D in Appendix I present the revised instrument used in the main survey. It should be noted that the direct attitude, SN, and PBC items were randomly embedded in the corresponding indirect measures. The next chapter describes the psychometric analyses of the instrument data from the main survey.

CHAPTER FIVE

RESULTS

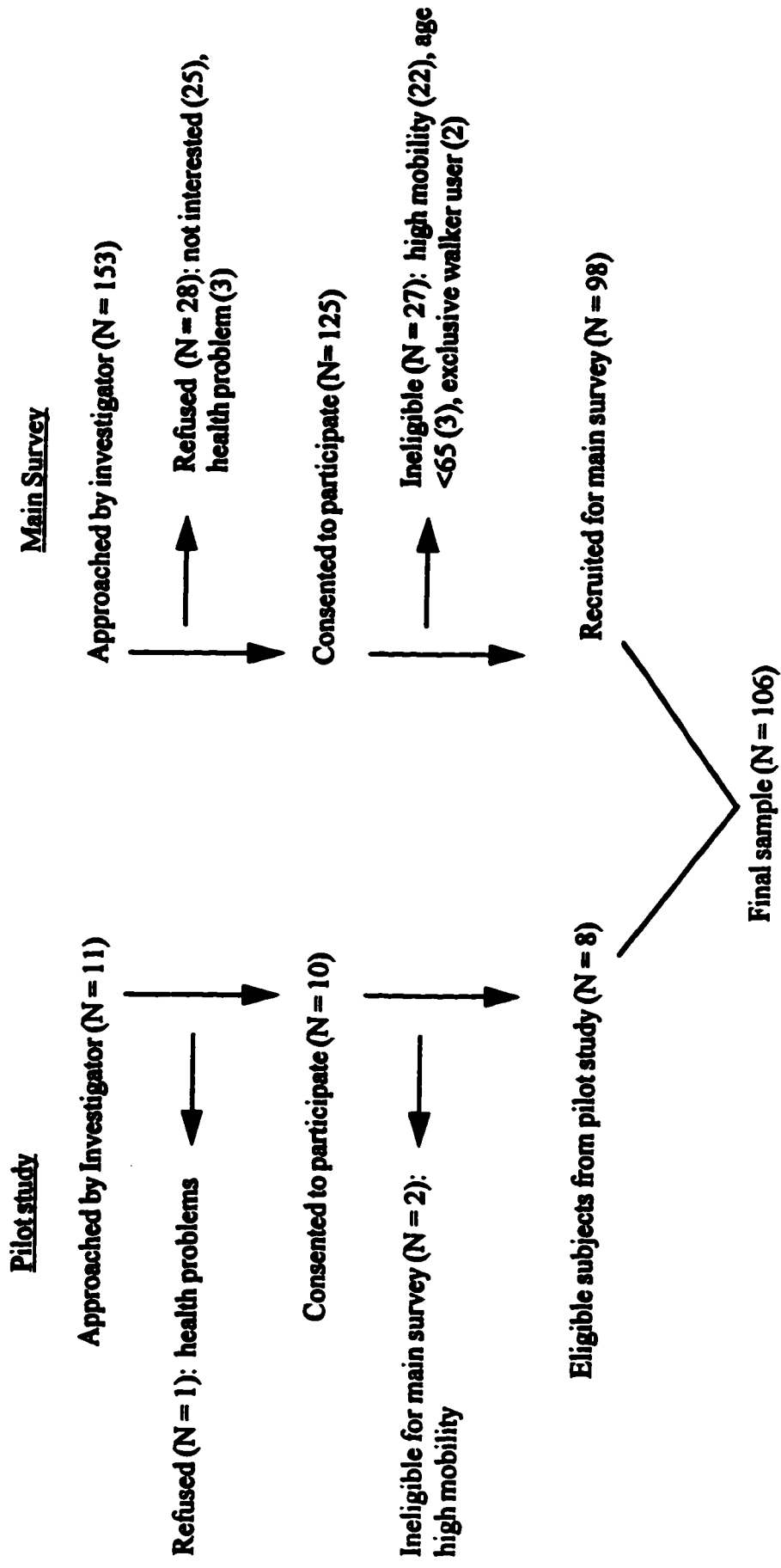
This chapter begins with a description of the response rate. Next, sociodemographic and health-related characteristics of the sample and the two groups of "cane-users" and "non-users" are presented. The chapter continues with the description of psychometric properties of the CCM Instrument. Finally, after presenting the relationships among various components of the TPB model, the differences between "cane-users" and "non-users" are outlined.

5.1 Response Rate

During the recruitment period for the main survey (between July 19, 1996 to September 10, 1996), 153 subjects were approached. Twenty eight seniors (18%) refused to participate in the study, either because they were not interested (25) or because of health problems (3). Twenty seven of the consenting seniors (22%), were ineligible for inclusion. Reasons for exclusion were: mobility and balance impairment score < 2 (22); under age 65 (3); or an exclusive walker user (2). Thus, a convenience sample of 98 eligible subjects were recruited for the survey.

Data from eight participants in the pilot study who met the inclusion criteria for the main survey were added to the sample. This decision was justified, since the data collection procedures and measures of the variables for the pilot study were similar to that of the main survey (see 4.2 Pilot Testing). Thus, the final sample consisted of 106 subjects. Figure 5.1 presents a flow-chart of the recruitment process.

Figure 5.1 Flow Chart of Recruitment Process



Twenty-three subjects (22%) were recruited from health promotion drop-in centres, 32 (30%) were recruited from blood pressure and foot care clinics held in seniors' congregate apartment buildings, and the remaining 51 (48%) were the clients of the Home Care Program. Of the 106 questionnaires, 100 (94%) were interviewer administered and 6 (6%) were self-completed. The average time to administer the questionnaire was 19.4 minutes (SD=5.9, range 10-40).

The calculation of the precise response rate for this study was difficult for two reasons. First, many seniors terminated the telephone conversation or left the community settings before their screening for mobility level was completed. Therefore, it was not possible to establish the eligibility of all the 28 refusals. With the indirect approach (see 3.4 Subject Recruitment and Data Collection Procedures), case managers of the Home Care Program contacted their clients and obtained their permission to release their names to the investigator. It is possible that key informants contacted those seniors who were more likely to agree to participate in the study, thus resulting in a pre-screening selection of subjects. Moreover, no data were collected on those seniors who refused to have their names released to the investigator. Therefore, if all known refusals were assumed to be eligible for the study, an estimate of the response rate would be 77.7%.

A comparison of refusers with respondents revealed that the rate of cane use was significantly lower among refusers than study subjects (7.1% versus 48.1%, $X^2=15.55$, $df=1$, $p<.001$), suggesting the possibility of a non-response bias.

5.2 Sample Characteristics

5.2.1 Sociodemographic Characteristics

a) Total Sample: Table 5.1 describes the sociodemographic characteristics of study subjects. The majority of participants (78.3%) were female and the average age for the sample was 77 years (SD=7.2, range 65-93). Most subjects were widowed (54.7%), followed by 21.7% married or in common-law relationship, 14.2% single, and 9.4% divorced. The majority of subjects lived alone (74.5%). Among the 27 seniors who cohabited, 74 % lived with their spouse, 22% lived with their children and the remaining 4% lived with a friend.

Over two thirds of subjects reported English, 20.8% French, and 9.4% other languages as their mother tongue. About one-fifth of the subjects (18.9%) had some primary education, 57.6% completed some secondary education, and the remaining 13.6% had some post-secondary or university education. Finally, the majority of subjects (80.2%) reported that their income was completely or somewhat adequate to satisfy their needs.

b) Group Differences: Chi-square and t-tests were conducted to determine group differences between “cane-users” and “non-users” with respect to the sociodemographic variables. As shown in Table 5.1, there were no statistically significant differences between the two groups on the demographic variables of sex, marital status, education, income, mother tongue, and living arrangements. However, “cane-users” were significantly older ($t=3.66$, $p<.0001$), with a mean age of 79.5 years (SD=6.5) compared to 74.7 years (SD=7.1) for “non-users”.

Table 5.1 Comparison of Sociodemographic Characteristics Between "Cane-Users" and "Non-Users"

Variable	Cane-Users (N=51)		Non-Users (N=55)		Total Sample (N=106)	
	%	(N)	%	(N)	%	(N)
Age Group:						
65-74	13.7	(7)	61.8	(34)	38.7	(41)
75-84	56.9	(29)	27.3	(15)	41.5	(44)
≥85	29.4	(15)	10.9	(6)	19.8	(21)
$\chi^2=25.98, df=2, p<0.0001$						
Gender:						
Female	84.3	(43)	72.7	(40)	78.3	(83)
Male	15.7	(8)	27.3	(15)	21.7	(23)
$\chi^2=2.09, df=1, p=0.15$						
Marital Status*:						
Single	15.7	(8)	12.7	(7)	14.2	(15)
Married/common law	21.6	(11)	21.8	(12)	21.7	(23)
Divorced/separated ^a	7.8	(4)	10.9	(6)	9.4	(10)
Widowed ^a	54.9	(28)	54.5	(30)	54.7	(58)
$\chi^2=0.19, df=2, p=0.91$						
Living Arrangement:						
Lives alone	72.5	(37)	76.4	(42)	74.5	(79)
Cohabits	27.5	(14)	23.6	(13)	25.5	(27)
$\chi^2=0.20, df=1, p=0.65$						
Highest Completed Education:						
Primary school	17.6	(9)	20.0	(11)	18.9	(20)
Secondary school	58.8	(30)	56.4	(31)	57.6	(61)
Post-secondary or higher	23.5	(12)	23.7	(13)	23.6	(25)
$\chi^2=0.11, df=2, p=0.95$						
Income*:						
Completely adequate ^b	37.3	(19)	25.5	(14)	31.1	(33)
Somewhat adequate ^b	45.1	(23)	52.7	(29)	49.1	(52)
Somewhat inadequate ^c	11.8	(6)	12.7	(7)	12.3	(13)
Inadequate ^c	5.9	(3)	9.1	(5)	7.5	(8)
$\chi^2=0.29, df=1, p=0.59$						
Mother Tongue*:						
English	70.6	(36)	63.6	(35)	67.0	(71)
French ^d	9.8	(5)	30.9	(17)	20.8	(22)
English & French ^d	3.9	(2)	1.8	(1)	2.8	(3)
Other ^d	15.7	(8)	3.6	(2)	9.4	(10)
$\chi^2=0.58, df=1, p=0.48$						

* Categories with the same identifiers (a-d) were collapsed together for chi-square analyses.

5.2.2 Health and Mobility Characteristics

a) Total Sample: Table 5.2 describes health and mobility characteristics of the subjects. Seniors were asked to compare their health and level of physical activity with other people of the same age. The majority of subjects (73%) felt that their health was excellent, very good, or good, and only 27% rated their health as fair or poor. Similarly, most respondents felt that they were either more active (36%) or as active as (33%) other seniors of the same age. In contrast to the subjective perceptions of activity levels, the mean score on the mobility tool suggests high levels of mobility and balance impairments in this sample. On a scale of 0 to 12 (higher scores indicating greater mobility restrictions), the mean mobility score for the total sample was 7.8 (SD=3.3).

The most prevalent mobility problems were “getting in and out of a bath” and “going up and down a flight of stairs”, with over half of the subjects reporting that they could not perform these activities without the assistance of a person or an aid (including the use of grab bars and handrails). Next, 30% and 14% of subjects reported similar problems with “walking a city block” and “getting in and out of a car”, respectively.

As presented in Table 5.2, self-reports of fall history indicate that 42.4% of subjects had at least one fall within the year preceding the study. The mean fall frequency for the sample was .93 (SD=1.4, range 0-6). Of the 45 subjects who fell, 16 (35.6%) reported that they fell once, and 29 (64.4%) fell two or more times. There were no statistically significant differences between “fallers” and “non-fallers” with respect to: age, self-rated health and activity levels, mobility impairment score, and reported difficulties in performing the four mobility tasks.

Table 5.2 Comparison of Health and Mobility Status Between "Cane-Users" and "Non-Users"

Variable	Cane-Users (N=51)		Non-Users (N=55)		Total Sample (N=106)	
	%	(N)	%	(N)	%	(N)
Health compared to peers*:						
Excellent/very good	37.3	(19)	45.5	(25)	41.5	(44)
Good	33.3	(17)	29.1	(16)	31.1	(33)
Fair ^a	23.5	(12)	23.6	(13)	23.6	(25)
Poor ^a	5.9	(3)	1.8	(1)	3.8	(4)
$\chi^2=0.73, df=2, p=0.69$						
Activity compared to peers*:						
A lot more active ^b	11.8	(6)	14.5	(8)	13.2	(14)
A little more active ^b	13.7	(7)	32.7	(18)	23.6	(25)
About the same	33.3	(17)	32.7	(18)	33.0	(35)
A little less active ^c	23.5	(12)	10.9	(6)	17.0	(18)
A lot less active ^c	17.6	(9)	9.1	(5)	13.2	(14)
$\chi^2=7.35, df=2, p=0.03$						
Difficulty getting in & out bath:						
Little/no difficulty	3.9	(2)	36.3	(20)	20.8	(22)
A lot of difficulty	15.7	(8)	27.3	(15)	21.7	(23)
Cannot do it	80.4	(41)	36.4	(20)	57.5	(61)
$\chi^2=23.97, df=2, p=0.0001$						
Difficulty going up & down stairs						
Little/no difficulty	2.0	(1)	29.1	(16)	16.0	(17)
A lot of difficulty	23.5	(12)	36.4	(20)	30.2	(32)
Cannot do it	74.5	(38)	34.5	(19)	53.8	(57)
$\chi^2=21.45, df=2, p=0.0001$						
Difficulty walking a city block:						
Little/no difficulty	15.7	(8)	65.5	(36)	41.5	(44)
A lot of difficulty	31.4	(16)	25.5	(14)	28.3	(30)
Cannot do it	52.9	(27)	9.1	(5)	30.2	(32)
$\chi^2=32.97, df=2, p<0.0001$						
Difficulty getting in & out a car:						
Little/no difficulty	25.5	(13)	78.2	(43)	52.8	(56)
A lot of difficulty	47.1	(24)	20.0	(11)	33.0	(35)
Cannot do it	27.5	(14)	1.8	(1)	14.2	(15)
$\chi^2=32.06, df=2, p<0.0001$						

* Categories with the same identifiers (a-c) were collapsed together for chi-square analyses.

Table 5.2 (Cont'd)

Variable	Cane-Users		Non-Users		Total Sample	
	%	(N)	%	(N)	%	(N)
Fall history:						
No falls	54.9	(28)	60.0	(33)	57.5	(61)
One fall	13.7	(7)	16.4	(9)	15.1	(16)
Multiple falls	31.4	(16)	23.6	(13)	27.3	(29)
$\chi^2=0.82, df=2, p=0.66$						
	Mean (SD) (Range)	(N)	Mean (SD) (Range)	(N)	Mean (SD) (Range)	(N)
Fall frequency	1.1 (1.6) (0-6)	(51)	.78 (1.2) (0-6)	(54)+	.93 (1.4) (0-6)	(105)+
$t=1.18, p=0.24$						
Mobility impairment	9.8 (2.2) (4-12)	(51)	5.9 (3.1) (2-12)	(55)	7.8 (3.3) (2-12)	(106)
$t=7.48, p<0.0001$						

+ An outlier was omitted from the analysis.

Table 5.3 presents the use of mobility aids among the sample. Close to one-half of the participants (48%) reported using a cane, while 6.6% used both a cane and a walker. The majority of "cane-users" reported using their canes almost every day (78%). While only one-half of the "cane-users" used their canes inside their home, 82% used them inside buildings, and 94% used them outdoors.

b) Group Differences: As shown in Table 5.2, there were no statistically significant differences between "cane-users" and "non-users" with respect to self-rated health, fall history, or fall frequency. However, "cane-users" reported significantly greater mobility difficulties ($t=7.48, p<.0001$), with a mean mobility impairment score of 9.8 (SD=2.2) compared to 5.9 (SD=3.1) for "non-users". Similarly, "cane-users" rated themselves to be less active than "non-users" ($\chi^2=7.35, df=2, p<.05$).

Table 5.3 Use of Mobility Aids

Variable	%	(N)
Among Total Sample (N=106)		
Use of a cane:		
Yes	48.1	(51)
No	51.9	(55)
Use of a walker:		
Yes	6.6	(7)
No	93.4	(99)
Among Cane-Users (N=51)		
Frequency of cane use:		
Always	78.4	(40)
Sometimes	9.8	(5)
Rarely	7.8	(4)
Only in winter	3.9	(2)
Location of cane use:		
Inside home		
Yes	51.0	(26)
No	49.0	(25)
Inside buildings		
Yes	82.4	(42)
No	17.6	(9)
Outdoors		
Yes	94.1	(48)
No	5.9	(3)

5.3 Internal Reliability of TPB Measures

Frequency distributions of the responses for each item were examined to establish that at least 10% of the respondents selected a minimum of 60% of the possible categories of the scale (Streiner, 1993). One item in the indirect attitude scale ("using a cane would isolate me from other people") and two items in the indirect PBC scale ("the cost of a cane would discourage me from buying one" and "not knowing how to get the right cane would discourage me from buying one") did not meet this criterion and were excluded from

subsequent analyses (more than 90% of subjects replied very unlikely/unlikely to these questions).

Table 5.4 summarizes mean, range, standard deviation, and Cronbach's alpha coefficients for each scale. Cronbach's alphas were within acceptable values ranging from .72 for the four-item direct attitude scale to .92 for the four-item indirect SN scale.

Table 5.4 Cane use Cognitive Mediator Scale Statistics

Statistics	Attitude Direct (N=106)	Attitude Indirect (N=106)	SN Direct (N=105)	SN Indirect (N=103)	PBC Direct (N=105)	PBC Indirect (N=105)
# of Items	4	14	1	4	4	7
Mean (SD)	.15 (1.1)	.60 (.8)	.02 (1.7)	.62 (4.6)	.72 (1.1)	.55 (.9)
Range	-2 to +2	-1.2 to 1.9	-2 to +2	-7.5 to 10.0	-2 to +2	-2 to +2
Cronbach's alpha	.72	.82	-	.92	.86	.81

5.4 Missing Values

As discussed in Section 4.2.4, "don't know" answers to scale items were treated as missing data. Missing values were relatively small (from zero to 4.7% for each item), with exceptions being the three questions in the indirect SN scale where between 6.6% to 10.3% of subjects stated that they were unaware of the opinions of their friends, physicians, or other health care workers with respect to their use of canes.

Two possible approaches for coping with missing data are dropping cases or dropping variables with missing values. Both methods have been subject to criticism. Dropping variables with missing data potentially loses information, and dropping subjects

results in lower statistical power due to reduced sample size. More importantly, when missing data are nonrandom, dropping cases may give results that are nonrepresentative of the original sample. An alternative approach that avoids the problems detailed above is the mean substitution imputation technique for missing values (Cohen & Cohen, 1983; Tabachnick & Fidell, 1989).

Using this approach, missing data for each item were replaced by the respondent's mean score for that particular scale, provided that the subject had responded to a minimum of 50% of the items in the scale. Three cases in the indirect SN scale and one case in the two PBC scales did not meet this criterion and were omitted.

5.5 Relationships Among Various Components of the TPB Model

Table 5.5 presents Pearson correlation coefficients among age, mobility, and various components of the TPB model. As shown in the table, all correlations among TPB measures were significant at $p < .0001$. As anticipated, the associations between direct and indirect (or belief-based) measures of each construct were high, ranging from .79 between the two attitude scales to .90 between the direct and indirect measures of SN. Similarly, there were high correlations between the two questions on intention to use a cane within the next month and next winter ($r = .91$).

Consistent with the model's predictions, among various constructs, intention and behavior had the strongest associations ($r_{pb} = .86$). In turn, intention had moderate to high correlations with SN ($r = .78$) and attitude ($r = .74$), and low correlations with PBC ($r = .42$). Among the precursors of intention, attitude moderately correlated with SN ($r = .65$) and PBC

Table 5.5 Pearson Correlation Coefficients Among Age, Mobility, and TPB Variables in the Total Sample (N=106)

Variable	1	2	3	4	5	6	7	8	9	10
1. Age	1.00									
2. Mobility	.32 ^d	1.00								
3. Attitude Direct	.23 ^b	.50	1.00							
4. Attitude Indirect	.14 ^a	.41	.79	1.00						
5. SN Direct	.22 ^b	.58	.65	.53	1.00					
6. SN Indirect	.22 ^b	.60	.62	.52	.90	1.00				
7. PBC Direct	.10 ^a	.04 ^a	.60	.60	.33	.29	1.00			
8. PBC Indirect	.10 ^a	.03 ^a	.51	.49	.28	.21	.81	1.00		
9. Intention (1 month)	.28 ^c	.62	.74	.66	.78	.76	.42	.37	1.00	
10. Intention (next winter)	.31 ^d	.58	.70	.60	.72	.70	.39	.35	.91	1.00
11. Cane-use ^e	.34	.59	.76	.68	.73	.72	.42	.38	.86	.81

* Correlations with cane-use are point-biserial correlations.

Note. All correlations are significant at $p < .0001$, with the exception of the following:

- a Association not significant
- b Association significant at $p < .05$
- c Association significant at $p < .01$
- d Association significant at $p < .001$

($r=.60$), while a very low association was found between SN and PBC ($r=.33$).

The associations between age and mobility with various components of the TPB model were also examined. As illustrated in the table, age had low ($r<.35$), but significant correlations with mobility, direct measure of attitude, direct and indirect measures of SN, intentions, and cane use behavior. However, the associations between age and belief-based measure of attitude and the two PBC scales were not statistically significant. Similar results were obtained with respect to the level of mobility impairment. This had statistically significant low to moderate associations with all components of the TPB model (correlations ranged from $r=.41$ to $r=.62$). The exceptions were the two measures of PBC which were not significantly associated with the subjects' level of mobility impairment. In other words, older seniors and those with greater mobility restrictions reported more positive attitudes, perceived social referents to be more supportive of their cane use, and expressed greater intentions to use canes. However, they did not anticipate fewer barriers in incorporating the device into their daily activities.

5.6 Description of the TPB Measures

a) Total Sample: Means and standard deviations for the TPB dimensions appear in Table 5.6. The results indicate that overall this sample of seniors was slightly favourable to cane use. As shown in the table, with the exception of intention to use a cane within the next month, means for all components of the model were in a positive direction (slightly above the scale midpoint of zero). A slightly higher mean for the intention to use a cane next winter (.06) compared to the intention for next month (-.18) was noted.

Table 5.6 Comparison of TPB Variables Between “Cane-Users” and “Non-Users”

Variable	Cane-Users		Non-Users		Total Sample	
	Mean (SD)	(N)	Mean (SD)	(N)	Mean (SD)	(N)
Attitude Direct ^a	1.02 (.62)	(51)	-.65 (.80)	(55)	.15 (1.10)	(106)
	t= 12.12, p<0.0001					
Attitude Indirect ^a	1.15 (.47)	(51)	.10 (.66)	(51)	.60 (.78)	(106)
	t= 9.37, p<0.0001					
SN Direct ^a	1.26 (1.04)	(51)	-1.14 (1.25)	(54)	.19 (1.67)	(105)
	t=10.69, p<0.0001					
SN Indirect ^b	3.95 (3.26)	(51)	-2.64 (3.20)	(52)	.63 (4.61)	(103)
	t=10.36, p<0.0001					
PBC Direct ^a	1.19 (.66)	(51)	.27 (1.26)	(54)	.72 (1.11)	(105)
	t=4.75, p<0.0001					
PBC Indirect ^a	.89 (.50)	(51)	.23 (1.04)	(54)	.55 (.88)	(105)
	t=4.23, p<0.0001					
Intention (1 month) ^a	1.49 (1.21)	(51)	-1.73 (.65)	(55)	-.18 (1.88)	(106)
	t=16.90, p<0.0001					
Intention (next winter) ^a	1.59 (1.04)	(51)	-1.36 (1.11)	(55)	.06 (1.83)	(106)
	t=14.07, p<0.0001					

a Scores theoretically ranged from -2 to +2

b Composite score theoretically ranged from -10 to +10

Note: Statistical significance assessed using $\alpha = 0.003$, as defined by Bonferroni test for multiple comparisons. Higher means indicate stronger positive attitudes, SN, and PBC.

b) Group Differences: Table 5.6 shows that compared to seniors who did not use a cane, “cane users” attained significantly higher scores on all components of the TPB model ($p < .0001$). As hypothesized, cane-users reported more positive attitudes towards using a cane, perceived greater social pressures to use a cane, and anticipated fewer obstacles in successfully using a cane. Figure 5.2 displays group differences in TPB constructs. With the exception of the PBC scale, for all other constructs of the model, the mean scores of “non-users” were below the scale midpoint of zero, suggesting unfavourable perceptions.

Post-hoc analyses were conducted to explore whether the differences in age and mobility impairments between the two groups influenced the results. The mean attitude, SN, and PBC values were compared between the two groups in stratified analyses. As illustrated in Figures 5.3 and 5.4, the group differences with respect to the TPB variables remained statistically significant. That is, regardless of age and level of mobility, “cane-users” had significantly more favourable perceptions than “non-users”.

For a better understanding of these differences, a closer examination of the underlying beliefs was warranted. Table 5.7 presents descriptive statistics for outcome, normative, and control beliefs expressed by subjects. There were both similarities and differences between “cane-users” and “non-users” with respect to their perceptions of the consequences of cane use. The latter were divided into three dimensions: psycho-social, functional, and safety outcomes. As shown in the table, the vast majority of “cane-users” expected improved function and ease in performing daily activities with canes and associated cane use with enhanced feelings of safety and fall prevention. Interestingly, over two-thirds of “non-users” also expected some safety gains and between 30% to 62% anticipated

Figure 5.2 Comparison of TPB Variables Between "Cane-Users" and "Non-Users" (P < .0001)

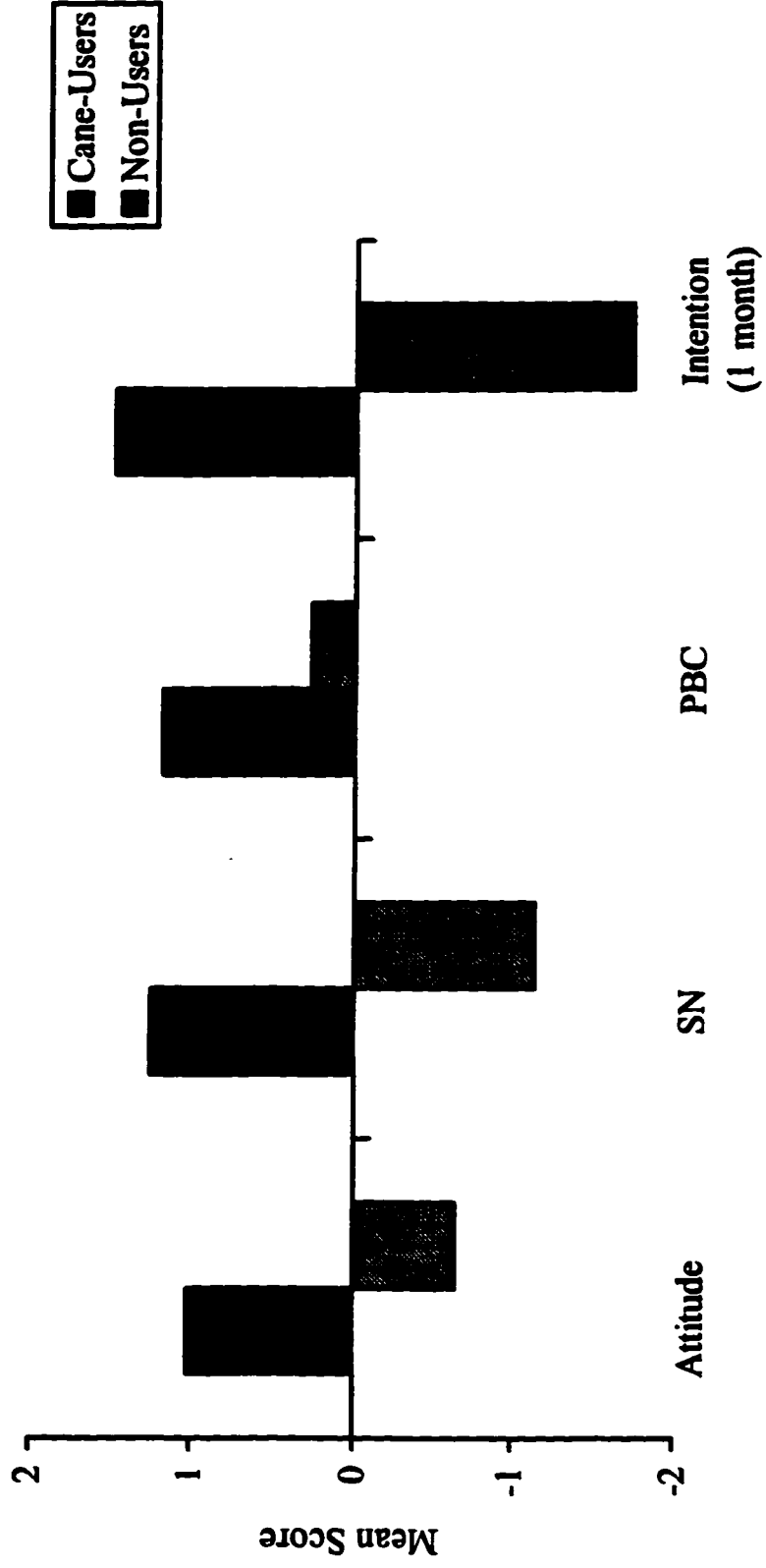
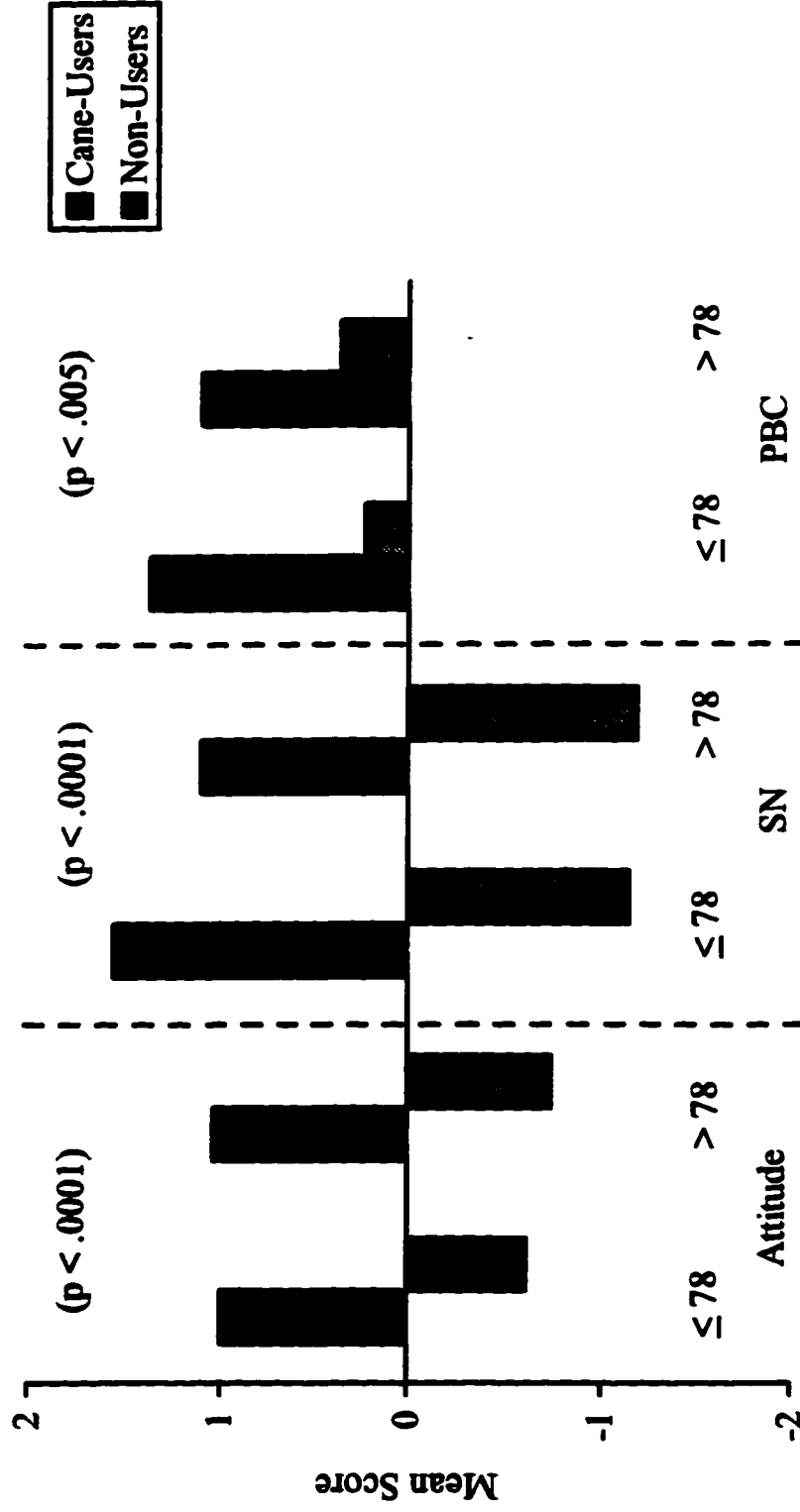
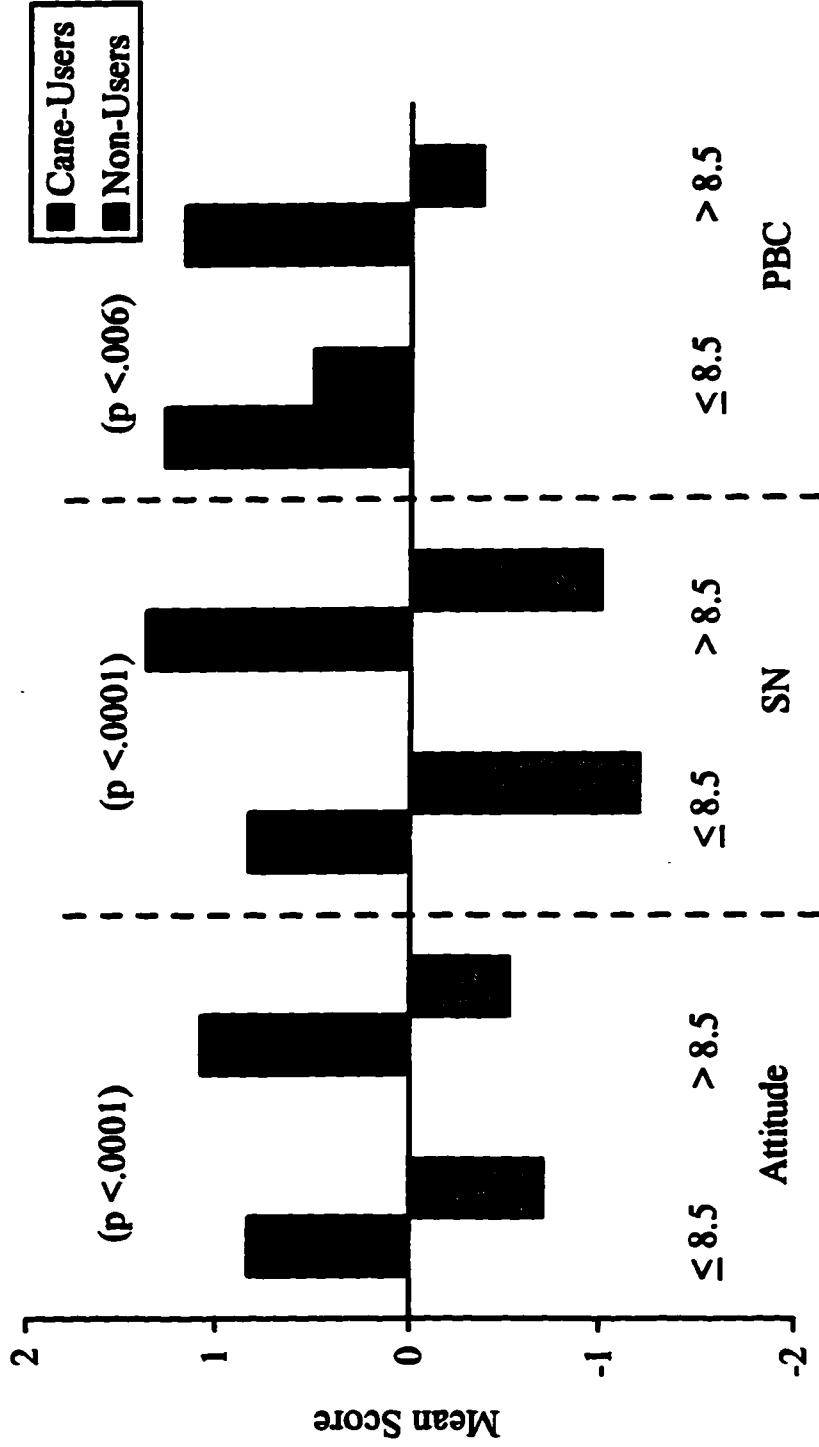


Figure 5.3 Comparison of TPB Variables Between “Cane-Users” and “Non-Users” Stratified by Age
 (≤ 78 versus > 78 years¹)



¹ Cut-point corresponds to the median age for the total sample

Figure 5.4 Comparison of TPB Variables Between “Cane-Users” and “Non-Users” Stratified by Mobility Level (Scores ≤ 8.5 versus > 8.5 ¹)



¹ Cut-point corresponds to the median mobility score for the total sample

Table 5.7 Outcome, Normative and Control Beliefs of "Cane-Users" and "Non-Users"

Variable	Likely/Very Likely (%)		
	Cane-Users (N=51)	Non-Users (N=55)	Total Sample (N=106)
Outcome Beliefs			
Using a cane would			
a) Psycho-social Outcomes:			
hurt my pride	15.7	36.4	26.5
make me look old	28.6	44.4	35.8
make me feel old	25.5	56.4	41.5
make me look handicapped	38.0	51.9	44.3
make me feel embarrassed	7.8	29.1	18.8
make me feel like I am giving up my independence	29.4	56.4	43.4
b) Functional Outcomes:			
interfere with my daily activities*	27.5	49.1	38.6
make walking easier for me	94.1	46.2	67.9
give me extra support I need	98.0	59.3	77.3
help me keep my balance	96.1	62.3	77.3
allow me to do my daily activities	86.3	29.6	56.6
c) Safety Outcomes:			
make me feel safe from falling	98.0	67.9	81.1
keep me from falling	98.0	71.7	83.1
keep me from slipping on ice in winter	94.0	71.2	79.2
Normative Beliefs			
My family thinks I should use a cane	70.6	19.2	43.4
My friends think I should use a cane	79.2	17.6	44.3
My doctor thinks I should use a cane	87.2	16.3	46.3
Other HCWs think I should use a cane	84.8	12.8	42.5
Control Beliefs			
Difficulty ... would discourage me from using it:			
learning how to walk with a cane	2.0	30.2	16.0
shopping with a cane	19.6	54.9	35.9
going up and down stairs with a cane	15.7	60.0	35.9
getting around my home with a cane	8.0	25.9	17.0
getting in a car with a cane	15.7	35.8	25.5
getting on/off a bus with a cane	9.8	28.8	18.9
Forgetting to carry my cane...	19.6	48.1	34.0

* This item represents a negative outcome belief

functional benefits from using a cane. Subjects were not unrealistically positive in their evaluations of cane use; nearly one-half of “non-users” and over one-fourth of “cane-users” felt that using a cane would interfere with their daily activities. Similarly, a considerable proportion of seniors in both groups associated canes with negative psycho-social outcomes (8% to 38% of “cane-users” and 29% to 56% of “non-users”).

With respect to the normative beliefs, the two groups differed considerably. Whereas over 70% of “cane-users” believed that the four social referents expected them to use a cane, less than 20% of “non-users” reported similar beliefs. Finally, between 26% to 60% of “non-users” thought that difficulties involved in performing daily activities with a cane would discourage them from using it. Not surprisingly, the proportions were considerably lower for “cane-users” (less than 20%).

Table 5.8 presents the subjects’ expressed motivation to comply with the four key referents. Seniors were asked to what extent they wanted to do what the respective referents thought they should do. Close to 70% of subjects reported high motivation to comply with their physicians’ advice. This was followed by 44% for other health care workers (HCW), 13% for family, and only 2% for friends.

Table 5.8 Motivation to Comply with the Key Referents for the Total Sample (N=104)

Motivation to Comply	Very Little/Little (%)	Somewhat (%)	A Lot/A Great Deal (%)
Family	61.5	26.0	12.5
Friends	74.0	24.0	2.0
Physician	12.5	18.3	69.1
Other HCWs	26.9	28.8	44.3

CHAPTER SIX

DISCUSSION

This final chapter discusses the results of the study and their implications for clinical practice, future research, and the TPB model. It begins with a description of the sample characteristics with respect to the sociodemographic and health-related variables. After a description of the psychometric properties of the TPB measures, the findings are discussed in light of the study objectives. Finally, study limitations and the implications of the findings are discussed. The chapter ends with a brief conclusion.

6.1 Discussion of the Findings

6.1.1 Sample Characteristics

a) Sociodemographic Characteristics: Participants were on average 77 ± 7.2 years old. More than two thirds were female, lived alone, had less than post-secondary education, were satisfied with their income, and reported English as their mother tongue. A comparison of the sociodemographic profile of the study participants with data from the 1991 Census for Ottawa-Carleton indicates that seniors in 65 to 74-year-old category, married, living with others, with some post-secondary or higher education, and reporting non-official languages as their mother tongue were underrepresented in the current study (Council on Aging, 1994).

The differences between subjects and the general older population should be interpreted in light of the inclusion criteria and non-probability sampling technique employed in this study. The present study targeted community-living older adults with some degree of mobility and balance impairments (seniors with scores of <2 on the screening tool,

corresponding to no or minimal mobility difficulties, were excluded from the study). Large scale studies of probability samples of community-living elderly persons indicate that the sociodemographic profile of this more frail sub-group of seniors differs from the general older population. For instance, a higher proportion of older seniors and women report functional impairments compared to men and younger seniors (Manton, Corder, & Stallard, 1993; Macken, 1986; Lundgren et al., 1990; Penning & Strain, 1994). In turn, a greater proportion of women and older seniors are widowed, live alone, and report lower educational levels (Davis, 1989; Government of Canada, 1993). More importantly, the observed differences may be related to the biases inherent in non-probability sampling techniques, suggesting the non-representativeness of the study population.

b) Health and Mobility Level: Various indicators of frailty were examined in this study. Overall, subjects had positive perceptions of their health and activity levels compared to their peers. Despite the high levels of mobility and balance impairments in this sample, over two-thirds of respondents felt that they were either “as active” or “more active” than their peers and rated their health as “good” to “excellent”. These findings support previous research suggesting seniors’ tendency to rate their health as favourable, despite facts of illness and functional decline. It has been reported that people tend to lower their health expectations as they age (LaRue et al., 1979; Graney & Zimmerman, 1980). However, it is important to note that compared to large scale local (Davis, 1989) and national Canadian studies of community-dwelling seniors (Government of Canada, 1993), a larger proportion of subjects in the current study perceived their health as “fair” or “poor” and rated

themselves to be “less active” than their peers.

The most prevalent mobility problem was “getting in and out of a bath”. This was followed by “going up and down a flight of stairs”, “walking a city block” and “getting in and out of a car”. Over half of the participants were either unable to perform these activities without the assistance of a person or an aid or reported having a lot of difficulties. The comparison of these findings with the previous literature reveals both commonalities and differences. For instance, the findings of the present study are consistent with Lundgren-Lindquist et al.’s (1983) Swedish population study of 79-year-olds, which reported “getting in and out of a bath”, followed by “going up and down stairs” as the most common mobility problems. However, compared to the present study, the proportion of seniors reporting these problems was considerably lower (30% and 20%, respectively). Similarly, in Zimmer and Chappell’s cross-sectional Canadian survey (1994) of a representative sample of 607 seniors with mobility difficulties, the three most common mobility problems were “going up and down stairs” (31%), “walking a city block” (29%), and “getting in and out of a bath” (24%). It appears that the three tasks detailed above are the most problematic mobility activities among community-living older adults. However, the proportion of seniors reporting these problems varies according to the study population, measurement techniques, and definition of impairments used.

c) Patterns of Cane Use: About one-half of the participants reported using a cane, and 13.7% of “cane-users” also used a walker. Over three-fourths of “cane-users” reported using their canes almost every day. As expected, a greater proportion of subjects reported

using their canes outdoors than indoors. This finding is congruent with previous research reporting that the use of mobility aids increases as the nature of the specific environment is farther from home and more public (York , 1989).

Not surprisingly, compared to the general older population, a greater proportion of subjects in the present study were “cane-users”. In the Ottawa-Carleton Seniors’ Health Survey (Davis, 1989), 15% of the community-dwelling seniors, aged 65 and over, reported regular use of canes. The rates increased to 23% for seniors over the age of 75. In the current study, 38% of the participants were regular cane users.

d) Fall Rates: Self-reports of fall history confirm earlier findings that falls are a common occurrence among community-living seniors. In the present study, 42.4% of subjects had at least one fall within the year preceding the study, of whom 64.4% were multiple fallers. The mean fall frequency for this sample was $.93 \pm 1.4$. Considering the measurement of fall history in the present study, these rates are likely an underestimation of the true prevalence of falls within the past year. To improve recall, subjects were asked to report any falls they had since “Thanksgiving of 1995 up to today”. Given that interviews were conducted from July to September 1996, the reported rates reflect falls within the past 9 to 11 months, as opposed to one year.

Nevertheless, a comparison of the findings with the previous large-scale studies of community-living seniors suggests a slightly higher rate of falls in the present study, probably a reflection of a more frail population. Previous research suggests that about one-third of community-living seniors fall each year (see Chapter Two, Table 2.1). However, a higher

rate of 57% was reported in a community study that targeted a high risk population of older adults (Nevitt et al., 1989). The higher rate of falls in the present study could also be a function of a broad definition which included falls, trips and slips. Most studies of falls have adopted more narrow definitions, excluding falls resulting from specific etiologies and/or trips and slips (Campbell, 1989, 1990; Lord et al., 1993; Nevitt et al., 1989; Sorock & Labiner, 1992; Tinetti et al., 1988). The measurement of falls in the current study was based on some recent recommendations for more inclusive and broad definitions (Cumming et al., 1990; Nevitt, 1991). However, it would have been useful to include additional probes to allow for a more precise classification of falls and near fall events.

6.1.2 Comparison of Fallers and Non-Fallers: Seniors who reported a history of falls did not significantly differ from non-fallers with respect to various indicators of frailty, such as age, self-rated health and activity levels, and mobility impairment. These findings are not consistent with past research providing evidence for the associations between mobility and balance impairments, reduced physical activity, and poor self-perceived health with the increased risk of falling (Graafmans et al., 1996; Lord et al., 1993; Nevitt et al., 1989; O'Loughlin et al., 1993; Robbins et al., 1989; Tinetti et al., 1988)(see Tables 2.2 to 2.4). There are several possible explanations for this apparent contradiction. First, the questions on mobility and balance restrictions asked subjects if they had any difficulty performing the tasks without the assistance of any persons or devices. Functional abilities do not necessarily reflect how the person usually performs the activity. It is possible that seniors with more severe mobility impairments had compensated for their deficits by taking proper precautions,

such as using appropriate assistive devices, avoiding high risk activities, or receiving personal assistance, therefore, reducing their chance of falling.

Another possible explanation relates to the fact that falls result from a complex interaction of many intrinsic and extrinsic risk factors, of which deficits in mobility are only one (see Tables 2.2 to 2.4). It is possible that seniors with fewer mobility impairments were at higher risk with respect to other predisposing factors for falls.

Additionally, the data on falls and various health-related variables were obtained by means of self-reports. Inaccuracies inherent in self-reports of health problems and the consequent misclassification of subjects may have compromised the findings. For instance, the inaccuracy of retrospective self-reports of fall history has been well documented (Cummings et al., 1988; Cumming et al., 1990). In addition to the recall bias, threats to reliable reporting of falls include: tendency to under-report health conditions that are attributed to normal aging and do not result in serious symptoms; psychological need to deny falls associated with diminishing competence; and fear of the consequences of being labelled a faller (Edwards, 1993, 1995; Gallagher & Scott, 1995; McVey & studenski, 1988; Nevitt, 1991; Nickens, 1985; Wright, Aizenstein, Vogler, Rowe, & Miller, 1990). Similarly, some cognitive laboratory studies have revealed considerable subjective interpretations of self-reports of health and functional levels (Feinberg, Loftus, & Tanur, 1985; Jobe & Mingay, 1990). For instance, the lack of a relationship between fall history and self-ratings of health may reflect seniors' perceptions of falls as normal events attributed to the aging process, particularly if falls do not result in serious injuries. Therefore, a history of falls may not significantly affect seniors' perceptions of their overall health compared to that of their peers.

6.1.3 Objective One: To Develop Valid and Reliable Measures of the TPB Variables

This research provided some evidence of the validity and reliability of the CCM Instrument developed to measure the constructs of the TPB model as they relate to the use of canes among community-living seniors. As discussed in Chapter Four, face and content validity of the instrument were established by means of qualitative approaches. The results of psychometric testing showed acceptable internal consistency reliability for all subscales (alphas ranged from .72 to .92). Generally, a Cronbach's alpha of .70 or higher is recommended for a reliable scale (Polit, 1996; Streiner, 1993).

Construct validation is an ongoing process and requires the findings of several studies and approaches to tap various aspects of the hypothetical construct (Kline, 1993; Streiner & Norman, 1995). In the current study, some evidence of construct validity of the instrument was provided by: 1) significant associations between various components of the model, according to the theory's predictions; and, 2) the ability of the instrument to discriminate between the two contrasting groups of "cane-users" and "non-users" with respect to all components of the TPB model (Burns & Grove, 1993; Polit, 1996; Streiner & Norman, 1995).

6.1.4 Objective Two: To Determine the Relationships Among Various Components of the TPB Model

Overall, this sample of seniors slightly favoured cane use. Means for most components of the model were in a positive direction, slightly above the scale mid-point of

zero. This reflects a relatively high proportion of regular cane users and should not be generalized to the larger population of older adults with mobility restrictions.

The TPB contends that behavior is a joint function of intention and PBC. Intention, in turn, is determined by the three constructs of attitude, SN, and PBC (Ajzen, 1991). In this study, all associations among various components of the model were highly significant ($p < .0001$), with intention and behavior having the strongest correlations ($r_{pb} = .86$). In turn, attitude, SN, and PBC were all found to have significant correlations with intention. Among the precursor variables, PBC had the weakest correlations with intention and behavior ($r = .42$).

In a comprehensive review of 58 applications of the TPB in health domain, Godin and Kok (in press) reported average correlations of .46 between behavior and intention, and .39 between behavior and PBC. In turn, the correlations between intention and its precursors were .46, .34, and .46 for attitude, SN, and PBC, respectively. The strength of these associations and the relative contribution of each component of the model in explaining intention and behavior varied across behaviors. The findings of the current study suggest that, compared to attitudes and SN, PBC may be a relatively less important construct in explaining variance in cane use behaviors of older adults. Multivariate analyses are needed to determine the unique contribution of each construct to the model.

Despite high correlations between the two measures of intention, a stronger intention to use a cane next winter compared to the intention for next month, suggests the possibility of seasonal differences in cane use practices, with more seniors using canes in winter. Considering the local climate, it is logical that in terms of personal safety and function, more

seniors consider using a cane in winter.

Statistically significant low to moderate correlations among the determinants of intention suggest that these variables may not be completely independent from each other. Attitude represents the sum of all the positive and negative outcomes of the behavior, while subjective norm reflects the expectations of others about the behavior. Finally, PBC represents the difficulties and barriers anticipated in performing the behavior. These constructs appear to reflect similar and interactive beliefs (Liska, 1984; Miniard & Cohen, 1981). Although, previous research has revealed a significant improvement in the prediction of behavior when each determinant is defined and measured separately (Kok, De Vries, Mudde, & Strecher, 1991; Godin & Kok, in press), there is some evidence suggesting that a portion of their joint effect may not be additive (Liska, 1984).

According to the theory, beliefs provide the basis for the formation of attitudes, SN, and PBC (Ajzen, 1991). It is therefore expected to find appreciable correlations between belief-based and more global measures of these constructs. Results of this study confirmed this prediction. The correlations between direct and belief-based measures of each construct were high and ranged from .79 for attitude to .90 for SN scales ($p < .0001$).

Finally, the associations between age and mobility with the TPB variables were examined. Findings revealed that older participants had greater mobility impairments ($r = .32$, $p < .001$). Age and level of mobility, in turn, had statistically significant low to moderate correlations with most components of the TPB model. The exception was the construct of PBC which was not significantly associated with age and mobility difficulties. These findings are congruent with previous research, suggesting increased use of devices with advanced age

and greater functional impairments (Forbes et al., 1993; Giltin et al., in press; Norburn et al., 1995; Sonn & Grimby, 1994; Zimmer & Chappell, 1994) (see Table 2.5). Heightened need for devices may influence seniors' perceptions of the consequences of device use and their acceptability. While seniors with fewer mobility impairments may respond more to the device unconventionality and inconveniences, older adults with greater mobility restrictions may attend more to the functional and safety gains of device use. Similarly, social influences may be more supportive of cane use for older and more frail seniors. On the other hand, this group of seniors may not necessarily be more confident about their ability to use canes, accounting for the lack of statistically significant associations between age and mobility impairment with the construct of PBC.

6.1.5 Objective Three: To Examine Differences Between “Cane-Users” and “Non-Users”

With the exception of age, there were no statistically significant differences between the two groups with respect to various sociodemographic factors. Generally, empirical evidence supporting an association between sociodemographic characteristics (other than age) and the patterns of device use among seniors has been inconclusive (Forbes et al., 1993; Giltin et al., in press; Norburn et al., 1995; Sonn & Grimby, 1994; Zimmer & Chappell, 1994) (see Table 2.5). This may be related to complex interactions between these factors in influencing seniors' perceptions of need, acceptance and access to devices. For instance, living arrangements and social networks can contribute to device use in some conflicting ways. Elderly persons who live alone may be particularly concerned about falling, and

therefore, more motivated to use canes. They may also perceive a greater need for canes in order to maintain their functional independence. On the other hand, as pointed out by Zimmer and Chappell (1994), strong social networks may contribute to device use by providing easier access to information about and reinforcement for proper use. Further research with larger and more representative samples and stronger designs are needed to gain a better understanding of the influences of various sociodemographic variables on seniors' decisions to use canes.

Four hypotheses were tested in this study. First, it was predicted that "cane-users" would report lower functional and health status compared to "non-users". As hypothesized, "cane-users" had significantly greater mobility difficulties and had more negative evaluations of their activity levels compared to their peers. However, there were no statistically significant differences between the two groups with respect to either their self-ratings of health, or their history and frequency of falling.

The absence of statistically significant differences between fall rates among "cane-users" and "non-users" warrants careful interpretation. As discussed earlier, one explanation may be the inaccurate reporting of falls and the resulting misclassification of subjects. Alternatively, it is possible that "cane-users" due to their advanced age and greater mobility and balance impairments were at higher risk for falls, but that the use of canes partially protected them from falls, accounting for comparable falling frequencies among the two groups. In support of this argument is the finding that over 90% of "cane-users" in this study felt that their canes prevented them from falling and/or slipping on ice. Although the benefits of canes in improving postural stability, mobility and feelings of safety have been well

documented (Axtell & Yasuda, 1993; Deathe et al., 1993; Edwards & Aminzadeh, 1996), as yet, there have been no studies linking the use of canes to a reduction in the incidence of falls among seniors. More research is needed to better understand the associations between mobility impairment, falling frequency, and cane use.

The three remaining hypotheses of this study on the differences between “cane-user” and “non-users” with respect to the TPB variables were supported by the results. That is, compared to seniors who did not use a cane, “cane-users” reported more positive attitudes towards using a cane, perceived greater social expectations to use a cane, and anticipated fewer obstacles in successfully using a cane. With the exception of the PBC scale, for all other precursors of intention, the mean scores of “non-users” were below the scale midpoint of zero, suggesting unfavourable perceptions. These findings indicate that although “non-users” held negative attitudes towards canes and perceived negative social influences, they anticipated relatively fewer pragmatic barriers in using canes.

To adjust for differences between “cane-users” and “non-users”, the sample was stratified according to age and levels of mobility impairment. The results revealed statistically significant differences in mean attitude, SN, and PBC values between “cane-users” and “non-users” within each strata. That is, regardless of age and mobility level, “cane-users” held significantly more positive perceptions towards cane use than “non-users”.

According to the theory, the ultimate determinants of any behavior are the underlying outcome, normative and control beliefs (Ajzen, 1988). A closer examination of these beliefs revealed both similarities and differences between “cane-users” and “non-users”. Overall, canes were viewed positively by the users. They were associated with improvements in

function and ease in performing mobility tasks, enhanced feelings of safety, and prevention of falls by a vast majority of “cane-users”. However, a significant minority associated cane use with undesirable pragmatic and psychosocial consequences, such as “interference with daily activities”, “giving up independence”, “feeling embarrassed”, “feeling old”, “looking handicapped”, and “hurt pride”. As expected, a higher proportion of “non-users” anticipated these negative outcomes. Interestingly, over half of “non-users” also expected some functional and safety gains from using canes.

These findings are in agreement with the qualitative studies revealing the dual consequences of being a device user for seniors. Mobility aids have been reported to generate deep feelings of ambivalence in prospective and current users. On one hand, using mobility devices enables the safe performance of fundamental life tasks, preserving a sense of independence. On the other hand, the need for mobility aids and the many emotional, behavioral and pragmatic adaptations required generate feelings of loss and personal disruption (Giltin, 1995a; Edwards & Aminzadeh, 1996). It is possible that seniors who decide to use a cane respond more to the functional and safety benefits of canes while non-users react primarily to negative psycho-social and pragmatic outcomes. Multivariate analyses are needed to determine the relative importance of each attitudinal dimension in determining seniors’ decisions to accept or reject canes.

As expected, “cane-users” tended to perceive greater social pressures for using a cane, with over 70% believing that their important social referents expected them to use a cane compared to less than 20% of “non-users”. Participants in this study were not equally influenced by the four key referents in their social network. Physicians, followed by other

health care workers' were the most influential referents, with 70% and 44% of subjects reporting high motivation to comply with their recommendations. The proportion of seniors who reported great motivation to comply with the advice of their family and friends dropped to as low as 13% and 2%, respectively. Similar findings were reported in the Ottawa-Carleton Seniors' Health Survey (Davis, 1989). In this survey, for advice about health matters, 85% of seniors reported using professionals, 12% used family, and less than 2% sought the advice of their friends and neighbours.

It is important to note that normative influences are not limited to overt behavioral prescriptions. Peer and family influences may exert their impact via more indirect routes, such as through modelling and stigmatized social reactions (De Vries, Backbier, Kok, & Kijkstra, 1995; Grube et al., 1986; Liska, 1984). The latter, in turn, may influence seniors' attitudes towards cane use. In Edwards and Aminzadeh's qualitative study (1996) of 30 community-dwelling seniors in Ottawa-Carleton, participants identified fear of stigma and negative social reactions as powerful barriers to cane use among seniors.

A significant proportion of participants in this study reported that difficulties in performing daily activities with a cane would discourage them from using it. The proportions were lower among "cane-users" than "non-users". The pragmatic difficulties associated with cane use have been cited as important reasons for device rejection and/or abandonment (Edwards & Aminzadeh, 1996; Mann et al., 1995).

The differences between "cane-users" and "non-users" with respect to their perceptions of their abilities to successfully use a cane may be in part influenced by their past behavior (Ajzen & Timko, 1986; Kok et al., 1991). It is likely that through regular

performance of the behavior, users develop the skills needed to overcome some of the difficulties, accounting for their greater confidence. The positive effect of performance mastery on the individual's expectations of self-efficacy has been proposed by other theorists (Bandura, 1977, 1982).

Contrary to the past literature on the barriers to the use of assistive devices (Edwards & Aminzadeh, 1996; Mann et al., 1993), over 90% of the subjects in the current study did not view "cost" and "lack of knowledge about how to obtain the right cane", as important barriers to use. This may be because canes are relatively inexpensive and widely available devices.

6.2 Study Limitations

The results of this study should be interpreted with caution, because it is a preliminary investigation and subject to several design, measurement, and analytic limitations.

6.2.1 Design Limitations: The major design limitations of this study pertain to non-probability sampling techniques and the cross-sectional nature of the investigation. Subjects of this study differed from the general older population on some key sociodemographic and cane use attributes, probably a reflection of the study's inclusion criteria. However, given the selection biases of non-probability sampling techniques and the possibility of a non-response bias of "refusers" (see 5.1 Response Rate), the findings of this study should not be generalized beyond the participants. Further research is needed to assess the extent to which

the present findings hold for more representative samples of seniors.

In this study, significant associations were detected among various constructs of the TPB model. However, correlations among variables do not establish causation. Reasonable grounds to claim causal relationships exist if there are significant correlations between the variables, an accepted theory predicts the causal relationships between the independent and dependent variables, and the changes in the independent variables can be shown to precede a change in the dependent variable (Polit & Hungler, 1991; Davis, 1985; Plotnikoff, 1994). Although the first two conditions were met in this study, the cross-sectional design of this study precluded the ability to verify the direction of influence. Ideally, prospective designs are needed to determine the extent to which attitudes, SN, and PBC actually precede cane use intentions and behaviors.

Another limitation of this type of design is that subjects differ in their past experiences with the behavior. In the current study, while the responses of “cane-users” reflected their beliefs about continuing their present behavior, for “non-users” they represented beliefs about engaging in a new behavior. It is possible that some of the variance in the responses were related to these differences.

Finally, the lack of consistency in the data collection techniques, although necessary and useful in ensuring the inclusion of diverse types of seniors, may be a threat to the internal validity of the findings. It is possible that the method of data collection (self- versus interviewer-administered techniques) and the settings where data were collected (home versus community settings) had an impact on the subjects’ responses.

6.2.2 Measurement Limitations: All health-related measures in this study were based on self-reports of subjects. Although it is common practice to use self-reports in health surveys, these reports are subjective and have raised concerns about the accuracy of the information (Guralnik, Branch, Cummings, & Curb, 1989; Cumming et al., 1990; Feinberg et al., 1985; Jobe & Mingay, 1990). On the other hand, it has been argued that the decision to use mobility aids may be more closely related to the individual's perceptions of their functional limitations than the objective measures of physical abilities per se (Myers, Powell, Maki, Holiday, Brawley, & Sherk, 1996). Moreover, there is growing evidence challenging greater utility and psychometric superiority of the performance measures of functional status compared to the self-reports of seniors (Myers, Holiday, Harvey, & Hutchinson, 1993). Ideally, for a more comprehensive and accurate assessment, a combination of subjective reports and more objective measures of health and functional levels should be considered.

The primary outcomes of this study were assessed by means of a newly developed instrument whose psychometric evaluation did not include test-retest reliability to establish temporal stability and factor analysis for construct validation. Ideally, to establish test-retest reliability, the instrument should have been administered on two separate occasions by some interval of time (Streiner & Norman, 1995). Additionally, psychometric testing of a newly developed instrument should include factor analysis. By examining the interrelationships among a large number of items in an instrument and identifying the clusters of items that load most closely together, factor analysis confirms the accuracy of theoretically developed constructs. This technique requires a larger sample size (Burns & Grove, 1993; Polit, 1996).

6.2.3 Analytic Limitations: In this study, multiple bivariate analyses were performed. One consequence of performing multiple analyses is an increased probability of committing a type I error (i.e., rejecting a true null hypothesis). To minimize this problem, Bonferroni's approach was used for the main analyses to correct for multiple testing and preserve the overall alpha of .05 (Polit, 1996).

Moreover, the level of analysis conducted limited the interpretability of the data. For instance, the limitations of bivariate analyses precluded the possibility of establishing the relative contribution of each component of the model in explaining variance in cane use intentions and behavior. Ideally, to test a causal model, path-analytic techniques should be employed. This technique enables the researcher to verify whether the specific associations between the independent variables and behavior claimed by the theory match the observed relationships. Using multiple regression analysis, this approach allows simultaneous comparisons of the relative contribution of each construct in predicting intentions and behaviors (Burns & Grove, 1993).

Despite these limitations, the findings of this study bear important implications for the TPB model, clinical practice and future research. These implications are discussed in the next section.

6.3 Implications of the Findings

6.3.1 Implications For Theory: This study provides evidence of the utility of the theory in its application to understanding seniors' cane use behaviors. To the author's knowledge, there has been no other published research demonstrating the applicability of the

TPB model to the use of assistive devices. Furthermore, to date there have been very few applications of the model to studies of older adults.

One observation made in applying the model to this new behavioral domain carry interesting implications for the theory³. In this study “cane-users” and “non-users” were treated as two distinct groups. However, the comments made by seniors during the interviews suggest that more likely the participants were at different points on a continuum. For instance, a few “non-users” appeared to be in a transitional stage, seriously considering the use of a cane. These subjects expressed ambivalent feelings about the consequences of cane use. At the same time, many “cane-users” who expressed firm positive attitudes towards canes stated that they had held different beliefs when they first started using canes. These comments suggest that in the process of deciding to use a cane, seniors may go through different stages of change in their perceptions and attitudes. Moving through these stages, seniors may gradually become more convinced of the benefits of canes and develop skills to cope with the inconveniences.

This observation is consistent with the assumption of the transtheoretical model suggesting that in the process of behavioral change people go through several stages, moving from precontemplation to contemplation, preparation, action, and maintenance with the possibility of relapse (Prochaska, 1984; Prochaska, DiClemente, & Norcross, 1992). The integration of the TPB model with the transtheoretical model has been successful in understanding exercise behaviors of older adults (Courneya, 1995) and smoking behaviors

³ The reader is referred to Chapter Four for a detailed discussion of the measurement issues.

of pregnant women (De Vries & Backbier, 1994). It is possible that such integration would provide a better understanding of cane use decisions of seniors.

This observation is congruent with previous research suggesting the possibility of reciprocal effects of behavior and its precursors. It has been argued that the actual performance of behavior may lead to a feedback process that in turn influences attitudes and perceptions (Kok et al., 1991; Liska, 1984). To date most research on the TPB model has focused on the effect of attitude, SN, and PBC on behavior. Future work on this theory needs to address the possible interactive effects of behavior and its determinants.

6.3.2 Implications For Clinical Practice: Some recent fall prevention campaigns in Ottawa-Carleton region have been aimed at reducing the incidence of falls by encouraging seniors to use appropriate assistive devices for safe mobility and transfer⁴. Community health nurses have played key roles in the planning, implementation, and evaluation of these programs. The aim of this study was to explore the cognitive determinants of cane use among community-living seniors to provide community health nurses with some direction for the design of more effective theory-based interventions. The clinical implications of the findings are discussed below.

The findings of this study support the importance of attitudes, SN, and PBC, in influencing seniors' decisions to accept or reject canes. Based on the results, inducing positive personal and social attitudes towards cane use, professional screening and

⁴This includes "Safe and Active in Winter" campaign orchestrated by three Community Health Centres across region; and ongoing community-wide educational activities of Ottawa-Carleton Health Department, Seniors' Safety Program, and Ottawa-Carleton Fall Prevention Coalition.

recommendations for safe mobility, and individualized cane use training programs are all theoretically sound pathways to increase the use of canes among community-living seniors.

Ajzen and Fishbein (1980) contend that to produce behavioral change, it is necessary to change the primary beliefs underlying perceptions and attitudes. The present study has contributed to our understanding of the salient beliefs relevant to cane use. Based on the findings, interventions to increase the use of canes among seniors should attempt to: change expectations that cane use is likely to produce undesirable personal, social, and pragmatic outcomes; and, reinforce safety and functional gains. In the process of deciding to use a cane, seniors' perceptions of the expectations of key social referents seem to be particularly important in facilitating or impeding the process.

These beliefs are amenable to change via community educational campaigns and individualized interventions. The educational interventions should not only target seniors and the public, but also health care practitioners who provide services to seniors. Indeed, the findings of this study highlight the importance of health providers' recommendations in influencing seniors' decisions. It has been argued that an important reason for the underutilization of assistive devices among the older population is that except in disease states requiring rehabilitation, seniors are rarely evaluated regarding their need for devices (Karpman, 1992).

The complex and interacting health needs of community-living elderly persons often require the involvement of different disciplines and services. Within this interdisciplinary context, nurses, by virtue of the breadth of their practice and the recurring access to the clients, often play a vital role in identifying the needs and coordinating the required services.

As direct care providers and case managers, community health nurses are placed in an ideal position to take the lead in ensuring safe mobility for seniors. This can be achieved by an early detection of the need for mobility aids, prescription (either directly or in collaboration with other disciplines), and continuing follow-up on the effective use of these devices. Thus, it is critical that the evaluation of elderly clients for a history of falls, mobility and balance impairments, and the need for assistive devices becomes an integral part of routine nursing assessments.

The findings of this study also emphasize the role of physicians as one of the most influential members of seniors' social networks with respect to health advice. It is reported that over 25% of community-dwelling seniors consult their physicians six or more times a year (O'Loughlin, 1991). Yet most physicians direct little or no attention to elders' initial needs for mobility devices, nor provide continued follow-up to evaluate proper use (Mann et al., 1995). To effectively respond to the seniors' safety needs, health professionals require expanded training on the benefits of assistive devices, the types of devices available, and renewed assessment and training approaches.

The findings of this study clearly highlight the importance of an individualized and holistic approach to device screening and training. In addition to evaluating the objective need for canes, nurses should assess and individually address attitudinal, normative and control barriers to cane use. This is compatible with the philosophies of client-centred and holistic nursing practice. The CCM Instrument developed in this study, can be used to guide the assessment and training process. The instrument can help nurses identify seniors' levels of emotional readiness and their focal concerns. It can also be used to guide the interventions

to assist seniors in obtaining the best possible functional and psychosocial outcomes and to evaluate the effects of these interventions. This approach may result in more cost-effective nursing strategies to ensure the proper use of devices and enhance both practitioners' and clients' satisfaction with care.

Although for research purposes it may be useful to employ both belief-based and more global measures of attitude, SN, and PBC, the constraints of the practice settings may necessitate the use of shorter versions of the instrument. Thus, depending on whether the prediction of intention and behavior or the underlying beliefs are more important, shorter versions of the tool could be used, omitting the indirect or direct measures, respectively.

Programs to increase the use of canes among seniors with mobility impairments need to overcome social stigmas attached to these devices. For example, canes should be presented in a more positive way, without undue associations with disability. As recommended by Childress (1986), a nonmedical, nondisability approach should be used to encourage assistive device use among the elderly persons. Social marketing strategies are needed to portray more positive images of canes as tools for safe and independent living. One possible strategy is peer testimony to emphasize the positive experiences and potential physical and social gains of cane use. Additionally, the design of more attractive and convenient canes may enhance the image of these devices. It has been argued that the modernization of walkers with bright colours, seats and shopping baskets has reduced the stigma associated with walker use (Mary Brophy, personal contact). A similar initiative currently underway in Ottawa-Carleton is the promotion of fashion cane covers and handles (Rosaline Postner, personal contact). These interventions call for close collaboration of

community health nurses with a range of disciplines and sectors such as other service providers, seniors and their advocacy groups, designers, manufacturers, and retailers.

To conclude, although the focus of this study was on community-living seniors, the findings may have implications for nursing and multidisciplinary interventions in other service delivery settings, such as rehabilitation and institutionalized care. Replication studies are needed to test the utility of the instrument for these populations.

6.3.3 Implications For Future Research: This is one of the first studies that has applied a theoretical model to test cognitive determinants of device use among seniors. The findings of this investigation provide some direction for future research. For instance, multivariate analyses of the current data base could test the TPB model to: a) determine the relative contribution of each component to the prediction of cane use intentions and behavior, and b) identify the most important beliefs underlying attitudes, SN, and PBC.

Further psychometric testing of the newly developed instrument is important to evaluate its validity and reliability in larger and more representative samples of seniors: 1) factor analysis can further establish construct validity of the instrument; 2) a test-retest research design is needed to address instrument stability; and, 3) longitudinal designs are required to evaluate predictive validity of the scale. A prospective investigation also provides the opportunity to test the direction of causation as predicted by the model. Furthermore, the replication of the measures in culturally diverse populations, other service delivery settings, and with other types of devices (e.g., bathroom aids) will strengthen the generalizability of the findings.

Future applications of the model should attempt to shorten the instrument without compromising its reliability and validity. With more testing of the CCM Instrument in larger and more representative samples, cut-points could be established to help identify seniors at high risk for cane rejection and/or abandonment.

Devices are given different evaluations according to the social and physical context of their use (Brook, 1991; Giltin, 1995a). Ajzen and Fishbein (1980) maintain that the ability of the model to predict behaviors increases, as the degree of correspondence between behaviors and the components of the model with respect to the four elements of action, target, time, and context increases: i.e., to use (action) a cane (target) within the next eight months (time) indoors or outdoors (context). In this study, due to the already taxing length of the instrument in its early stages of development, distinctions between indoor versus outdoor, and private versus public use of canes were not made. Future research could attempt to differentiate the context of use.

Finally, of primary importance is the need for further research to systematically evaluate the effect of cane use on reducing the risk of falls and fall related injuries. Well controlled longitudinal studies are needed in which falling frequency is assessed before and after cane prescriptions.

6.4 Conclusion

This cross-sectional descriptive comparative study of a convenience sample of 106 community-living seniors in Ottawa-Carleton was an introductory step in research on cognitive determinants of cane use among seniors. The results revealed that “cane-users”

were significantly older, reported greater mobility difficulties, and had more negative evaluations of their activity levels compared to “non-users”. However, there were no statistically significant differences between the two groups with respect to other sociodemographic characteristics, fall history and frequency, and self-rated health.

As hypothesized, the two groups significantly differed with respect to all components of the TPB model: “cane-users” reported more positive attitudes towards using a cane, perceived greater social pressures to use a cane, and anticipated fewer difficulties in incorporating the device into their daily activities. After stratifying the sample by age and level of mobility, the group differences regarding the TPB measures remained statistically significant. This study has expanded the current knowledge on device utilization among seniors and can be used to direct future research on this topic. The findings provide some direction for the design of theory-based fall prevention interventions to enhance the acceptance and effective use of mobility aids.

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APPENDIX A:
SCREENING TOOL

SCREENING TOOL

ID number:	
Date: ___/___/___	
Place:	
Method of screening: 1. in-person	2. on telephone

My name is Faranak Aminzadeh. I am a registered nurse working on my thesis for the Master of Science in Nursing Program at the university of Ottawa. I am doing a survey to learn about seniors' opinions on using a cane. This information will help us design better programs for seniors who need a cane. I would like to ask you a few questions to see whether you can be in this study:

	ELIGIBLE	INELIGIBLE
Gender	<input type="checkbox"/> M <input type="checkbox"/> F	
How old are you? ----	<input type="checkbox"/> ≥ 65	<input type="checkbox"/> < 65
Do you live in Ottawa-Carleton?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you live in a nursing home?	<input type="checkbox"/> No	<input type="checkbox"/> Yes
Do you use a walker to help you move about?	<input type="checkbox"/> No	
IF YES, do you use a cane?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Many seniors have difficulty with some daily activities. I will read a list of these activities for you. I would like you to tell me whether you have any difficulties with these activities. Please imagine doing these activities **WITHOUT ANY HELP FROM ANYONE OR USE OF ANY AIDS**:

- a. Walking a city block?-----
- b. Walking up and down a flight of stairs (about 12 steps)? -----
- c. Getting in and out of a bath?-----
- d. Getting in and out of a car? -----

IF YES: what sort of difficulty? would you say you have a little difficulty, a lot of difficulty, or cannot do them on your own?

IF NO: would you say you have no difficulty? Do you use any special equipment or aids? Is this all the time? Do you receive help from another person? How much difficulty would you have if you were not receiving any help?

Score difficulty as follows:

0. No difficulty
1. A little difficulty
2. A lot of difficulty
3. Cannot do it

Total mobility score:	<input type="checkbox"/> LM	<input type="checkbox"/> HM
a. IF SCORE $X < 2$ - HIGH MOBILITY		
b. IF SCORE $X \geq 2$ - LOW MOBILITY		

Display of cognitive impairment?	<input type="checkbox"/> No	<input type="checkbox"/> Yes
ELIGIBLE?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
CONSENTS TO PARTICIPATE?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Reasons for refusal:		

APPENDIX B:
LETTERS OF AGENCY APPROVAL



30 May 1996

Ms. Faranak Aminzadeh
M.Sc.N. Candidate
University of Ottawa
School of Nursing
451 Smyth Road
Ottawa, Ontario
K1H 8M5

Dear Ms. Aminzadeh:

RE: Project #96-02 -- Perceptions, attitudes and subjective norms influencing seniors' decisions to accept or reject mobility aids in fall prevention: an application of Ajzen's theory of planned behaviour.

I am pleased to be able to support the implementation of your proposed research project. In light of the positive review by Dr. Stewart, Director of Research, and the approval of the RMOC Research Ethics Committee, our management team will be able to facilitate your access to project participants.

Good luck in the next phase of your work. I look forward to reviewing the research results.

Yours sincerely,

Maureen Murphy

cc: M. O'Hagan
N. Porteous
G. Roberge



Regional Municipality of Ottawa-Carleton
Regional Municipality of Ottawa-Carleton
Health Department
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1223 Michael Street
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July 12, 1996

Mrs. Faranak Aminzadeh
M.Sc.N Candidate, University of Ottawa
1214-1551 Riverside Drive
Ottawa, Ontario
K1G 4B5

Dear Faranak Aminzadeh:

I was pleased to learn about your study on perceptions, attitudes, and subjective norms influencing seniors' decisions to accept or reject mobility aids in fall prevention. The Regional Municipality of Ottawa-Carleton Home Care Program would be happy to cooperate in the recruitment of subjects for your study. We would also be most interested in receiving a copy of your results.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Cathy Danbrook'. The signature is fluid and cursive.

Cathy Danbrook
Director
Home Care Program

CD:sj



July 12, 1996

55 Eccles Street
Ottawa, Ont K1R 6S3

Tel:
General (613) 238-8210
Health (613) 238-1220

Fax (613) 238-7595

At 55 Eccles Street:

Administration

Health Services

Social Services

Community Services

Seniors Services

Supporting:

Dalhousie Food
Action Group

Aids Housing
Group of Ottawa

Tungasuvvirigat Inuit

Ms. Faranak Aminzadeh
M.Sc.N Candidate, University of Ottawa
1214-1551 Riverside Drive
Ottawa, Ontario
K1G 4B5

Dear Ms. Aminzadeh:

We were very pleased to learn about your decision to study the perceptions, attitudes and subjective norms influencing seniors' decisions to accept or reject aids in fall prevention. Somerset West Community Health Centres' health outreach nurses would be happy to cooperate in the recruitment of subjects for your study.

We would be very interested in receiving a copy of your results.

Yours Sincerely,

Dona Bowers, MD, CCFP,
Program Manager of Health Services

DB.qh

APPENDIX C:
LETTER OF INFORMATION FOR KEY INFORMANTS

LETTER OF INFORMATION FOR KEY INFORMANTS

My name is Faranak Aminzadeh. I am a registered nurse currently working on my thesis for the Master of Science in Nursing Program at the university of Ottawa. My thesis advisor is Dr. Nancy Edwards who is an expert in the area of fall prevention. I am conducting a survey to learn about seniors' perceptions and attitudes towards cane use in fall prevention. It is anticipated that the results of this study will assist in designing more appropriate fall prevention programs for seniors.

I am asking for your assistance to recruit seniors that meet the following criteria: age 65 or older; community resident of Ottawa-Carleton region; read or speak English; no apparent cognitive impairment; ambulatory with or without the use of a cane (seniors who are permanent walker users are excluded).

Participation involves completing a questionnaire that will take about 30 minutes. Seniors will be asked questions about their opinions on cane use, their health and functional status and their sociodemographic background. The questionnaire could be answered by seniors with or without the help of an interviewer. I can mail the questionnaire to the seniors or arrange for an interview at a time and place convenient to them.

Participation in this study is voluntary. Seniors may refuse to participate, refuse to answer any questions or withdraw from the study at any time. There are no risks associated with participation in this study. For subjects' protection this study has been reviewed by Ottawa-Carleton Health Department Research Ethics Committee. All information will be kept confidential. Seniors' names will not be recorded with their responses or identified in any way. The information collected will not be used for any purposes other than research.

What I need you to do:

- 1. Contact eligible seniors and inform them about the study.**
- 2. Obtain their permission to release their names and phone numbers to me.**
- 3. Call me with the names and phone numbers of interested seniors.**
- 4. I will call interested seniors to provide them with more information and assess their eligibility.**

If you have any further questions or concerns about this study, you can contact: researcher, Faranak Aminzadeh, (xxx) xxx-xxxx; study advisor, Dr. Nancy Edwards, (xxx) xxx-xxxx (ext. xxxx); or chair of the Ottawa-Carleton Health Department Research Ethics Committee, Reuven P. Bulka (xxx) xxx-xxxx (ext. xxxx).

THANKS FOR YOUR COLLABORATION.

APPENDIX D:
LETTER OF INFORMATION FOR SENIORS⁵

⁵ The original letter was in large print.



Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé
École des sciences infirmières

Faculty of Health Sciences
School of Nursing

WHAT YOU MIGHT WANT TO KNOW ABOUT THE SENIORS' CANE-USE SURVEY

What is this all about?

My name is Faranak Aminzadeh. I am a registered nurse working on my thesis for the Master of Science in Nursing Program at the University of Ottawa. I am doing a survey to learn about seniors' opinions on using a cane. This information will help us design better programs for seniors who need a cane.

I am inviting you to participate in this study. Your participation is voluntary. You may refuse to participate or refuse to answer any questions. You may also stop your participation from the study at any time. Whatever your decision, the services you receive at _____ will not be affected.

What do I need to do?

If you agree to take part in this study, you will be asked a few questions. The questions are about your opinion on using a cane, your ability to do things, and your background. This will take about 30 minutes of your time. I will read the questions to you and record your answers. You may also choose to complete the questionnaire yourself.

What good/harm will this do me?

There is no risk involved in your participation in this study. For your protection this study has been reviewed by the Ottawa-Carleton Health Department Research Ethics Committee. Your participation may have no benefits to you, but this information will be used to improve programs for other seniors.

I don't need a cane:

We are interested in learning about the opinions and experiences of **ALL SENIORS**. The participation of seniors who do not need to use a cane is important.

I don't know much about this topic:

There are no right or wrong answers to the questions. As I said, we are interested to learn about your ideas and experiences.

Is this confidential?

All information is confidential. Your name will not be recorded with your answers. If the results of this study are published, only information from the group will appear.

If I have more questions who do I call?

If you have any questions or concerns about this study, you can call myself (Faranak Aminzadeh, the investigator). You can also call my advisor (Dr. Nancy Edwards) or chair of the Ottawa-Carleton Health Department Research Ethics Committee (Reuven P. Bulka). Please see the numbers listed below:

Researcher: Faranak Aminzadeh, (xxx) xxx-xxxx

Study advisor: Dr. Nancy Edwards, (xxx) xxx-xxxx (ext. xxxx)

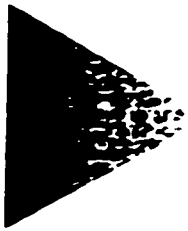
Chair, Ottawa-Carleton Health Department Research Ethics Committee (Reuven P. Bulka), (xxx) xxx-xxxx (ext. xxxx)

Can I get a copy of the results?

Yes, I would be glad to send it to you. If you want a copy of the results, please give me your telephone number and address. I hope to have the results ready in about 6-8 months.

THANKS FOR YOUR HELP

APPENDIX E:
LETTER OF FUNDING SUPPORT



RNAO FOUNDATION

Registered Nurses Association
of Ontario Foundation

Fondation de l'Association des infirmières
et infirmiers autorisés de l'Ontario

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September 6, 1996

Ms. Faranak Aminzadeh,
1214-1551 Riverside Drive,
Ottawa, Ontario
K1G 4B5

Dear Farah,

I am pleased to be able to notify you that your submission for funding for your research study "Attitudes, Subjective Norms and Perceptions Influencing Senior's Decisions to Accept or Reject Mobility Aids in Fall Prevention" has been awarded support from the RNAO Foundation.

You have been selected to receive the Kay Harrison Research Award in the amount of \$1000.00.

Please complete and sign the enclosed agreement and forward it to the RNAOF as soon as possible. Address the envelope to my attention. On receipt of the agreement, we will forward your cheque to you.

I would like to congratulate you on your success and to wish you the best in your research activities.

Sincerely,

Best regards,

Kathleen MacMillan, Chair
Scholarships and Awards Committee.

APPENDIX F:
LETTER OF ETHICAL APPROVAL

Regional Municipality of Ottawa-Carleton
Ottawa-Carleton Health Department
495 Richmond Road
Ottawa, Ontario K2A 4A4

Research Ethics Committee
Tel. (613) 724-4122 extension 3750
Fax. (613) 724-4191



Municipalité régionale d'Ottawa-Carleton
Service de Santé d'Ottawa-Carleton
495, chemin Richmond
Ottawa (Ontario) K2A 4A4

Comité d'évaluation déontologique de recherche
Tél. (613) 724-4122 extension 3750
Télécopieur (613) 724-4191

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27 May 1996

Faranak Aminzadeh
M.Sc. N. Student
University of Ottawa
School of Nursing
451 Smyth Road
Ottawa, Ontario
K1H 8M5

RE: Project # 96-02 — *Perceptions, attitudes and subjective norms influencing seniors' decisions to accept or reject mobility aids in fall prevention: an application of Ajzen's theory of planned behaviour*

Dear Faranak,

The Ottawa-Carleton Health Department Research Ethics Committee has deemed project 96-02 ethically acceptable.

The Committee requires a request for a renewal of ethical approval by October 31st of each year that the project is active. Ethical approval will be withdrawn if the Committee does not receive this report by October 31st. An end of project report is also required. Please refer to the Research Ethics Committee's Terms of Reference and Procedures for copies of these forms.

Sincerely,

A handwritten signature in black ink, appearing to read "R. Bulka".

Rabbi Reuven Bulka
Chair

APPENDIX G:
CONSENT FORM FOR THE MAIN SURVEY⁶

⁶ The original form was in large print.



Université d'Ottawa • University of Ottawa

Façulté des sciences de la santé
Ecole des sciences infirmières

Faculty of Health Sciences
School of Nursing

Consent Form Seniors' Cane-use Survey

What is this all about?

My name is Faranak Aminzadeh. I am a registered nurse working on my thesis for the Master of Science in Nursing Program at the University of Ottawa. I am doing a survey to learn about seniors' opinions on using a cane. This information will help us design better programs for seniors who need a cane.

I am inviting you to participate in this study. Your participation is voluntary. You may refuse to participate or refuse to answer any questions. You may also stop your participation from the study at any time. Whatever your decision, the services you receive at _____ will not be affected.

What do I need to do?

If you agree to take part in this study, you will be asked a few questions. The questions are about your opinion on using a cane, your ability to do things, and your background. This will take about 30 minutes of your time. I will read the questions to you and record your answers. You may also choose to complete the questionnaire yourself.

What good/harm will this do me?

There is no risk involved in your participation in this study. For your protection this study has been reviewed by the Ottawa-Carleton Health Department Research Ethics Committee. Your participation may have no benefits to you, but this information will be used to improve programs for other seniors.

I don't need a cane:

We are interested in learning about the opinions of all seniors. The participation of seniors who do not need to use a cane is important.

I don't know much about this topic:

There are no right or wrong answers to the questions. As I said, we are

interested to learn about your ideas and experiences.

Is this confidential?

All information is confidential. Your name will not be recorded with your answers. If the results of this study are published, only information from the group will appear.

I don't have time for an interview right now:

I can meet with you at a time and place convenient to you. You may also take the questionnaire home. If you choose to take the questionnaire home, I would ask you to give me your telephone number to call you later and check if you have any questions. I will also give you a postage-paid envelope to return the completed questionnaire.

If I have more questions who do I call?

If you have any questions or concerns about this study, you can call myself (Faranak Aminzadeh, the investigator). You can also call my advisor (Dr. Nancy Edwards) or chair of the Ottawa-Carleton Health Department Research Ethics Committee (Reuven P. Bulka). Please see the numbers listed below:

Researcher: Faranak Aminzadeh, (xxx) xxx-xxxx

Study advisor: Dr. Nancy Edwards, (xxx) xxx-xxxx (ext. xxxx)

Chair, Ottawa-Carleton Health Department Research Ethics Committee: Reuven P. Bulka, (xxx) xxx-xxxx (ext. xxxx)

Can I get a copy of the results?

Yes, I would be glad to send it to you. If you want a copy of the results, please give me your telephone number and address. I hope to have the results ready in about 6-8 months.

This is to certify that _____ has received a copy of this consent form and the content of the consent form has been reviewed with the respondent. The respondent has provided verbal consent to participate in the study.

Date:

Place:

Time:

Interviewer's Signature:

APPENDIX H:
CONSENT FORM FOR THE PILOT STUDY⁷

⁷ The original form was in large print.



Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé
École des sciences infirmières

Faculty of Health Sciences
School of Nursing

Consent Form Seniors' Cane-use Survey (pilot study)

What is this all about?

My name is Faranak Aminzadeh. I am a registered nurse working on my thesis for the Master of Science in Nursing Program at the University of Ottawa. I am doing a survey to learn about seniors' opinions on using a cane. This information will help us design better programs for seniors who need a cane.

I am inviting you to participate in the pilot study for this survey. The purpose of the pilot study is to test the questions with a small group of seniors and receive their suggestions on how to improve the questionnaire. Your participation is voluntary. You may refuse to participate or refuse to answer any questions. You may also stop your participation from the study at any time. Whatever your decision, the services you receive at _____ will not be affected.

What do I need to do?

If you agree to take part in this pilot study, I will arrange to meet with you at a time and place convenient to you. You will be asked a few questions on your opinion about using a cane, your ability to do things, and your background. I will read the questions to you and record your answers. You may also choose to complete the questionnaire yourself. After completing the questionnaire, you will be asked to talk through some of the questions. I will also ask for any suggestions you might have to change the wording of the questions. This will take about an hour of your time.

What good/harm will this do me?

There is no risk involved in your participation in this study. For your protection this study has been reviewed by the Ottawa-Carleton Health Department Research Ethics Committee. Your participation may have no benefits to you, but this information will be used to improve programs for other seniors.

I don't need a cane

We are interested in learning about the opinions of **ALL SENIORS**. The participation of seniors who do not need to use a cane is important.

I don't know much about this topic

There are no right or wrong answers to the questions. As I said, we are interested to learn about your ideas and experiences.

Is this confidential?

All information is confidential. Your name will not be recorded with your answers. If the results of this study are published, only information from the group will appear.

If I have more questions who do I call?

If you have any questions or concerns about this study, you can call myself (Faranak Aminzadeh, the investigator). You can also call my advisor (Dr. Nancy Edwards) or chair of the Ottawa-Carleton Health Department Research Ethics Committee (Reuven P. Bulka). Please see the numbers listed below:

Researcher: Faranak Aminzadeh, (xxx) xxx-xxxx

Study advisor: Dr. Nancy Edwards, (xxx) xxx-xxxx (ext. xxxx)

Chair, Ottawa-Carleton Health Department Research Ethics Committee (Reuven P. Bulka), (xxx) xxx-xxxx (ext. xxxx).

Can I get a copy of the results?

Yes, I would be glad to send it to you. If you want a copy of the results, please give me your telephone number and address. I hope to have the results ready in about 10-12 months.

This is to certify that _____ has received a copy of this consent form and the content of the consent form has been reviewed with the respondent. The respondent has provided verbal consent to participate in the pilot study.

Date:

Place:

Time:

Interviewer's Signature:

APPENDIX I⁸:

SENIORS' CANE-USE SURVEY QUESTIONNAIRE

**OFFICE USE ONLY:**ID Number: Date questionnaire administered\distributed:
DD MM YYDate questionnaire returned:
DD MM YY

Method questionnaire administered:

1. Self-administered: supervised
2. Self-administered: unsupervised
3. Interviewer-administered

Name of interviewer:

Place questionnaire administered:

1. Respondent's home
2. Other community settings (specify):

Time started (24 hr clock): Time finished (24 hr clock):

⁸ The original questionnaire was in large print and legal size paper.

INSTRUCTIONS

For the following questions, please **CHECK the box** [✓] that matches your answer. Check only one box for each question.

Example:
Cold winter is:

very bad bad neither good very good

(If you check the first box, like above, it means you believe cold winter is **very bad**.)

Please read each question carefully and answer every question as best as you can. If you have any questions do not hesitate to contact the investigator at xxx-xxxx. **Remember there are no right or wrong answers. I am interested in your opinion.**

A. Your Opinion About Using a Cane:

The following comments have been made by seniors about the consequences of using a cane. Please show if you think using a cane may have similar consequences for you by **CHECKING [✓] THE BOX which matches your answer**. If you are not using a cane right now, please try to imagine how you would feel if you were using a cane **within the next 8 months**.

1. Using a cane would make me feel like I am **giving up my independence**.

very unlikely Unlikely neither likely very likely

2. Using a cane would **make walking easier** for me.

very unlikely Unlikely neither likely very likely

3. Using a cane would be a **nuisance** for me.

very unlikely Unlikely neither likely very likely

4. Using a cane would **keep me from falling**.

very unlikely Unlikely neither likely very likely

5. Using a cane would make me **look old**.

very unlikely Unlikely neither likely very likely

6. Using a cane would be **awkward** for me.

very unlikely Unlikely neither likely very likely

7. Using a cane would help me **keep my balance**.

very unlikely Unlikely neither likely very likely

8. Using a cane would make me **feel old**.

very unlikely Unlikely neither likely very likely

9. Using a cane would make me **feel safe from falling**.

very unlikely Unlikely neither likely very likely

10. It would be to my **benefit** to use a cane.

very unlikely Unlikely neither likely very likely

11. Using a cane would **allow me to do my daily activities**.

very unlikely Unlikely neither likely very likely

12. Using a cane would **hurt my pride**.

very unlikely Unlikely neither likely very likely

13. Using a cane would **give me extra support I need**.

very unlikely Unlikely neither likely very likely

14. Using a cane would make me **feel embarrassed**.

very unlikely Unlikely neither likely very likely

15. It would be **wise** for me to use a cane.

very unlikely Unlikely neither likely very likely

16. Using a cane would **keep me from slipping on ice** in winter.

very unlikely Unlikely neither likely very likely

17. Using a cane would make me **look handicapped**.

very unlikely Unlikely neither likely very likely

18. Using a cane would **isolate me from other people**.

very unlikely Unlikely neither likely very likely

19. Using a cane would **interfere with my daily activities**.

very unlikely Unlikely neither likely very likely

B. Opinions of Others About Your Use of a Cane:

The following questions are about whether other people think you should use a cane or not and how much their opinions are important to you. **Please CHECK [✓] THE BOX that matches your answer.**

1. Most members of my **family** think I should use a cane.

very unlikely Unlikely neither likely very likely

2. Most of my **friends** think I should use a cane.

very unlikely Unlikely neither likely very likely

3. My **doctor** thinks I should use a cane.

very unlikely Unlikely neither likely very likely

4. **Other health care workers** (example: my therapist, my nurse, etc.) think I should use a cane.

very unlikely Unlikely neither likely very likely

5. **Most people who are important to me** think I should use a cane.

very unlikely Unlikely neither likely very likely

6. Generally speaking, to what extent do you want to do what your **family** thinks you should do?

very little a little Somewhat a lot a great deal

7. Generally speaking, to what extent do you want to do what your **friends** think you should do?

very little a little Somewhat a lot a great deal

8. Generally speaking, to what extent do you want to do what your **doctor** thinks you should do?

very little a little Somewhat a lot a great deal

9. Generally speaking, to what extent do you want to do what **health care workers (other than your doctor)** think you should do?

very little a little Somewhat a lot a great deal

C. Difficulties You Anticipate in Using a Cane:

The next set of questions are about some difficulties seniors have identified in using a cane. Please show how likely it is that the following difficulties would **DISCOURAGE** you from using a cane. Please **CHECK** **THE BOX** that matches your answer:

1. Difficulty **learning how to walk with a cane**, would discourage me from using it:

very unlikely Unlikely neither likely very likely

2. Difficulty **shopping with a cane**, would discourage me from using it.

very unlikely Unlikely neither likely very likely

3. It would be difficult for me to **get used to a cane**.

very unlikely Unlikely neither likely very likely

4. Difficulty **going up and down stairs with a cane**, would discourage me from using it.

very unlikely Unlikely neither likely very likely

5. Difficulty **getting around my home with a cane**, would discourage me from using it.

very unlikely Unlikely neither likely very likely

6. Difficulty **getting in a car with a cane**, would discourage me from using it.

very unlikely Unlikely neither likely very likely

7. Difficulty **getting on/off a bus with a cane**, would discourage me from using it.

very unlikely Unlikely neither likely very likely

8. It would be **inconvenient** for me to use a cane

very unlikely Unlikely neither likely very likely

9. **The cost of a cane**, would discourage me from buying one.

very unlikely Unlikely neither likely very likely

10. **Not knowing how to get the right cane**, would discourage me from buying one.

very unlikely Unlikely neither likely very likely

11. **Forgetting to carry my cane**, would discourage me from using it.

very unlikely Unlikely neither likely very likely

12. If I wanted to, I could **EASILY** use a cane inside my home.

very unlikely Unlikely neither likely very likely

13. If I wanted to, I could **EASILY** use a cane outdoors.

very unlikely Unlikely neither likely very likely

D. Your Intention to Use a Cane:

The following questions are about your intention to use or not use a cane. Please CHECK THE BOX that matches your answer:

1. I intend to start using (or continue using) a cane in the next month.

very unlikely Unlikely Likely very likely

2. I intend to start using (or continue using) a cane next winter.

very unlikely Unlikely Likely very likely

E. Your Use of a Cane:

The next questions are about whether you use a cane or not and under what circumstances. For each question please **CHECK [✓] THE BOX** for the answer of your choice.

1. Do you ever use a cane?

- 1 No → If no please GO TO SECTION F
2 Yes → If yes please CONTINUE

a. Where do you use your cane? (Please check as many boxes that apply to you)

- 1 inside your home
2 outside your home but inside buildings
3 outside buildings
4 other (specify): _____

b. How often do you use your cane? (Please check one box only)

- 1 always (almost every day)
2 sometimes (a couple of times weekly)
3 rarely (once in a while)
4 Other (specify): _____

F. Your Health and Activity Level:

Now, I would like to ask you some questions about your health and activity level. For each question please **CHECK [✓] THE BOX** for the answer of your choice.

1. Compared to people your own age, how would you rate your overall health at the present time?

- 1 excellent
2 very good
3 good
4 fair
5 poor

2. Compared to other people your age, how would you rate your overall activity level at the present time?

- 1 a lot more active
- 2 a little more active
- 3 about the same
- 4 a little less active
- 5 a lot less active

G. Falls You Had Last Year:

Now I would like to ask you some questions about any falls you may have had **since THANKSGIVING, October 1995 up to today**. By a fall, I mean an event where you landed on the ground, tripped on the stairs, slipped, or lost your balance and hit against an object like a chair or bed.

1. I would like you to think back to THANKSGIVING this past fall. Have you had any **slips, trips or falls** since then?

- 1 No
- 2 Yes

a. If yes, since THANKSGIVING this past fall, how many times have you slipped, tripped or fallen? _____

H. Your Background:

I would like to ask you a few questions about your background so that I learn a little more about seniors who participate in this study. For each question please **CHECK [✓] THE BOX for the answer of your choice**.

1. Your gender:

- 1 Female
- 2 Male

2. In what year were you born? _____
Year

3. What is your present marital status?

- 1 Never Married/Single
- 2 Married
- 3 Divorced/Separated
- 4 Widowed

4. Does anyone else live with you?

- 1 No
- 2 Yes

a. If yes, who lives with you (Please check as many boxes that apply to you)?

1 spouse/partner

2 Own children

3 Other (Please specify) _____

5. What is your mother tongue?

1 English

2 French

3 Other (please specify): _____

6. How far did you go in school?

1 No formal education

2 Some elementary

3 Completed elementary

4 Some secondary

5 Completed secondary

6 Some post-secondary

7 University degree or higher

8 Other (please specify): _____

7. This is my last question. In general, how well do your income and investments satisfy your needs?

1 Completely adequate

2 Somewhat adequate

3 Somewhat inadequate

4 Inadequate

This is the end of my questions. Is there anything else you wanted to mention that I did not ask you?

If you have no further comments, please seal the completed questionnaire in the attached self-addressed stamped envelope and mail it as soon as possible. If you have any questions, please do not hesitate to contact the investigator at xxx-xxxx. Thanks for your patience and your time. This information will help health professionals improve fall prevention programs for seniors.

THANKS FOR YOUR HELP