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**PERCEPTIONS, ATTITUDES, AND SUBJECTIVE NORMS INFLUENCING
THE DECISIONS OF PHYSICALLY FRAIL SENIORS TO EXERCISE OR NOT
TO EXERCISE: AN APPLICATION OF THE THEORY OF PLANNED
BEHAVIOUR**

By

Kathleen Holdway

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

University of Ottawa

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ABSTRACT

Physical inactivity among physically frail seniors living in the community carries high human and societal costs. Physical inactivity can lead to social isolation and decline in function, mobility, and health. These declines can result in increased frailty, an increased risk for falls, and loss of independence. Physical inactivity is a serious public health problem that is potentially modifiable with the appropriate mix of educational and health promoting strategies.

Guided by the Theory of planned Behavior (TPB), this study was an exploratory investigation of attitudinal, normative, and perceptual determinants of exercise behavior among community residing older adults who reported difficulties in performing one or more activities of daily living. The objectives of this study were: 1) to determine the relationship between various components of the TPB model and exercise behavior in a sample of community-dwelling physically frail older adults aged 65 and over, and 2) to examine the differences between “low actives” and “high actives” 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 the TPB constructs and pilot testing on a purposive sample of 10 seniors; and 2) a cross-sectional survey of a convenience sample of 99 community-dwelling seniors in the Ottawa-Carleton Region. Subjects were recruited from a variety of community settings, using both direct (in-person) and indirect (key informant) approaches. Data were collected through interviewer-administered questionnaires

Although the two groups did not differ significantly with respect to most of the sociodemographic, health, and exercise characteristics, a few exceptions were found. A greater percentage of low actives, compared to high actives, were female, more dependent in their activities of daily living, reported lighter exercise intensity when walking, housekeeping, or stretching. On the other hand, a greater percentage of high actives, compared to low actives, reported pain, activity limitation, were advised to exercise mainly by their physicians, and did chair exercises, resistance training, or climbed stairs at home.

The findings provided some evidence for the validity and reliability of the instrument and confirmed the utility of the TPB in its application to the domain of exercise behavior. Significant group differences were found with respect to social norms and intentions to continue exercising. That is, high actives, compared to low actives, perceived greater social pressure to exercise and had stronger intentions to continue exercising. A stratified analysis found that gender, age, health and pain status influenced the attitudinal, perceptual, and normative beliefs of seniors in this study. The findings of this study expands our current knowledge of the determinants of exercise among physically frail seniors living in the community, has implications for clinical practice, and provides some direction for future research.

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TABLE OF CONTENTS

ABSTRACT	i
ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
APPENDICES	vi
LIST OF TABLES	vii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	x
 CHAPTER ONE-INTRODUCTION	 1
1.1 Rationale.....	1
1.2 Purpose of the Study.....	3
1.3 Organization of Thesis.....	3
 CHAPTER TWO-LITERATURE REVIEW	 5
2.1 Methods for Review of the Literature.....	5
2.1.1 Methods used for the review.....	5
2.1.2 Frailty.....	5
2.2 Relationship of Physical Inactivity with Frailty.....	7
2.3 Exercise Intervention Studies.....	9
2.3.1 Exercise in Relation to Fall prevention and Physical Function..	9
2.3.2 Exercise in Relation to Chronic Health Conditions.....	12
2.3.3 Types of Exercise Interventions.....	14
2.4 Predictors of Exercise Among Community-Living Adults.....	15
2.4.1 Background.....	15
2.4.2 Barriers/Facilitators to Exercise Among Older Adults.....	17
2.5 Summary.....	19
2.6 Conceptual Framework: The Theory of Planned Behaviour.....	19
2.6.1 Description.....	19
2.6.2 Previous Applications.....	21
2.6.3 Rationale for Selection.....	21
2.6.4 The Theory's Limitations.....	23
2.7 Conclusion.....	24

CHAPTER THREE-METHODS.....	25
3.1 Study Objectives.....	25
3.2 Study Hypotheses.....	26
3.3 Research Design.....	26
3.4 Sample.....	26
3.5 Subject Recruitment and Data Collection.....	27
3.5.1 Recruitment Approaches.....	27
3.6 Sample Size and Power.....	30
3.7 Ethical Considerations.....	31
3.8 Measurement.....	32
3.8.1 Screening Tools.....	32
3.8.2 Measurement of the Variables in the Main Questionnaire.....	34
3.8.3 Indicators of Frailty.....	36
3.8.4 Sociodemographic Characteristics.....	37
3.8.5 Measurement of “Exerciser” and “Non- Exerciser”	37
3.8.6 “High Actives” Versus “Low Actives”.....	38
3.9 Data Preparation and Analysis.....	41
3.9.1 Data preparation.....	41
3.9.2 Data Analysis.....	42
CHAPTER FOUR-INSTRUMENT DEVELOPMENT AND PILOT TESTING.....	43
4.1 Instrument Development Process.....	43
4.2 Pre-Pilot Stage.....	44
4.2.1 Item Generation.....	44
4.2.2 Item Refinement and Reduction.....	44
4.3 Scale Development and Measurement of the TPB Variables.....	45
4.3.1 Attitude.....	45
4.3.2 Subjective Norms.....	47
4.3.3 Perceived Behavioral Control.....	48
4.3.4 Intentions.....	48
4.4 Summary of scale development procedures to measure the TPB Model Constructs	49
4.5 Pilot Testing.....	50
4.5.1 Sample	50
4.5.2 Subject Recruitment & Data Collection Procedures.....	51
4.6 Findings and Revisions.....	52
4.6.1 Questionnaire Length.....	52
4.6.2 Comprehensiveness of Scale Format.....	52
4.6.3 Completeness of Response Options.....	52
4.6.4 Considerations of the Quality of Responses to Scale Items.....	53
4.6.5 Senior’s Responses to Other Study Questions.....	54
4.7 Discussion.....	54

CHAPTER FIVE-RESULTS	56
5.1 Response Rate.....	56
5.2 Sample Characteristics.....	57
5.2.1 Sociodemographic Characteristics.....	57
5.3 Persons Who Advised and/or Assisted Respondents with Exercise.....	59
5.4 Health and Activity Characteristics.....	60
5.5 Activities of Daily Living.....	61
5.6 Type, Frequency, Duration & Intensity of Exercises.....	64
5.7 Total Exercise Score and Total Number of Exercises.....	66
5.8 Internal Reliability of the TPB Variables.....	69
5.9 Relationships Among Various Components of the TPB Model.....	70
5.10 Description of the TPB Measures.....	72
5.11 Stratified Analyses.....	76
CHAPTER SIX-DISCUSSION	82
6.1 Discussion of the Findings.....	82
6.1.1 Health, Functional Status, & Sociodemographic Characteristics.....	82
6.1.2 Patterns of Exercise Behavior & Types of Exercises.....	84
6.1.3 Patterns of Exercise Behavior: Frequency, Duration, & Intensity	86
6.1.4 Barriers to Exercise.....	87
6.1.5 Advantages of Exercise.....	88
6.2 Persons Who Advised/Assisted Respondents With Their Exercises.....	89
6.3 Objective One: To Develop Valid and Reliable Measures of the TPB Variables.....	89
6.4 Objective Two: To Determine the Relationship Among Various Components of the TPB Model	90
6.5 Objective Three: to Examine the Differences Between “ Exercisers” and “Non-Exercisers” (High Actives and Low Actives).....	92
6.6 Study Limitations.....	96
6.6.1 Design Limitations.....	96
6.6.2 Measurement Limitations.....	97
6.6.3 Analytical Limitations.....	99
6.7 Implications of the Findings.....	100
6.7.1 Implications for Theory.....	100
6.7.2 Implications for Clinical Practice.....	101
6.7.3 Implications for Future Research.....	105
6.8 Conclusions.....	106
REFERENCES	107-122

APPENDICES

APPENDIX A:	Selected Exercise Intervention (RCTs) Illustrating Sample Characteristics.....	123 –125
APPENDIX A:	Major Outcomes Measures in Selected Exercise Intervention Studies (RCTs) Among Older Adults.....	126-127
APPENDIX A:	Types and Location of Exercise Interventions Among Older Adults...	128
APPENDIX B:	Correlates of Exercise.....	130-131
APPENDIX B:	Major Barriers to Exercise.....	132
APPENDIX C:	Schematic Diagram: Theory of Planned Behavior & Theory of Reasoned Action.....	134
APPENDIX D:	Subject Recruitment and Data Collection Process.....	136
APPENDIX E:	Letter for Key Informants.....	138-139
APPENDIX F:	Letter for Information for Participants.....	141-142
APPENDIX G:	Consents for Pilot and Main Study.....	144-147
APPENDIX H:	Screening Tools.....	149-151
APPENDIX H:	Older Adults Exercise Questionnaire (O.A.E.Q).....	152-157
APPENDIX I:	Ethical & Agency Approvals.....	159-165
APPENDIX J:	Scoring Methods to Calculate the Total Exercise Score.....	167
APPENDIX K:	Sociodemographic Characteristics of Subjects in Pilot Study....	169
APPENDIX L:	Flow-Chart of Recruitment Process.....	171
APPENDIX M:	Group Differences In Exercises.....	173-175
APPENDIX N:	Summary of Stratified Analysis by Gender	177
APPENDIX N:	Summary of Stratified Analysis by Age.....	178
APPENDIX N:	Summary of Stratified Analysis by Health Status.....	179
APPENDIX N:	Summary of Stratified Analysis by Pain/Activity Restriction....	180

LIST OF TABLES

Table 2.1	Selected Exercise Intervention Studies (RCTs) Illustrating Sample Characteristics Among Older Adults.....	124
Table 2.2	Selected Exercise Intervention Studies (RCTs) Illustrating Sample Characteristics Among Older Adults.....	125
Table 2.3	Major Outcomes Measured in Selected Exercise Intervention Studies (RCTs) Among Older Adults.....	126
Table 2.4	Major Outcomes Measured in Selected Exercise Intervention Studies (RCTs) Among Older Adults	127
Table 2.5	Types/Location/Durations of Exercise Interventions Among Older Adults.....	128
Table 2.6	Sociodemographic & Psychological Correlates of Exercise Among Community-Living Older Adults.....	130
Table 2.7	Health, Environmental, and Interpersonal Correlates of Exercise Behaviors...	131
Table 2.8	Summary of the Major Barriers Cited in Exercise Studies among Older Adults.....	132
Table 3.1	Power Estimates for Independent Means with Fixed Sample Size of 100.....	31
Table 3.3	Illustration of the Scoring Method used to Classify High & Low Actives.....	169
Table 4.1	Attitudes, Subjective Norms, and Perceived Behavioral Control Items.....	46
Table 4.2	Sociodemographic & Health Characteristics of the Pilot Study Respondents...	169
Table 5.1	Comparison of Sociodemographic Characteristics Between High & Low Actives.....	58
Table 5.2	Comparisons of Key Persons Who Advised and/or Assisted Respondents with their Exercise.....	59
Table 5.3	Differences Between High & Low Actives with Respect to Selected Health & Activity Characteristics.....	60
Table 5.4	Comparisons of the Activities of Daily Living Between High & Low Actives	62-63
Table 5.5	Type, Frequency, Duration & Intensity of Exercises.....	65

LIST OF TABLES

Table 5.6	Group Differences in Reported Exercise Characteristics.....	67
Table 5.7	Group Differences in Reported Exercise Characteristics.....	68
Table 5.8	Group Differences In the Characteristics of Endurance Exercises	173
Table 5.9	Group Differences In the Characteristics of Strength Exercises.....	174
Table 5.10	Group Differences In the Characteristics of Strength & Stretching Exercises.....	175
Table 5.11	Differences Between High & Low Actives with Respect To Total Number of Exercises Performed.....	69
Table 5.12	TPB Scale Statistics.....	69
Table 5.13	Pearson Correlation Coefficients Among Selected Health & TPB Variables.....	71
Table 5.14	Differences in the TPB Variables Between High & Low Actives.....	72
Table 5.15	Outcome, Normative and Control Beliefs of High & Low Actives.....	75
Table 5.16	Motivation to Comply With Key Referents Among High & Low Actives.....	76
Table 5.17	Group Differences in the TPB Variables Stratified by Gender.....	177
Table 5.18	Group Differences in the TPB Variables Stratified by Age.....	178
Table 5.19	Group Differences in the TPB Variables Stratified by Health Status.....	179
Table 5.20	Group Differences in the TPB Variables Stratified by Pain/Activity Restriction.....	180

LIST OF FIGURES

Figure 2.1	Schematic Diagram of the Theory of Planned Behavior and Theory of Reasoned Action	134
Figure 3.1	Subject Recruitment and Data Collection Procedures.....	136
Figure 4.1	Flow-Chart of Instrument Development Process.....	43
Figure 5.1	Flow-Chart of The Recruitment Process.....	171
Figure 5.2	Comparison of the TPB Variables Between High & Low Actives...	73
Figure 5.3	Comparisons of the TPB Variables Between High & Low Actives Stratified by Gender	78
Figure 5.4	Comparison of the TPB Variables Between High & Low Actives Stratified by Age	79
Figure 5.5	Comparison of the TPB Variables Between High & Low Actives Stratified by Health Status	80
Figure 5.6	Comparison of the TPB Variables Between High & Low Actives Stratified by Pain/Activity Restriction	81

LIST OF ABBREVIATIONS

ADL- Activities of Daily Living

CFLRI- Canadian Fitness and Lifestyle Research Institute

FPBQ- Fall Prevention Behavior Questionnaire

FICSIT- Frailty and Injuries: Cooperative Studies of Intervention Techniques

HCW- Health Care Worker

IADL- Instrumental Activities of Daily Living

NPHS- National Population Health Survey

OARS- Older American Research Service Center Instrument

OAEQ- Older Adults' Exercise Questionnaire

PBC- Perceived Behavioral Control

PSMS- Physical Self-Maintenance Scale

SD- Standard Deviation

SN- Subjective Norm

SPMSQ- Short Portable Mini-Mental Status Questionnaire

TPB- Theory of Planned Behavior

TRA- Theory of Reasoned Action

TES-Total Exercise Score

CHAPTER ONE

Introduction

This chapter introduces the problem of physical inactivity among the frail elderly, provides the rationale for the study, and describes the contribution of this study to filling gaps in the literature.

1.1 Rationale

The population of Canadians over the age of 65 years is growing. In 1921, 4.8% of the Canadian population was over the age of 65 years. By 2021, approximately 17.8% of the population will be aged 65 years and over (Statistics Canada, 1996-97). Dramatic increases in average life expectancy during the past century mean that Canadian seniors can anticipate living longer than their ancestors did. However, because seniors carry a heavy burden of chronic illness and disability (Bradley, Yoshida, Webster & Stephens, 1993; Statistics Canada, 1997 b), these additional years may not be “quality” years.

Results of the 1995 National Population Health Survey (NPHS) indicated that 80.7% of Canadian seniors reported the presence of a chronic condition, and 39.5% reported limitations in at least some activities due to a chronic health condition (Statistics Canada, 1996-97). Furthermore, Birse and Lander (1998) estimated that 44% of Canadian seniors suffer from chronic pain, defined as recurring or persistent pain of six months duration or longer.

Frail seniors living in their homes face significant challenges. Declining physical function often forces frail seniors to become dependent on others for care. In most cases, independent living can be ensured provided that their care needs do not exceed the amount of available

support. If the delicate balance between care needs and available resources is not maintained, frail seniors may face relocation and/or institutionalization.

As the prevalence of illness and disability increase with age, so do the societal costs.

Seniors, as a group, are the largest consumers of hospital health services. In 1993, nearly half of the \$26.1 billion dollars spent on hospital services were consumed by people 65 years and over (Health Canada, 1993). With more seniors living longer, it is anticipated that health expenditures for seniors will continue to increase.

In light of the high human and societal costs associated with frailty, there is an obvious need for preventive measures to ensure the health of elderly Canadians. Promoting physical activity is an investment that can increase the well being of Canadian seniors, while reducing escalating health care costs.

The beneficial effects of exercise on various psychological and physiological parameters among the elderly have been well established. Regular exercise benefits older adults through improved overall health and physical fitness, increased opportunities for social contact, lower rates of mortality, gains in cerebral function, reduced risks for falls and functional decline, and fewer years of disability in later life (Astrand, 1992; Barry, Rich, Carlson, 1993; Cress et al., 1999; Ho, Woo, Yeun, Sham, & Chan, 1997; Province et al. 1995; Shepard, 1990). Of particular importance to frail seniors, is emerging evidence, which suggests that exercise may help to postpone the onset of frailty or ameliorate its further development (Strawbridge, Shema, Balfour, Higby, & Caplan, 1998; Fiatarone & Evans, 1993).

Despite the many benefits of exercise, physical inactivity remains prevalent among seniors. According to Statistics Canada (1997 a), only 50% of older adults are active on a regular

basis. Furthermore, approximately 79% of females and 69% of men 65 years and over, are not active enough to achieve health benefits (Russell & Craig, 1999).

In Canada, over the past 20 years, substantial inroads have been made in reducing rates of physical inactivity for all age groups, with the notable exception of older adults, whose physical inactivity levels have remained unchanged over the past 17 years (Cameron, Craig, Russell & Beaulieu, 2000). A better understanding of the factors that influence frail seniors' decisions to exercise or not, will help nurses plan interventions that break down barriers to exercise and enhance the benefits and rewards of exercise. Through these interventions frail seniors may be motivated to make exercise a regular part of their lives, limiting the advancement of chronic disease, impaired function, and loss of independence.

1.2 Purpose of the Study

Guided by the Theory of Planned Behaviour (TPB), this study was undertaken to explore the attitudinal, normative, and perceptual determinants of exercise behaviour among community residing older adults who reported difficulties in performing one or more activities of daily living.

1.3 Organization of Thesis

This thesis is divided into six chapters. Chapter two provides an overview of the relevant empirical and theoretical literature. Chapter three begins with an outline of the study objectives and hypotheses and presents the methods and procedures for the main survey. Chapter four details the methods and qualitative findings of the instrument development and pilot-testing

phase. Results of the main survey are presented in chapter five. Lastly, chapter six discusses study findings and their implications for theory, clinical practice and future research.

CHAPTER TWO

LITERATURE REVIEW

This chapter is divided into two main sections. The following topics are included in section one: 1) a description of the methods used to review the literature, 2) a discussion of the concept of "frailty", 3) an overview of the empirical research on the relationships between exercise, functional status, frailty, and falls, 4) a summary of selected exercise intervention studies among seniors living in the community, 5) a synopsis of research examining the predictors of exercise among seniors. Section two includes 1) a description of the Theory of Planned Behavior, 2) a discussion of past applications of this theory to exercise research and 3) a summary of the rationale for using this theory in this present study.

2.1 Methods for Review of the Empirical Literature

2.1.1. Methods used for the review of literature: Most papers cited in this review were identified by an English language search of Medline, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, Sports Discus and Health databases from the years 1989 to date. The following keywords were used: aged, frail, exercise, interventions, psychology, Theory of Planned Behavior and Theory of Reasoned Action. The reference sections of individual publications were also used to identify relevant studies. In most cases, studies included in this review are limited to community living persons 65 years and older.

2.1.2 Frailty: With an aging population and seniors living with chronic diseases for a longer period of time, there has been a growing interest in the study of "frailty." However, lack

of a consistent definition of the term “ frailty “ has been problematic for both researchers and clinicians. Frailty has been conceptualized and defined in a variety of ways.

Some researchers have conceptualized frailty in terms of a broad range of physical problems in old age, or even aging itself (Fiatorone & Evans, 1993; Pendergast, Fisher & Calkins, 1993; Strawbridge et al., 1998; Whipple, Wolfson, Derby, Singh & Tobin, 1993; Winograd et al. 1991; Woollacott, 1993). For example, Fiatorone and Evans (1993) discussed frailty in terms of muscle weakness associated with aging, chronic diseases, sedentary lifestyle and nutritional inadequacies. Other researchers have conceptualized frailty in terms of physical functioning and/or disability (Guralnik & Simonsick, 1993; Larson, 1991; Mulrow et al. 1994; Strawbridge et al., 1998). In other cases, researchers have equated “frailty” with institutionalization, or with severe physical disability (Stamford, 1972; Manton, Stallard & Liu, 1993).

While much of the literature focuses on the physical and functional consequences of frailty, some researchers have emphasized the psychological and behavioral dimensions of frailty (Svanborg, 1993; Schultz & Williamson, 1993). For example, Schulz and Williamson (1993) suggested that frailty is not all physical, for it has important psychological and social dimensions that should be considered in assessing its impact and planning interventions. Still other researchers have examined “frailty” in relation to capacity-demand and/or vulnerability to environmental challenge (Czaja, Weber & Nair, 1993; Strawbridge et al., 1998). For example, Strawbridge and colleagues (1998) defined frailty as a syndrome involving deficiencies in two or more of the following domains: cognitive, nutritive, physical and sensory capabilities.

For this study, frailty was conceptualized within the physical domain of functioning. Although this is a somewhat narrow view of frailty, this view was adopted because exercise is related to the physical domain of functioning. Therefore, a frail senior was defined as a person 65 years and older; who had difficulty in successfully completing one or more ADLs. Such a person would require human and/or mechanical assistance to complete their ADLs. The activities of daily living included feeding, dressing, grooming, bathing, ambulation and toileting. Lastly, frailty was viewed as a syndrome of deficiencies occurring along a continuum.

2.2 Relationship of Physical Inactivity with Frailty

It is estimated that approximately 10% to 43% of the senior population experience some degree of mobility restriction (Daley & Spinks, 2000; Norburn et al., 1995; Zimmer & Chapell, 1994) and approximately one-quarter of seniors have difficulty in performing at least one of the daily activities of living (Czaja et al., 1993; Wilkins & Park, 1996). Maintenance of function and mobility are central to seniors' independence.

Although the relationships between physical activity and preservation of function and mobility have not been fully explored, preliminary evidence suggests that physical activity may play an important role in delaying functional decline, and may even postpone the onset of frailty (Ensrud et al., 1994; Ho et al., 1997; Seeman et al., 1995, Strawbridge et al., 1998, Young, Maski, & Curb, 1995).

Strawbridge et al. (1998) reported that reduced physical activity, poorer mental health, and lower life satisfaction were associated with frailty. Cumulative significant predictors over the previous three decades included heavy drinking, cigarette smoking, physical inactivity, depression, social isolation, chronic illness, chronic symptoms, and fair or poor perceived health.

The frailty risk associated with physical inactivity was twice as great for seniors inactive in two or three decades compared to none.

Seeman et al. (1995) examined behavioral and psychosocial predictors of physical performance among a sample of high functioning older adults. Both physical exercise and emotional support from one's social network were found to predict better performance over a 2.5-year follow-up period, independent of sociodemographic and health status characteristics. These findings suggest that maintenance of better physical performance within a high-functioning cohort was influenced by prior exercise behavior and social network emotional support.

Results of an 18-month longitudinal study among a Chinese cohort aged 70 years and older, indicated that among the various health behavior factors examined, subjects who did not perform any exercise at baseline experienced more mobility decline than respondents who reported performing exercise at baseline (OR 2.1, 95% CI 1.4-3.1) (Ho et al., 1997). The types of exercises documented in this study included morning walking and Tai Chi.

Results of a longitudinal study indicated that engagement in physical activity was predictive of a high level of physical functioning in older men with and without chronic disease (Young, Maski & Curb, 1995). Associations were found at a moderate level of estimated daily energy expenditure, which lead the authors to conclude that benefits may be realized from a generally active lifestyle.

Lastly, results of a cross-sectional study indicated that a combination of many factors, including medical conditions, health habits such as smoking and physical inactivity, and direct neuromuscular performance were associated with impaired function among women 65 years and older (Ensrud et al., 1994).

2.3 Exercise Intervention Studies

A total of 31 exercise intervention studies among seniors 65 and older years were identified. Eighteen of these studies (Ades, Ballor, Ashikaga, Uttonet & Sreekumaran, 1996; Blumenthal et al., 1991; Brill et al., 1998; Carroll et al., 1992; Shumay-Cook, Gruber, Baldwin, & Lioa, 1997; Cress et al., 1999; Emery & Gantz, 1990; Fahlman et al., 2000; Jette et al., 1996; Lan, Lai, Wong & Yu, 1996; Nichols, Omozo, Peterson, & Nelson, 1993; Okumiya et al., 1996, Pollack et al., 1991; Pyka, Lindenberger, Charette, & Marcus, 1994; Rooks, Kile, Parson & Hayes, 1997; Shin, 1999; Simmons & Hansen, 1996; Tse & Bailey, 1992; Wolfson et al., 1996) were excluded from further discussion since they targeted seniors who were independent and relatively healthy.

The remaining 13 randomized control trials (RCTs) describe exercise interventions among seniors with functional limitations and/or medical conditions. Table 2.1 and Table 2.2 (see Appendix A) illustrate the inclusion criteria of these 13 studies with respect to functional limitations and/or medical conditions.

2.3.1 Exercise in relation to Fall Prevention and Physical Functioning: The consequences of falls constitute a major impediment to independence among older adults. Approximately one-third of community living seniors report at least one fall each year (Cwikel, 1992; Graafmans et al., 1996; Lord, Ward, Williams, & Anstey, 1993; O'Loughlin, Robitaille, Boivin & Suissa, 1993; Sorock & Labiner, 1992). In Canada, falls are the leading cause of fatal and nonfatal injuries among seniors and injuries in turn, are the sixth leading cause of death in older adults (Canadian Institute for Health Information, 2000; Health Canada, 1997). Not all falls result in injuries but the psychological shock of a fall can have serious functional and

psychological consequences such as loss of confidence, lower quality of life, self-imposed activity restriction, and increased dependence (Cwikel, Kaplan, & Vita, 1990; Lachman et al., 1998; Tinetti & Powell, 1993; Vellas, Cayla, Depemille & Albarede, 1987).

Evaluations of the utility of exercise for reducing the risk of falls have had mixed results (Bucher et al., 1997; Campbell et al., 1997; Gillespie, Cumming, Lamb & Rowe, 2000; Krebs, Jette, Assmann, 1998; Lord, Ward, Williams, & Strudwick, 1995; Lord, Ward, Williams & Anstey, 1993; Province et al., 1995; Wolf et al., 1996). Table 2.3 and Table 2.4 illustrate the major outcomes measured and the results of selected exercise interventions. Some exercise intervention studies have reported a positive effect, some no effect, while others have suggested that exercise may place seniors at a higher risk for falls. Variations in intervention design, sample characteristics, and compliance issues are possible explanations for these mixed results.

The FICSIT Studies (Frailty and Injuries: Cooperative Studies of Intervention Techniques), which involved eight different sites and various combinations of exercise, attempted to determine if short-term exercise reduces falls and fall related injuries in the elderly (Province et al., 1995). Results of a pre-planned, methodologically sound, meta-analysis indicated that assignment to an intervention group, which included exercise interventions resulted in a 10% reduced risk of falls (Province et al., 1995). Conclusions from this meta-analysis about the effectiveness of specific types of exercises must be guarded, since each site employed different combinations, durations and frequencies of exercise interventions. Among various exercise interventions, balance training, appeared to be more effective, while evidence for the effectiveness of other training domains such as aerobic and strength training were not compelling (Province et al., 1995). Notably, the Atlanta FICSIT Study, which examined the effect of Tai Chi and computerized balance training among seniors 70 years and older, indicated

a significant reduction in fall rates with the Tai Chi intervention (Wolf et al., 1996). After adjusting for fall risk factors, Tai Chi was found to reduce the risk of multiple falls by 47.5%.

In a Cochrane review, eighteen intervention trials and one preplanned meta-analysis were examined to determine the effects of programs designed to reduce the incidence of falls among community-dwelling, institutionalized, or hospitalized seniors (Gillespie et al., 2000). The analysis of four trials, which studied the effect of exercise alone, did not establish protection against falling. However, significant protection against falling was apparent from interventions that targeted multiple risk factors in individual subjects (Odds ratio 0.77; 95% CI 0.64 to 0.91), and from interventions that focused on interventions targeting both environmental hazards and other risk factors (Odds ratio 0.81; 95% CI 0.71 to 0.93). These results suggest that there is inadequate evidence for the effectiveness of single interventions such as exercise, or health education classes for the prevention of falls (Gillespie et al., 2000). The authors suggest that fall prevention programs should include health screening to identify seniors at risk, followed by multifaceted interventions targeting both intrinsic and environmental risk factors of individual seniors (Gillespie et al., 2000).

In addition to the trials from the two meta-analyses, three additional RCTs examined the impact of exercise on physical function and/or disability, but did not measure fall rates (Jette et al., 1999; McMurdo & Johnstone, 1995; Thompson, Crist, Marsh & Rosenthal, 1988). Jette et al. (1999) reported statistically significant gains in lower extremity strength, gait, and reduced disability with their home-based “Strong-for-Life” program. An 89% adherence rate was achieved, which is in contrast to a similar earlier study, which achieved only a 59% adherence rate (Jette et al., 1996). The authors suggested that the success of the more recent study was most likely due to the addition of various cognitive and behavioral strategies aimed at promoting

adherence. Some of these strategies were motivational videotape, exercise video, monetary incentives, and telephone follow-up.

In contrast, no significant improvements in physical function were found following a strength and mobility-training program among 86 seniors with limited mobility and ADL difficulties (McMurdo & Johnstone, 1995). Although there was a consistent trend toward improvement with this home-based training program, the authors suggested that poor exercise compliance, possibly due to the level of cognitive impairment, might have contributed to the non-significant results. Similarly, although the results of a home-based exercise intervention study among functionally limited seniors showed a trend towards improvement in neuromotor function, treadmill performance, serum lipids, and blood pressure, the results failed to reach statistical significance (Thompson et al., 1988). A small sample size (N=34) may have contributed to the non-significant results.

2.3.2 Exercise in Relation to Chronic Health Conditions: Although there are many health conditions that can afflict seniors, arthritis is the most frequently reported chronic condition in people 65 years and older, accounting for one-third of all mobility-agility disabilities (Bradley et al. 1993; Davis, Ettinger, Neuhaus & Mallon, 1991; Raina, Dukeshire, Lindsay & Chambers, 1998; Statistics Canada, NPHS, 1996/97). Activity avoidance due to such factors as pain and/or lower extremity weakness is common among older persons suffering from osteoarthritis (OA) (Ettinger & Afafe, 1994; Ettinger et al., 1997; Mangione, et al., 1999; Minor, Hewett, Weebel, Anderson & Kay, 1989). Furthermore, OA of the knee, may place seniors at a greater risk for falls, which in turn can lead to reduced physical activity (Barret, Cobb, & Bentley, 1991; Wegener, Kisner, & Nochols, 1997).

Although many exercise intervention studies have shown promising results with respect to improvements in postural stability (Lord & Castell, 1994; Roberts, 1989), few studies have examined the effects of exercise on postural stability among seniors with OA of the knee (Messier et al., 2000). Results of an 18-month longitudinal exercise intervention study among seniors with OA of the knee indicated that both an aerobic walking and weight-training program significantly improved postural sway disturbances (Messier et al., 2000).

Results of an 18-month aerobic and resistance training study, among seniors with OA of the knee, indicated that although both types of exercise training resulted in lower disability scores, subjects in the aerobic group had lower disability scores and knee pain scores, compared to subjects in the resistance-training group (Ettinger et al., 1997). Based on these findings, the authors suggest that both aerobic walking and resistance-training programs are safe and effective therapies that can improve pain and function in older people with OA of the knee.

In a Cochrane review of six RCTs, Van den Ende and colleagues examined the effectiveness of dynamic exercise therapy in patients with rheumatoid arthritis (including seniors) (Van den Ende, Vliet Vlieland, Munneke & Hazes, 2000). The results suggest that dynamic exercise therapy, which refers to exercises where the muscles lengthen and shorten, is effective in improving aerobic capacity, muscle strength and joint mobility, but less effective in improving functional ability. The authors suggested that the lack of improvement in functional ability might be partly related to methodological difficulties encountered in assessing functional ability. The authors also reported that there was no evidence indicating any untoward effects of dynamic exercise therapy on joint inflammation and disease activity. However, the results of this review should be interpreted carefully, since pooling of data was problematic because of the variety in outcome measures used (Van den Ende et al., 2000).

2.3.3 Types of Exercise Interventions: There is considerable evidence that exercise is beneficial for most seniors including the very old and frail. Upon initiation of an exercise program, the greatest physiological benefits are normally achieved in the first few months and plateau thereafter (Morey et al., 1991; Rubenstein, 1990; Sidney & Shepard, 1978; Wolfe & Cunningham, 1982). Controversy remains as to what is the best type or combination of exercise training (Fiatarone et al, 1990; McMurdo & Rennie, 1994; Mulrow et al., 1994; Naso, Carner, Blankfort-Doyle & Coughley, 1990).

As illustrated in Table 2.5 (see Appendix A), the majority of studies used a combination of two or more types of exercise training. The most common combination was strength training and aerobic walking. Other studies combined aerobic, strength and flexibility training into one general exercise program (Leveille et al., 1998; Lord, Ward & Williams, 1996; Lord, Ward, Williams & Strudwick, 1995; Thompson et al. 1988). Only two studies focused mainly on strength training (Jette et al, 1999; Krebs, Jette, & Assmann, 1998), and one study focused on Tai Chi training (Wolf et al., 1996).

In summary, the optimal type or combination of exercises for gaining appropriate health and functional benefits among older adults remains controversial. It is likely that such a regimen would include a combination of endurance, strength, and flexibility/balance activities (King, Rejeski, David & Bucher, 1998; Phillips & Haskell, 1995).

2.4 Predictors of Exercise among Community-Living Older Adults

2.4.1 Background: With the exception of advancing age and gender, evidence supporting the association between various sociodemographic, health, psychological, environmental, and program-related variables with physical inactivity has been inconsistent

(Health Canada, 1999 b; King et al., 1998, King et al., 1992; Wilcox & Storandt, 1996).

According to Statistics Canada (1996-97), 16% of Canadians between the ages of 45 and 64 years were classified as active (i.e. 17% - males versus 14% - females). A slight overall increase was reported for people aged 65-74 years (i.e. 17%), mainly due to the increased activity levels in men, particularly around retirement age (i.e. 23% - males versus 11% - females) (Statistics Canada, 1996-97). However, in both genders, levels of physical activity declined thereafter (i.e. 12% at 75 +) (17 % - males versus 8% - females) (Statistics Canada 1996-97).

Very few studies have examined predictors of exercise among frail seniors. Tables 2.6 and 2.7 provide a summary of the studies examining the predictors of exercise among older adults (see Appendix B). A discussion of these studies follows.

Courneya (1995) examined the relationships between selected demographic and psychological variables with stage of readiness for regular physical activity and the constructs of the Theory of Planned Behavior among healthy seniors 60 years and older. The results indicated that all participants could be categorized into one of the five stages of change as outlined by Prochaska and DiClemente (1983). The most important discriminators among stages were intention, attitude, and perceived behavioral control. The only demographic variable associated with the TPB constructs was age. Older adults held lower perceived behavioral control (Courneya, 1995).

MacLeod and Stewart (1994) examined the relationship between demographic and motivational variables to participate in a peer-led exercise program among 75 female apartment dwellers 65 years and older. All selected variables (i.e. competency, medication use, education, age), with the exception of income and marital status, emerged as significant predictors. The strongest predictor of exercise group participation was competency. Women who were more

likely to attend an exercise group were younger, had greater competence in health matters, had higher education, used fewer medications, and were living in one of the study's buildings. Occupants of this building had higher levels of education and higher levels of income.

Clark and Northwehr (1999) examined predictors of exercise efficacy and outcome expectations within a stratified random sample of lower-income adults 55 years and older. Exercise self-efficacy was greater among persons who were currently exercising, reported no pain or fear of shortness of breath with exercise; and self rated their health as good, very good or excellent. Higher outcome expectation scores were associated with verbal persuasion to exercise from a doctor, family or friends; and positive attitudes and knowledge of exercise. Multiple linear regression analysis indicated that 31% of the variance in self-efficacy was explained by sociodemographic characteristics, intrapersonal factors, and environmental factors, but the model explained only 13 % of the variance in outcome expectations.

Clark, Patrick, Grembowski and Durham (1995) found direct associations between age, education and exercise self-efficacy. Indirect associations were reported between age, income, education, and occupation, which operated primarily through previous exercise experience, satisfaction with amount of walking, depression, and outcome expectations. The results indicated that subjects were more confident that they would exercise in the coming year if they were better educated, reported prior exercise or attempts to exercise, and were satisfied with the amount of walking they did. Lastly, subjects with greater self-efficacy had stronger beliefs in the harmfulness of not exercising.

Conn (1998 b) examined the relationships between self-efficacy, outcome expectancy, barriers, health, age, and lifelong exercise and exercise behaviors, among seniors who had multiple chronic illnesses, but were independent with self-care and ambulation. Perceived

barriers, self-efficacy expectations, and age, exerted the greatest influence on exercise, while outcome expectancy contributed little to the model.

2.4.2 Barriers and Facilitators of Exercise Among Older Adults: A few qualitative studies have provided insight into the personal experience of exercise behaviors and factors that may influence seniors' perceptions of exercise (Conn, 1998 a; Conn, Libbus, Thompson, & Kelly, 1994; Melillo et al., 1996). A discussion of these studies follows.

Conn (1998 a) examined behavioral, control and normative beliefs influencing older women's decisions to engage in physical activity. Content analysis of responses revealed three major themes: social influences on physical activity, psychological benefits of activity, and joint problems and fatigue as factors that interfere with activity. In an earlier study, which examined these same beliefs with respect to episodic exercise behavior among older women with similar demographic and health characteristics, distinct differences and similarities were found (Conn, 1998 a; Conn et al., 1994). Conn (1998 a) indicated that the women in the physical activity study talked about physical activity as being embedded in their social lives and strongly emphasized the social-psychological benefits of exercise, while women in the episodic exercise study viewed exercise as separate from their daily lives and emphasized the physical health benefits of exercise. As suggested by Conn (1998 a), these findings could be related to the fact that typical activities such as babysitting grandchildren were included in the physical activity study, but not in the study on episodic exercise. Lastly, health problems were cited as a major barrier to a more active lifestyle in both studies.

In a qualitative study (Melillo et al., 1996), which examined perceptions of physical fitness and exercise, three major themes emerged. These themes were: functional independence

“being able to do”, holism, “mind-body works together”, and age reference “for people my age”. As noted by the authors, an interesting finding related to the fact that respondents in this study defined their own physical fitness relative to people their own age. The authors suggest that this may demonstrate a need to establish appropriate societal expectations for exercise in older age.

Table 2.8 summarizes quantitative studies, which have examined the barriers to exercise among older adults (see Appendix B). O’Neil and Reid (1991) indicated that the barriers most frequently cited by seniors were: perceptions that they were already getting enough physical activity, decreased activity tolerance, health problems, lack of discipline to exercise, and perceptions that they did not need as much physical activity now that they were older. The authors indicated that the number of perceived barriers was significantly related to age and illness/handicap, but unrelated to gender, income, activity, or educational levels.

In a study among socioeconomically disadvantaged seniors, Clark and Northwehr (1999) indicated that pain was cited as a major barrier (49%) to exercise. Other barriers included fear of falling (42%), shortness of breath with exercise (30%), swelling (25%) and chest pain (22%) Interestingly, the authors noted that younger respondents more commonly reported some of these barriers.

Finally, among a sample of African American women recruited from a seniors’ community center, barriers most often cited related to issues of accessibility, while the perceived benefits reflected those categorized as life-enhancing such as exercise enjoyment, reduction of stress and improved mental health (Jones & Nies, 1996).

2.5 Summary: Lack of a consistent definition of the term “frail” is problematic for both researchers and clinicians and hinders the identification of seniors at risk for “frailty” for research and program implementation purposes.

Most of the past exercise intervention studies have targeted functionally independent and relatively healthy older adults. The existing evidence, although inconclusive, suggests that exercise in combination with other interventions, may play a significant role in reducing falls, disability and frailty. However, many questions remain unanswered with respect to what is the best type of exercise and the best mode of delivery for frail seniors. Current literature has identified some determinants of exercise behavior. However, more research is needed to better understand the determinants that appear to be especially influential for frail seniors. These determinants include a) barriers and facilitators to exercise, b) social influences, and c) and the impact of chronic illness, pain and fatigue on intentions and exercise behaviors. A better understanding of these determinants is critical in helping to design more effective intervention programs for frail seniors.

2.6 Conceptual Framework: The Theory of Planned Behavior

2.6.1 Description: The Theory of Planned Behavior (TPB) is an extension of the Theory of Reasoned Action [(TRA)(see Figure 2.1, Appendix C)]. The TPB extends the TRA by adding the concept of perceived behavioral control to recognize behaviors that are not under complete volitional control (Ajzen, 1988, 1991; Ajzen & Fishbein, 1980). The assumption of both theories is that individuals behave in a rational and sensible manner by taking into account all available information and then consider the potential implications of their actions (Courneya & McAuley,

1993). The TPB proposes that positive attitudes, subjective norms and perceptions of behavioral control lead to stronger intentions to perform the considered behavior (Ajzen, 1988).

Perceived behavioral control (PBC) refers to the perceived ease or difficulty of performing the behavior. It can influence behavior directly as well as indirectly, by influencing intention. PBC is a function of the beliefs about the resources and opportunities, known as control beliefs, weighted by the perceived power of the particular control factor, which either facilitates or inhibits the behavior (Ajzen, 1988; Ajzen, 1991).

Subjective norm (SN) refers to the social pressure to perform or not perform the behavior. SN is determined by the person's beliefs that salient referents either approve or disapprove of performing the behavior (i.e. normative beliefs), weighted by the person's motivation to comply with the referent (Ajzen, 1988; Ajzen, 1991). Lastly, attitude is defined as the degree to which a person has a favorable or unfavorable evaluation of performing the behavior. Attitudes are assumed to be a function of salient beliefs about the outcome of performing the act (i.e. outcome beliefs), weighted by the evaluation of the outcome (Ajzen, 1988; Ajzen, 1991).

Consider for example, a frail elderly woman who believes that her doctor would approve of her exercising. If she values her doctors' opinion, she is more likely to have stronger intentions to exercise. Similarly, if this woman anticipates fewer barriers to her exercise, and believes that exercise has many positive outcomes (e.g. reduction of joint pain), she is more likely to have stronger intentions to exercise.

The relative importance of these three TPB components varies with different behaviors and situations. Antecedents of attitudes, SN, and PBC, are outcome, normative, and control beliefs, which in turn, directly determine intentions and behaviors. External variables such as

demographics have an effect on behavior only to the extent that they influence the three determinants (Ajzen, 1988; Ajzen, 1991).

2.6.2 Previous Applications: Two comprehensive reviews of the literature on the TRA and the TPB were identified (Blue, 1995; Godin & Kok, 1996). Blue (1995) reported 23 applications of the TRA ($N = 16$) and TPB ($N = 7$) in the exercise domain. Elderly persons were not included in any of the studies reviewed. In all of the studies reviewed, attitude was predictive of intention. The behavioral belief component was positively correlated with attitude, while the normative belief component was positively correlated with SN. In most cases, the correlations of SN with intention were not significant. In the few cases when this relationship was significant, the normative correlation was lower than the attitude-intention correlation. Blue concluded that although both theories were useful in predicting intention, the TPB appeared to be a more promising theory for the study of exercise because it includes beliefs about the control factors that would facilitate or inhibit carrying out exercise.

Godin and Kok (1996) reported 58 applications of the TPB in the domain of health. Eighteen of these applications were related to exercise. The results of this review indicated that the TPB performed well for the explanation of intention. Across all studies, an average R^2 of .41 was observed. Attitudes towards the action and PBC emerged as the most significant predictors of intention.

For the period 1997-2000, four exercise studies using the TPB among adults aged 50 years and older were identified (Brenes, Strube, & Storandt, 1998; Conn, 1998 a; Gravelle, Pare & Laurencelle, 1997; Michels & Kugler, 1998). Generally speaking, the findings of these studies were consistent with the findings of Godin and Kok (1996). For instance, Michels and Krugler

(1998) reported that attitude, SN and PBC were strongly associated with intentions to exercise. These variables, along with a variable to measure “habit” yielded an R^2 of 0.47, $p < 0.001$).

Lastly, Gravelle, Pare and Laurencelle (1997), examined the influence of attitudes upon the intentions of older adults (i.e. 50-70 years), who were participants in structured community-based physical activity programs. A stepwise regression analysis showed that most of the variance in intention (69%) was explained by the belief that the programs were “good” and “beneficial” to them.

2.6. 3 Rationale for Selection: The TPB has had previous applications to a wide range of health-related behaviors including exercise, and has strongly influenced attitude-behavior research (Ajzen, 1991; Blue, 1995; Godin & Kok, 1996). In recent years an increasing number of nurse researchers have supported the utility of this theory in understanding health issues, such as cane use, mammography, breast feeding, AIDS, and exercise (Aminzadeh, 1997; Champion, 1994; Conn 1998 a; Goldenberg & Laschinger, 1991; Janke, 1994; Montana & Taplin, 1991). As suggested by Aminzadeh (1997), the TPB may be especially useful for nursing because it addresses salient beliefs, which can be targeted with appropriate nursing interventions. Finally, another strength of this theory is that the authors have provided specific guidelines for construct measurement and questionnaire development (Ajzen & Fishbein, 1980). An elicitation study forms the basis for instrument development (Ajzen & Fishbein, 1980; Blue, 1995). Rather than selecting salient beliefs intuitively, salient beliefs about a specific behavior are generated from a sample of interest, which helps to ensure that the items are salient for both the study population and the target behavior (Aminzadeh, 1997; Liska, 1984; Weinstein, 1993; Young, Lierman, Powell-Cope, Kasprzyk, & Benoliel, 1991).

2.6.4 The Theory's Limitations: Behavioral theories have generally accounted for 30% or less of the variability in physical activity behaviors (Baronski, Anderson, & Carmack, 1998; Godin & Kok, 1996). The TPB seems to perform quite well across behavioral categories with respect to explaining intention, but its efficiency varies with respect to predicting behavior (Godin & Kok, 1996). The inability to enact one's intention in some areas may result from various environmental, personal and control factors (Godin & Kok, 1996). However, by adding the PBC construct, the predictive utility of this model can be significantly improved (Aminzadeh, 1997; Ajzen & Madden, 1985; Dzewaltowski, Noble, & Shaw, 1990; Gatch & Kendzierski, 1990; Kimiecik, 1992).

In general, social influence on intention appears to be less important than attitude or PBC (Aminzadeh, 1997; Godin & Kok, 1995; Godin & Shepard, 1990; Godin, Valois & Lepage, 1993). When the influence of SN has proven statistically significant, it has always exerted less influence upon exercise than attitude or PBC (Godin & Kok, 1996). Some researchers have suggested that the ambiguity concerning the importance of SN could be attributed to the method used to measure this construct (Aminzadeh, 1997; Godin & Shepard, 1990; Godin & Kok, 1995; Grube, Morgan, & McGee, 1986).

Social influences on exercise behavior may exert their influence via different routes (Aminzadeh, 1997; Godin & Kok, 1996, Grube et al., 1986). To determine these influences Godin and Kok (1996) recommended the measurement of additional variables. For example, a few recent applications of the theory have reported the contribution of constructs such as role identity, moral norm, or personal normative beliefs in explaining significant portions of variance in intention and in some cases behavior (Boissonneault & Godin, 1990; Boyd & Wandersman,

1991; Sparks & Shepard, 1992; Theodorakis, 1994). Further research is needed to confirm the contribution of these additional constructs to the theoretical model.

Since beliefs and attitudes change over time, a cross-sectional study using the TPB provides only a single snap shot of what people believe at a particular time. Nonetheless, such profiles offer a rational basis for the design of intervention programs aimed at strengthening intentions (Ajzen & Fishbein, 1980). Finally, another limitation pertains to the unidirectional causal structure of the model, which does not account for the reciprocal effect of behavior on intention and its precursors (Liska, 1984).

2.7 Conclusion: The TPB has been useful in helping to understand the salient beliefs influencing an individual's decisions to exercise, which in turn can be targeted with appropriate exercise and/or educational interventions. However, most past applications of the TPB to the exercise domain have focused on individuals under the age of 65 years. Currently, very little is known about the salient beliefs, influencing the decisions of frail seniors to exercise. Many of the existing interventions programs are based on the salient beliefs of independent and relatively healthy seniors, who may not face the same barriers to exercise as more frail seniors.

CHAPTER THREE

METHODS

This chapter begins with an outline of the study objectives and hypotheses followed by a discussion of the methods. This research involved three phases: 1) instrument development to measure the TPB constructs and other variables; 2) pilot testing of the draft questionnaire; and 3) a cross-sectional survey. This chapter focuses on the methods for the cross-sectional survey. A description of the research design, sampling procedures, subject recruitment, data collection, and analysis approaches is provided. Development and pilot testing of the questionnaire will be discussed in chapter four.

3.1 Study Objectives: The objectives of this study were:

- 1) To use the measures of the Theory of Planned Behavior (TPB) constructs to determine the relationship between a) attitudes, subjective norms and perceived behavioral control; and b) the intention to exercise and self-reports of exercise, in a sample of community-dwelling physically frail seniors 65 years and over.

- 2) To examine the differences between “exercisers” and “non-exercisers” with respect to the Theory of Planned Behavior variables, and selected health (i.e. perceived health, perceived pain and its impact on level of activity, and perceived level of activity) and sociodemographic variables (i.e. age and gender).

3.2 Study Hypotheses: Based on empirical evidence and the TPB predictions, it is hypothesized that compared to “exercisers”, “non-exercisers” will:

- 1) have more negative attitudes towards exercise,
- 2) anticipate greater difficulties in exercising,
- 3) perceive less social pressure to exercise,
- 4) be older, report poorer health, and report pain that prevents activities.

3.3 Research Design

This study was a cross-sectional survey. Data were collected from a convenience sample of community-living physically frail seniors. Differences between the TPB variables for “exercisers” and “non-exercisers” were examined using descriptive and bivariate analyses.

3.4 Sample

The target population consisted of all community-living, physically frail seniors residing in the Ottawa-Carleton region who had some degree of physical impairment, and who were dependent in one or more of the activities of daily living (ADLs) (i.e. feeding, dressing, grooming, physical ambulation, bathing, and toileting).

A nonprobability, convenience-sampling technique was used. Inclusion criteria were: a) age 65 or older, b) resident of Ottawa-Carleton region, c) able to speak or read English, d) no apparent cognitive impairment [i.e. ≤ 2 errors on Short Portable Mental Status Questionnaire (SPMSQ)], e) physically frail [i.e. score of 8-20 on the Physical Self-Maintenance Scale (PSMS)], f) not institutionalized, and g) written consent to participate in the study.

3.5 Subject Recruitment and Data Collection Procedures:

Seniors were recruited from the Community Care Access Center (CCAC), Victorian Order of Nurses (VON), day programs at two long-term-care (LTC) facilities, a day hospital program, three retirement residences, two seniors' health promotion programs affiliated with the Health Department of the Region of Ottawa-Carleton, and one women's church organization. Direct and indirect recruitment approaches were used.

3.5.1 Recruitment Approaches: Figure 3.1 presents a flow-chart of the two approaches used for subject recruitment and data collection (see Appendix D). The indirect approach involved a third party (i.e. program managers, nurses, and physiotherapists) in the initial recruitment process. However, with the direct approach, the researcher was responsible for all aspects of recruitment including the initial determination of the subjects' interest in and eligibility for the study.

The indirect approach used with the Clinical Care Access Centre (CCAC) and Victorian Order of Nurses (VON) clients consisted of the following steps:

- 1) Case managers of the CCAC and VON asked their nurses working in the community to determine their clients' interest in participating in the study (see Appendix E).
- 2) The nurses asked their clients for permission to release their names and telephone numbers to the investigator.
- 3) The investigator called the referred seniors, provided an explanation of the study and assessed their eligibility (see Appendix F). Arrangements were made to complete a face-to-face interview in the respondent's home.

- 4) At the home visit, potential subjects received a more detailed explanation about the study and what their participation involved (see 3.6 Ethical Considerations & Appendix G). After receiving written permission, the subject was screened and the questionnaire was then administered to the subject (see Appendix H).
- 5) A copy of the signed consent was given to the subject.

The direct approach consisted of the following steps:

- 1) The investigator introduced the study at various walking programs, chair exercise programs, and luncheon groups.
- 2) The investigator asked for volunteers and a letter of information was given to interested parties (see Appendix F).
- 3) In a private setting the consent form was reviewed with the senior and any questions were answered (see 3.5 Ethical Considerations).
- 4) After receiving written consent (see Appendix G) the screening process was completed (see Appendix H) and the questionnaire was administered to the eligible subject. In some instances, arrangements were made for a later interview at the same community setting or at the respondent's home.
- 5) A copy of the signed consent was given to the subject.

The indirect approach used for clients of day programs consisted of the following steps:

- 1) Program managers at senior's day programs associated with one-day hospital and two LTC facilities were approached by the investigator and a letter of information was given to them (see Appendix E).

- 2) Using the inclusion criteria provided in the letter of information the program managers briefly approached clients they thought met the criteria, explained the study, and determined their interest.
- 3) A list of potential subjects was provided to the investigator.
- 4) The investigator approached each senior and a more detailed explanation of the study was provided.
- 5) In a private setting after receiving written consent, screening was completed and the questionnaire was administered.
- 6) A copy of the signed consent was given to the subject.

Program directors at a day hospital and two LTC facilities provided the investigator with a general description of the population characteristics prior to the actual recruitment. The participation rate among men was expected to be lower than among women. Thus, one of the planned strategies was to recruit from an all male group. However, despite obtaining permission to approach a group of male veterans, the group dissolved before the investigator had the opportunity to initiate recruitment.

With respect to exercise status, the investigator was aware that all seniors associated with the day hospital and LTC day programs were participating in chair exercises. Thus, to avoid over-sampling exercisers, one of the planned recruitment strategies was to target seniors not associated with social exercise programs.

Finally, the investigator anticipated that seniors recruited from the day hospital would have greater functional limitations compared to seniors recruited from seniors' residences or from home care. This assumption was based on the investigators' awareness concerning admission criteria for the day hospital. To gain admission to the day hospital, a senior had to

require at least two of the rehabilitative services provided at the day hospital (e.g. nursing, physiotherapy, recreation, and dietary). Thus, to ensure a heterogeneous population with regard to level of disability, one of the planned recruitment strategies was to recruit seniors from diverse settings which included: seniors' residences, health promotion programs, home care, and social groups.

All questionnaires were administered in face-to-face interviews by the investigator. Although this method can be more time consuming for the interviewer compared to self-completed questionnaire, this method has several advantages. For example, face-to-face interviews can result in a higher response rate, permit inclusion of illiterate seniors, and minimize the cognitive burden for seniors with sensory-motor or visual or sensory-motor deficits (Aminazedeh. 1997; Guelder & Hanner, 1989; Zimmer et al, 1985).

To ensure consistency in the administration of the questionnaire, questions were read to the subjects exactly as they were written. All subjects were given the option of using visual references. The visual references consisted of a series of 14 cards, listing the different response options to individual questions. Large print and a bright yellow color were used to help subjects with visual impairments. These cards were designed to help reduce fatigue and response burden. Lastly, the investigator recorded all verbatim comments during the interviews with respondents. All observations during the investigators' participation in the various exercise programs were recorded.

3.6 Sample Size and Power

There were two considerations regarding sample size: feasibility and statistical power. A five-month time period was available for data collection. Based on previous research

(Aminzadeh, 1997), it was estimated that approximately 100 seniors could be recruited during the five-month study period. Statistical power was estimated for independent means, based on the approach of Cohen (1977). Table 3.1 presents a range of powers of independent means for small to large effect sizes, for a sample size of 100. As illustrated in the table, the power of this study to detect the hypothesized differences between “exercisers” and “non-exercisers”, and the TPB variables, assuming a medium effect size, was adequate (.70 with $\alpha = .05$, two-tailed).

Table 3.1 Power Estimates for Independent Means With Fixed Sample Size of 100 (Two-Tailed, Alpha = .05)

Sample size	Small effect ($\sigma = .20$)	Medium effect ($\sigma = .50$)	Large effect ($\sigma = .80$)
N= 100	.17	.70	.98

3.7 Ethical Considerations

Ethical approval for this study was obtained from the University of Ottawa Ethics Committee, the Ottawa-Carleton Health Department Research Ethics Committee and the Queensway-Carleton Hospital Ethics Committee (see Appendix I). Before administering the questionnaire, seniors received a verbal and written explanation of the study purpose and procedures, and of their rights. Seniors received a copy of the consent form signed by the investigator (see Appendix G). Confidentiality was maintained using anonymous identifiers. Throughout the interviews appropriate steps were taken to compensate for seniors’ functional deficits. As well, similar considerations were made in the design of the questionnaire. For example, to minimize undue fatigue and response burden the entire interview was designed to take on average 30-45 minutes for completion (i.e. administrative, screening, questionnaire, and debriefing).

Following administration of the questionnaire, participants were provided with a copy of Canada's Physical Activity Guide to Healthy Active Living for Older Adults (Health Canada, 1999 a). Seniors who were interested in having further information about exercise programs were directed to the various programs organized by the Ottawa-Carleton Regional Health Unit.

3.8 Measurement

3.8.1 Screening Tools: The Short Portable Mental Status Questionnaire (SPMSQ) was used as a screening tool for cognitive impairment (see Appendix H). It is a brief screening tool consisting of ten questions, which have been extensively used and incorporated, for example into the Older American Research Service Center Instrument (OARS) assessment (McDowell & Newell, 1996). The tool has been tested in a number of studies (Erkinjuntti, Sulkava, Wikstrom, & Autio, 1987; Fillenbaum, 1980; Pfeiffer, 1975; Smyer, Hofland, & Jonas, 1979), and shows adequate reliability and validity in clinical samples. The instructions and scoring technique, as recommended by the author Pfeiffer (1975), were followed (see instructions for scoring SPMSQ, Appendix H). A score of 0 to 2 errors indicates intact intellectual functioning and qualified the subject for inclusion in this study.

The Physical Self-Maintenance Scale (PSMS) developed by Lawton and Body (1969) was used as a screening tool for physical frailty (see Appendix H). The PSMS appears to be a reliable and valid ADL scale for clinical and survey research applications (McDowell & Newell, 1996). Two alternate scoring methods can be used. These are: 1) a count of the number of items on which any degree of disability is identified, or 2) a severity scale, which sums the response codes for each item, resulting in an overall score ranging from 6 to 30 (McDowell & Newell, 1996). In this study, the latter scoring method was used. A score of six indicates complete

independence or no disability, while a score of 30 indicates total dependence or severe disability. One item asked subjects if they were able to rise from a chair. However, according to McDowell and Newell (1996), this item is not assigned any numerical value and thus does not contribute to the total PSMS score. Lastly, one question asking respondents about bathtub grab-bar use was added to the ADL screen. This decision was based on the fact that the Lawton and Brody instrument scores only people requiring human assistance for bathing as dependent. This tool does not consider any form of mechanical assistance such as grab-bars. Initially, the investigator was concerned that the PSMS would not provide an accurate picture of the bathing difficulties experienced by some seniors. However, examination of the data collected on bathing indicated that over one-half of the subjects were dependent on human assistance for bathing. Therefore, to maintain consistency with the recommended method of scoring, the investigator decided not to assign any numerical value to this item.

As discussed earlier, the term “frail” has yet to be universally defined. For this study, a physically frail senior was defined as an older person > 65 years, who had difficulty performing one or more of the activities of daily living independently. The cut-points of 8 and 20 on the PSMS were used to ensure that independent seniors (i.e. score of 6-7), as well as severely disabled seniors (i.e. score of 21-30), would be excluded from this study. Several examples are outlined below to illustrate the rationale for using the cut-points of 8 and 20.

- 1) A senior with a score of six would be completely independent in performing all six ADLs. Such a senior would not be considered frail and would be excluded from this study.

- 3) Home care program managers suggested that a score of 8 to 20 would be representative of the types of clients requiring home care. They suggested that the probability of finding seniors living independently in the community with a score greater than 20 would be small, for many of these seniors would be institutionalized.
- 4) A senior with a score of 21 would require moderate assistance on five tasks or extensive help with four tasks. A senior with a score of 30 would require extensive human assistance to successfully complete all six ADLs. Seniors with such high scores are seriously physically compromised, and in most cases would be unable to actively exercise. Therefore, seniors scoring 21 to 30 on the PSMQ were excluded from this study.

3.8.2 Measurement of Variables in Main Questionnaire: The Questionnaire began with the measurement of the TPB variables, followed by questions on health and sociodemographic characteristics (see section E & J, Appendix H). This type of sequencing has been recommended by other researchers for it can reduce anxiety associated with questions of a personal nature which could potentially affect the participants' responses to the attitude-intention questions (Aminzadeh, 1997; Fry, 1986).

TPB Variables (Sections A to D, Appendix H): The Older Adults' Exercise Questionnaire (OAEQ), composed of seven 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.

Exercising Behaviors (see section H, Appendix H): The basic format for the questions on exercise type, frequency, and duration was extracted from the 1988 Ontario Health Survey (Ministry of Health, Ontario, 1988). The following modifications to the questions were made:

1. Based on a review of the literature and with the input of a multidisciplinary team of health professionals, the statements of exercise types were modified to better reflect exercises more common to a frail senior population. For example, exercises included in the 1988 Ontario Health Survey such as “running/jogging” were replaced by “walking”.
2. The list of 21 activities (see section H, Appendix H) was divided into three categories to provide the investigator with a reference point to allow for comparisons [i.e. endurance (n = 6), strength/balance activities (n = 8), and flexibility activities (n = 7)].
3. The time reference of “have you done any of the activities within the past month” was changed to “during the past week” because the investigator was interested in more recent exercise behaviors.
4. The option “other” was added to each of the three categories to capture additional types of activities not listed. The option “none of the above” was included to capture information on seniors who were not doing any type of exercise.
5. To obtain data on the intensity of these exercises, subjects were asked to rate their perceived intensity of the particular exercises that they were engaging in. The response options included “very light”, “light”, “somewhat moderate”, “moderate”, and “heavy/vigorous” (see Section H, Appendix H).

Data on whether anyone had ever advised the subject to exercise was collected by a question with a “yes” or “no” response option. To determine who advised the subject to exercise,

a question with the following response options was included: “doctor”, “nurse”, “physiotherapist”, “chiropractor”, “home care worker” and “other/specify” (see section I, Appendix H).

Data on whether the subject received assistance to exercise were collected by a question with a “yes” or “no” response option. To determine who assisted the subject with his/her exercises, a question with the following response options was included: “nurse”, “physiotherapist”, “home care worker”, “spouse/partner”, “your children”, and “other” (see section J, Appendix H).

3.8.3 Indicators of Frailty: Various measures of frailty tapped impairments in physical function faced by seniors and identified their perceived and objective needs for exercise.

Perceived health compared to peers is a subjective measure of health status extracted from the Older Adults American Research Service Center Instrument (OARS) (Duke University Center, 1978). Subjects were asked to rate their health compared to other people their own age. Responses included “excellent”, “very good”, “good”, “fair”, and “poor” (see section E, Appendix H).

This question has been included in a variety of large-scale gerontological surveys (Davis, 1989; Government of Canada, 1993; Health and Welfare Canada, 1988) and its validity has been established by its correlation between self-ratings of health and objective health measures as well as, self-ratings and physician’s judgments (Fillenbaum, 1979; Larue, Bank, Jarvik, & Hetland, 1979). Lastly, in a representative sample of 3,128 community-living seniors in Canada, this self-reported health measure was reported to be a predictor of mortality, (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 asks seniors to self-rate their 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" (see section F, Appendix H).

The effect of pain or discomfort on level of activity was measured using a question developed for the Ontario Health Status Survey (Ministry of Health, Ontario, 1988). This question asks seniors about pain and the impact of pain on their level of activity. Responses included "free of pain or discomfort", "pain or discomfort that does not prevent any activities", "pain or discomfort that prevents a few activities", "pain or discomfort that prevents some activities", and "pain or discomfort that prevents most activities" (see section G, Appendix H).

3.8.4 Sociodemographic characteristics: Data on age, gender, marital status, living arrangements, mother tongue, education and income were collected using questions from the OARS and the Fall Prevention Behavior Questionnaire (FPBQ) (Edwards, 1995) (see section J, Appendix H).

3.8.5 Measurement of "Exercisers" and "Non- Exercisers": For this study "exercise" was defined as "any physical activity performed for the purposes of improving or maintaining health or fitness. These activities could be performed in a formal or informal setting, performed individually or as a group, and include both leisure and household activities ". To ensure consistency, all subjects were provided with this definition prior to answering the questions concerning their individual exercise habits (see section H, Appendix H). This definition was

formulated based on a variety of discussion and conceptual papers (Blair, Kohl, & Gorden, 1992; Dunn, Anderson, & Jakicic, 1998; King, Rejeski, David, & Bucher, 1998), as well as, public health guidelines (Health Canada, 1999 a; Pate et al., 1995).

To enable a comparison, the investigator needed to set up criteria to categorize subjects as “exercisers” or “non-exercisers”. There were several considerations in formulating the criteria for this study. These considerations are outlined below.

- 1) A recent Health Canada publication recommends that seniors should try to accumulate 30 to 60 minutes of moderate activity most days of the week (Health Canada, 1999 a). Using five days per week as a reference point, this would equate to 150 to 300 minutes of moderate intensity exercise per week.
- 2) Health Canada suggests that seniors choose activities from all three-activity groups: daily flexibility activities, endurance activities (4-7 days a week), and strength/ balance activities (2-4 days a week).
- 3) The above criteria are intended for the general senior population. Based on clinical judgment, as well as empirical evidence of effective exercise interventions, it was decided to modify the above criteria for the frail senior population. A discussion of these modifications follows.

3.8.6 “High Actives” Versus “Low Actives”: Using this study definition of exercise, all but one senior reported engaging in at least one type of exercise. To provide a more accurate description of the groups being compared, the labels “exercisers” and “non-exercisers” were changed to “high actives “ and “low actives”.

In determining if a senior was a “high” or “low” active, the frequency, duration and intensity of each reported exercise was considered and a cumulative total exercise score (TES) was calculated for each participant. Thus, the $TES = \Sigma (\text{frequency/ per week of each exercise performed; multiplied by the intensity of each exercise performed; multiplied by the duration of each exercise performed})$. More simply stated, the $TES = \Sigma (\text{Frequency} \times \text{intensity} \times \text{time})$ of all reported exercises.

The investigator decided to relax the recommended cumulative weekly duration of 150 -300 minutes for the frail senior population. A cut point of 150 minutes per week was chosen (e.g.. 5 days per week x 30 minutes = 150 minutes per week). The rationale for this choice was based on clinical judgment, as well as empirical knowledge of what would be an appropriate and effective cumulative exercise duration for the more frail senior population (Pate et al., 1995; Health Canada, 1999 a).

Seniors were provided with four possible duration options. These were: a) 1-15 minutes, b) 16-30 minutes, c) 31-60 minutes, and d) > 60 minutes. In order to estimate the total weekly exercise time, the investigator assigned new average values to replace these values. These new values were: a) 1-15 minutes = 8 minutes, b) 16-30 minutes = 23 minutes, c) 31-60 minutes= 46 minutes, and d) > 60 minutes = 60 minutes. In determining these new assigned values several factors were considered.

The new value of 8 minutes was based on comments made by the respondents during the interviews. Many of the respondents who chose the 1-15 minutes category commented that they would split this time into 2-3 short segments of exercise, resting for 1-2 minutes between each segment. Thus, 8 minutes may better approximate the average actual exercise time.

The investigator had the opportunity to participate in the chair exercises in all of the day programs. Typically, within a 30-minute chair exercise program, 5-10 minutes was allotted for administrative purposes, which reduced the actual exercise time to 20-25 minutes. Thus, 23 minutes represents an estimation of the average actual exercise time. Similarly, home exercisers commented that they often split a 30-minute exercise session into two 10-minute sessions to avoid fatigue.

One facility offered a 60-minute chair exercise program. Within this 60-minute program about 15-20 minutes was allotted for administrative/educational purposes. Similarly, home exercisers who reported exercising for 31-60 minutes indicated that they split the routine into 15-20 minute segments to reduce fatigue. Thus, 46 minutes represents an estimation of the average actual exercise time.

Subjects who choose the >60 minutes duration, typically were walking outdoors. Although these subjects reported that they took rest periods when tired, they typically reported walking for a total of 60 minutes per exercise session. Thus, 60 minutes represents an estimation of the average actual exercise time.

Seniors were provided with five intensity options, which were a) very light, b) light, c) somewhat moderate, d) moderate, and e) vigorous. For this study, the investigator decided to adopt Health Canada's recommendation with respect to "moderate" intensity.

The investigator divided the intensity options into two categories: 1) an activity performed at a perceived intensity of "very light" or "light" would be defined as a "low" intensity activity, and 2) an activity performed at a perceived intensity of "somewhat moderate", "moderate" or vigorous would be defined as a "high" intensity activity. In order to calculate a TES for each

respondent, these categories were assigned a numerical value. Thus, a “low” intensity activity was assigned a value of zero, while a “high” intensity activity was assigned a value of one.

The final consideration in determining the TES for each participant related to exercise frequency. In determining the TES, the intensity and duration of the exercise was multiplied by the reported frequency of the exercise.

In summary, calculation of the TES and the classification of participants as either “low” or “high” actives were based on the following considerations. The exercise patterns of each participant were examined.

- 1) The reported durations were replaced with a single numerical value, which represented an average estimation of the time spent exercising (i.e. 8, 23, 46, 60 minutes).
- 2) The reported intensity was assigned new values which were: 1) Very light/light = low activity = 0, and 2) Somewhat moderate/moderate/vigorous = high activity = 1.
- 3) The intensity and duration of each exercise was multiplied by the reported frequency.

A senior would be classified as a “high” active if his/her TES = >150 minutes per week. Conversely, a senior would be classified as a “low “ active if his/her TES ranged from 0-150 minutes per week. The reader is referred to Appendix J, which provides an illustration of the scoring method used in this study.

3.9 Data Preparation and Analysis

3.9.1 Data Preparation: A database was constructed using the Statistical Package for Social Sciences (SPSS) for Windows (9.0). Data were entered directly from coded questionnaires. Following data entry, a two-step data verification process was used: 1) all data values for 25 cases were rechecked by two people. One person read the data from the coded

questionnaire, while the other checked that the correct number was entered on the computer, 2) data cleaning was conducted to detect errors (e.g. out of range values) through a review of the frequency distributions and descriptive statistics for each variable. Skip patterns were checked using cross tabulations.

3.9.2 Data Analysis: The following analyses were conducted:

- 1) Descriptive statistics (mean, standard deviations, and percentages) were used to describe the sociodemographic, health and exercise behaviors of the total sample, as well, as the two subgroups of “high” and “low” actives.
- 2) Pearson correlations were calculated to determine the associations among various components of the TPB model. Details of the scoring and measurement of the TPB variables are outlined in Chapter 4 (see section 4.3, Scale Development and Measurement of the TPB Variables).
- 3) Differences between “high” and “low” actives with respect to each TPB variable were examined using chi-square tests for categorical variables and independent t-tests for continuous measures.
- 4) Stratified analyses, by gender, age, health status, and pain/activity restriction were completed to determine if these four variables influenced the results. Independent sample t-tests were used to compare the mean scores of high and low actives for each of the TPB constructs within each stratum. Mann-Whitney U tests were done to determine statistically significant group differences. These non-parametric tests were used due to the small sample size within some of the strata.

CHAPTER FOUR

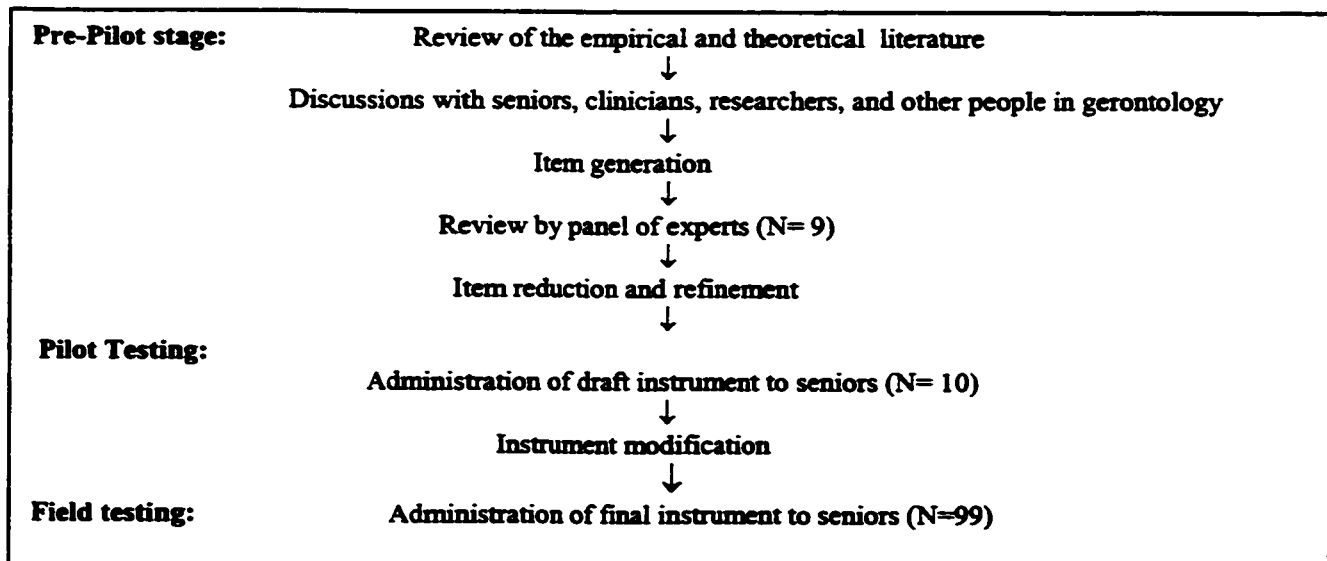
INSTRUMENT DEVELOPMENT AND PILOT TESTING

The instrument development process comprised a combination of qualitative and quantitative methods. This chapter describes the approaches used in developing and pretesting the instrument.

4.1 Instrument Development Process

The Older Adults' Exercise Questionnaire (OAEQ) was developed by the author to operationalize the constructs of the TPB model. The instrument development process was comprised of two stages: instrument formation in the pre-pilot stage, and pilot testing of the draft instrument. A flow-chart of the instrument development process is presented in Figure 4.1.

Figure 4.1 Flow-Chart of Instrument Development Process



4.2 Pre-Pilot Stage

The two main activities of the pre-pilot stage were: item generation and a panel review of the instrument to establish face and content validity of the instrument.

4.2.1 Item Generation: A pool of potential items was drawn from previous empirical and theoretical literature, as well as from discussions with seniors, clinicians, researchers, home care and program managers. Certain strategies, such as the avoidance of double negatives and the construction of clear, direct, and relevant questions, were used to reduce measurement error (Aminzadeh, 1997; Streiner & Norman, 1995). Finally, an approximate equal numbers of negative and positive items were generated to minimize response set-acquiescence (i.e. agreeing with items regardless of content) (Aminzadeh, 1997; Kline, 1993; Streiner & Norman, 1995).

4.2.2 Item Refinement and Reduction: The initial pool of 72 items (excluding sociodemographic variables) was evaluated by a panel of nine experts composed of researchers and clinicians with expertise in the areas of fall prevention, gerontology, statistics, kinesiology and health behavior measurement. Panel members were given specific instructions to evaluate the items with respect to accuracy, relevance, completeness, construction flaws, biases, and were asked to provide recommendations for revisions (Aminzadeh, 1997; Burns & Grove, 1993). Finally, panel members were asked to rate the instructions to participants and to provide additional items to ensure that all aspects of each construct were covered.

Based on the panel's evaluations and suggestions, the revised draft questionnaire consisted of 62 items. A minimum of one item was retained for each dimension of the measured constructs (Streiner & Norman, 1995).

4.3 Scale Development and Measurement of the TPB Variables: The OAEQ consisted of 7 subscales eliciting constructs of the TPB (see Conceptual Framework, section 2.6). In general, scale development followed the methods recommended by Ajzen and Fishbein (1980), Ajzen (1988), Ajzen & Madden (1985), and Godin and Kok (1996). The questionnaire began with instructions concerning use of the five-point Likert scales and was followed by an assessment of the TPB constructs.

4.3.1 Attitude: Table 4.1 (see p.47) illustrates the attitudes, subjective norms and perceived behavioral control items. Attitude was measured using both a direct and an indirect measure. An indirect measure (belief-based) of attitude was assessed by obtaining a summative score of the products of 12 outcome beliefs. The strength of subjects' beliefs with respect to the 12 social, health and personal consequences of exercising was assessed, using response options ranging from very unlikely (-2) to very likely (+2).

Although not consistent with the guidelines of the authors (Ajzen, 1988; Ajzen & Fishbein, 1980), the outcome evaluation scale was omitted. This decision was based on past research that points to the problematic nature of the outcome evaluation component of the model (Aminzadeh, 1997; Mullen, Hersey, & Iverson, 1987; Young, Liberman, Powell-Cope, Kasprzyk, & Benoliel, 1991). For example, poor performance during pilot testing of two different formats of this scale (i.e. high response latency, high "don't know" and high "it depends" answers) and concerns for "satisficing" effects, lead the investigator to eliminate the outcome evaluation scale for the main study (Aminzadeh, 1997). In another study, participants

Table 4.1 Attitudes, Subjective Norms and Perceived Behavioral Control Items**Indirect Attitude****Outcome Beliefs**

- 1.Exercising would make my muscles and bones stronger.
- 2.Exercising would make me feel too tired.
- 3.Exercising would reduce my risk of falling.
- 4.Exercising would give me more energy.
- 5.Exercising would help me meet new people.
- 6.Exercising would help me think more clearly.
- 7.Exercising would help me to enjoy my life more.
- 8.Exercising would help me to feel more relaxed.
- 9.Exercising would help me maintain my independence.
- 10.Exercising would keep my joints flexible.
- 11.Exercising would be painful.
- 12.Exercising would reduce my aches and pains.

Direct Attitude

- 1.Exercising would be inconvenient

Indirect Subjective Norm**Normative Beliefs**

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

Motivation to Comply

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

Direct Subjective Norm

- 1.Most people who are important to me think I should exercise.

Indirect Perceived Behavioral Control**Control Beliefs**

- 1.Not knowing how to exercise would discourage me from exercising.
- 2.The cost of an exercise class would discourage me from exercising.
- 3.Fatigue would discourage me from exercising.
- 4.My health problems would discourage me from exercising.
- 5.Lack of transportation would discourage me from exercising.
- 6.Lack of someone to exercise with would discourage me from exercising.
- 7.Lack of motivation would discourage me from exercising.
- 8.Lack of support would discourage me from exercising.
- 9.At my age, it is hard to get interested in doing regular exercise.

Direct Perceived Behavioral Control

- 1.If I wanted to, I could easily exercise.

responded to the evaluative items by stating, “they had already answered the question” (Mullen, 1987). The difficulty with this scale may partly be explained by the fact that in asking a respondent to evaluate an item, one assumes that the respondent holds an absolute opinion about the belief and that it is possible for the respondent to make this evaluation acontextually (Young et al, 1991). Another possible explanation for the problems with this scale pertains to the fact that beliefs items and the evaluative items are conceptually similar (Mullen et al., 1987).

The statement “exercising would be inconvenient” assessed a more direct (or global) measure of attitude (see Table 4.1, p.47). On a five-point Likert-scale, respondents indicated their response, with endpoints labeled from very unlikely (+2) to very likely (-2).

4.3.2 Subjective Norms (SN): The indirect measure of SN was based on normative beliefs concerning the expectation of four groups of referents: family, friends, doctor, and other health care workers (see Table 4.1, p.47). On five-point scales, respondents indicated the likelihood that these referents think they should exercise, with endpoints labeled very unlikely (-2) and very likely (+2). The corresponding motivation to comply was evaluated by subjects to indicate to what extent they were inclined to act according to the recommendations made by the four referents (see Table 4.2, Appendix K). On five-point Likert scales, response options ranged from very little (1) to a great deal (5). As recommended by Ajzen and Fishbein (1980), this was the only scale that adopted a unipolar scoring technique. Finally, each measure of normative beliefs was multiplied by the score for corresponding motivation to comply and the products were summed.

A direct measure of perceived social pressure was assessed with the statement, “most people who are important to me think I should exercise”. On a five-point Likert scale

respondents indicated their response, with endpoints labeled very unlikely (–2) to very likely (+2).

4.3.3 Perceived Behavioral Control (PBC): The indirect measure of PBC over exercising was constructed by summing over nine control beliefs with respect to specific difficulties involved in exercising (see Table 4.1, p.47). Using a five-point Likert scale, with endpoints labeled very unlikely (+2) to very likely (–2), respondents stated their beliefs to each of these nine control beliefs. Although this method of measurement does not strictly adhere to the guidelines of Ajzen (1991), this alternate method has been used in some previous applications (Aminzadeh, 1997; Ajzen & Madden, 1985; Courneya, 1995; Godin, Valois, & Lepage, 1993) and was recommended by the authors of a critical review of the model (Godin & Kok, 1996). Normally, PBC is computed by summing the products of the control beliefs and the relative strength of these control factors. Lastly, the direct measure of PBC (see Table 4.1, p. 47) was obtained by assessing the degree to which participants believed they had control over exercising. Scale format was similar to that for the indirect measure of PBC and this item was reverse coded [(i.e. endpoints labeled very unlikely (–2) to very likely (+2)(e.g. if I could I could easily exercise)].

4.3.4. Intentions: Two intentions were measured. The first item asked seniors about their intention to start exercising within the next month, while the second item asked about their intention to continue exercising within the next month. The responses for each measure of intention were recorded on a five-point Likert scale, with endpoints labeled very likely (+2) to very unlikely (–2).

4.4 Summary of Scale Development Procedures to Measure the TPB Model Constructs:

Construction of the OAEQ required a number of modifications to the procedures for scale format recommended by Fishbein and Ajzen (1975) and Ajzen (1991). These modifications are discussed below.

Normally, semantic differential scales, which consist of seven-point response options, inserted between bipolar adjectives, are used to operationalize the constructs of the TPB model. [(e.g. good/bad, harmful/ beneficial)(Ajzen & Fishbein, 1980)]. In this study, five-point bipolar Likert scales were used to measure all constructs of the model to maintain consistency and minimize the cognitive burden for frail seniors (Burns & Grove, 1999). The Likert scale is the most extensively used scaling technique designed to measure attitude and there is growing evidence suggest that Likert scales and semantic differential scales yield comparable results (Aminzadeh, 1997; Burns & Grove, 1999; Fishbein & Ajzen, 1975).

In most past applications of the model, the indirect measure of attitude is obtained through multiplicative composite scoring. In this type of scoring, the participants determine the value of the attribute under investigation, rather than the researcher assigning a negative or positive value to the outcome beliefs (Fishbein & Ajzen, 1975). However, multiplicative composite scoring can be problematic because of the way it computes negative and positive scores (Streiner & Norman, 1995). Consider for example, that a woman does not believe that exercise has a positive outcome (e.g. reduced joint stiffness) (-2) and does not value the outcome (e.g. increased flexibility) (-2). With multiplicative composite scoring, this particular belief would make a contribution of (+ 4) to the woman's attitude towards exercising (Ajzen, 1980), when in fact her evaluation of exercise is negative.

In light of the difficulties identified by other researchers with the outcome evaluation scale the evaluative component was omitted in both the pilot and final questionnaire (Aminzadeh, 1997; Mullen, Hersey, & Iverson, 1987; Young et al., 1991). Lastly, based on the technical problems associated with multiplicative scoring (Streiner & Norman, 1995), the indirect attitude scale was constructed by summing over the outcome belief items to which the investigator assigned positive or negative values.

4.5 Pilot Testing

The draft questionnaire was pretested in a pilot study. The main objectives of this strategy were to establish if the questions were clear, complete and valid and to determine the time for questionnaire completion (Burns & Grove, 1993).

4.5.1 Sample: A sample of 10 clients of a day program affiliated with a long-term-care facility (LTC), were recruited for the pilot study. Table 4.2 (see Appendix K) outlines the sociodemographic and health characteristics of this sample. Inclusion criteria were identical to those described for the main study. Attempts were made to recruit a heterogeneous sample with respect to functional limitations (i.e. visual and hearing impairments), age and gender, which could potentially affect the method of data collection. However, it was impossible to compare “exercisers” with “non-exercisers” for comparative purposes, since all subjects participated in a chair exercise program at the facility. The most common exercises performed by this sample were indoor walking (N = 10); chair exercise in a fitness class (N = 10); stretching in a fitness class (N = 10); and climbing stairs (N = 7).

4.5.2 Subject Recruitment and Data Collection Procedures: With a few exceptions subject recruitment and data collection methods followed the steps described for the main study (see section 3.4 Subject Recruitment and Data Collection Procedures). Prior to the interviews, subjects were informed that the study was a pilot and were asked to complete a copy of the signed “consent for pilot study” (see Appendix G).

Prior to completion of the questionnaire, subjects were asked five open-ended questions, concerning the major advantages; disadvantages; facilitators and barriers of exercise for themselves, and the individuals in their lives who were likely to have opinions about whether they should exercise or not. These responses were coded and analyzed to determine if the list of items in the OAEQ was complete (Aminzadeh, 1997).

Based on the recommendations of other researchers, various cognitive interviewing techniques were used. These techniques included: retrospective think-aloud (i.e. respondents asked to think aloud to indicate how they arrived at their answers); probes (i.e. follow-up questions to elicit more information); and paraphrasing (i.e. repetition of question in respondents own words) (Aminzadeh, 1997; Jobe & Mingay, 1989). Lastly, throughout the interviews, subjects’ verbal and non-verbal reactions (i.e. response burden, signs of confusion, answer changing) were monitored.

4.6 Findings and Revisions

4.6.1 Questionnaire Length: The average time to administer the questionnaire (including the time to complete the open-ended questions and the final debriefing session) was 42.9 minutes (SD 7 minutes)(range 35-60 minutes). Only one participant found the questionnaire lengthy. As reported by other researchers (Aminzadeh, 1997; Kelsey, O’Brien, Grisso, &

Hoffman, 1989) keeping respondents focused were a challenge that required patience and tact by the interviewer. Some participants provided details about their medical conditions and/or had difficulty recognizing the type of information needed. This tended to increase the length of the interview.

4.6.2 Comprehensiveness of Scale Format: Some seniors experienced difficulty responding to scale formats requiring a choice among multiple options. It has been suggested that some seniors when confronted with the ambiguity created by these types of scales tend to respond with a “yes” or “no”; choose extreme responses; or restrict their answers to the neutral midpoint position (Aminzadeh, 1997; Andrews & Herzog, 1986; Drevenstedt, 1975; Guelder & Hanner, 1989). Indeed, this was the case with two subjects who initially did not accept use of the visual references. These subjects tended to answer with a simple “yes” or “no”. After realizing the type of information that was needed, these subjects opted to use the visual references. Most of the subjects indicated that the visual references were very helpful.

4.6.3 Completeness of Response Options: All scales had an odd number of response options with the midpoint representing “neither likely nor unlikely”. This arrangement in bipolar scales permits subjects to maintain a neutral position (Streiner & Norman, 1995). Most previous applications of the TPB have excluded a “don’t know” response alternative, while some authors have treated “don’t know” responses as neutral answers, corresponding to “neither likely nor unlikely” (Montano & Taplin, 1991). As suggested by Aminzadeh (1997), a “don’t know” option was not included in this study in order to reduce the frequency of “don’t know” answers.

However, if subjects indicated that they did not know the answer, this was treated as a missing value and recorded as such.

4.6.4 Considerations of the Quality of Responses to Scale Items: Some seniors had difficulty answering questions pertaining to the beliefs of specific referents. Seniors made the following remarks: “ I don’t know, this topic has never been discussed ” and “I don’t know what my friends would think, because most of them are deceased”. On the other hand, the subjects had no problem answering the one-item direct measure of SN (i.e. most people who are important to me think I should exercise), which suggested that the “don’t know” answers indicated a genuine lack of information rather than a refusal to answer the questions.

A few questions in the indirect PBC scale seemed less salient for this sample of chair exercisers, who had already overcome some of the barriers to exercise. This included such statements as “ lack of knowledge” or “the cost” would discourage me from exercising. Because the investigator planned to interview respondents in various other settings, these items were retained because of the potential contribution of these items to the content validity of PBC.

In response to the question “lack of time would discourage me from exercising”, most respondents commented that this was either a “silly” and/or “ irrelevant” question. Some respondents commented that they had “too much free time” because they were retired. Based on this feedback, this question was eliminated.

None of the respondents found any of the items offensive. Lastly, coding of the open-ended questions validated the relevance and completeness of the existing items and no additions were deemed necessary.

4.6.5 Seniors' Responses to Other Study Questions: The pilot study also allowed the author to identify problems with other questions. Most respondents did not appear to have any difficulty understanding and answering questions about their health or activity levels, nor were they hesitant in revealing demographic information of a personal nature. None of the subjects had conceptual difficulty relating to the study definition of "exercise". Some gender differences emerged during the interviews. Men tended to talk about their past athletic abilities, while women made no reference to past exercising. Many of the men expressed frustration and dissatisfaction with their current exercise abilities. These gender differences may in part have been due to the fact that several of the men had a history of stroke with resulting weakness or paralysis.

In summary, this was a highly motivated group of chair exercisers. In fact, all respondents agreed to be interviewed on the condition that the interview did not interfere with their exercise time. Most respondents indicated the presence of a chronic condition or a past health event.

4.7 Discussion

This chapter provided a description of the approaches used to ensure face and content validity of the OAEQ. To ensure completeness and to minimize the biases inherent in selecting items from limited sources, scale items were elicited from various sources (Streiner, 1993). A panel of nine clinicians and researchers evaluated the first draft. This strategy has been reported to be a sensible and sound approach that ensures that the best possible item content is obtained (Burns & Grove, 1993; Kline, 1993). In fact, the review by panel members allowed the investigator to make nearly all of the revisions prior to the pilot study. The draft questionnaire

was pre-tested in a pilot study, which permitted an analysis of the open-ended questions to further verify the content validity of the questions. The revisions following the pilot study included some minor rewording and reformatting of the instructions for the participants, and the elimination of one irrelevant item (i.e. lack of time would discourage me from exercising). Since the revisions to the questionnaire were few and minor, the data from the ten pilot study subjects were added to the data from the main study for analysis.

CHAPTER FIVE

RESULTS

This chapter begins with a description of the response rate. Sociodemographic and health-related characteristics of the sample and the two groups of “low actives” and “high actives” are then presented. A summary of respondents’ exercise behaviors is provided. Finally after describing the relationship among various components of the TPB model, the differences between “low actives” and “high actives” are outlined.

5.1 Response Rate

During the recruitment period for the main survey (i.e. December 06, 1999 to May 30, 2000), 150 subjects were approached. Twenty-seven seniors (18 %) refused to participate in the study, either because they were not interested (N= 24), or because of health problems (N= 3). Twenty-four of the consenting seniors (16%) were ineligible for inclusion. Reasons for exclusion were: possible cognitive impairment (N= 3), under the age of 65 years (N= 1), high functioning (i.e. score of ≤ 7 on the PSMQ) (N= 20). Thus, a convenience sample of 99 eligible subjects was recruited for the survey.

Data from participants in the pilot study were added to the sample. This decision was justified since the data collection procedures and measures of the variables for the pilot study were nearly identical to that of the main survey (see section 4.4 Pilot testing). A total of 11 subjects were approached in the pilot study, and one was excluded due to high functioning. Thus, the final sample consisted of 109 subjects. Figure 5.1 presents a flow-chart of the recruitment process (see Appendix L).

Calculation of the exact response rate for this study was difficult. Many seniors terminated the telephone conversation or left the community settings before eligibility screening was completed. With the indirect approach, case managers of home care contacted their clients and only those who gave permission had their names released to the investigator. Thus, no information was available on the number of seniors who refused to have their names released to the investigator. If all known refusals were assumed to be eligible for the study, an estimate of the response rate would be 90.6%. Nearly one-half (44%) of the subjects were recruited from the CCAC and the VON, 19.3% from a day hospital program, 15.6 % from day programs at long-term-care facilities, 15.7% from three seniors' retirement residences, 2.8 % from two health promotion programs, and 2.8% from a women's church organization. The average time to administer the questionnaire was 32.5 minutes (SD 10.7, range, 15-60).

5.2 Sample Characteristics

5.2.1 Sociodemographic Characteristics

a) Total Sample: Table 5.1 describes the sociodemographic characteristics of the respondents. The majority of respondents were female (82.6%), with an average age of 80.1 years (SD 6.4, range 65-94). The majority were widowed (56.9 %), and lived alone (57.8%). Of those who cohabited, 61% lived with their spouse and 34.1% with their own children. The majority of respondents (83.5%) reported English as their mother tongue, 8.3% reported French, and 8.3% reported another language. Most respondents (84.4%) reported their income as completely or somewhat adequate. Finally, 87.2 % of respondents had some secondary or higher education.

Table 5.1 Comparison of Sociodemographic Characteristics Between High and Low Actives

		<i>Low Actives</i> (N=59)		<i>High Actives</i> (N=50)		<i>Total Sample</i> (N = 109)		<i>Statistic</i>
		%	N	%	(N)	%	(N)	
<i>Age Group</i>	65-74	15.3	(9)	26	(13)	20.1	(22)	$X^2 = 2.18$
	75-84	57.6	(34)	54	(27)	55.9	(61)	$df=2$
	85-94	27.1	(16)	20	(10)	23.8	(26)	$p = .34$
<i>Gender</i>	Female	89.8	(53)	74	(37)	82.6	(90)	$X^2 = 4.71$
	Male	10.2	(6)	26	(13)	17.4	(19)	$df=1$ $p=.030 *$
<i>Marital Status •</i>								
Never married/single ^a		11.9	(7)	8	(4)	10.1	(11)	$X^2 = .55$
Married/ common law		23.7	(14)	30	(15)	26.6	(29)	$df=1,$
Divorced/ separated ^a		5.1	(3)	8	(4)	6.4	(7)	$p = .46$
Widowed ^a		59.3	(35)	43.5	(27)	56.9	(62)	
<i>Living Arrangements</i>								
Lives alone		55.9	(33)	40.0	(20)	57.8	(63)	$X^2 = .18$
Cohabits		44.1	(26)	60.0	(30)	42.2	(46)	$df=1$ $p = .67$
<i>Co- habits with •</i>								
Spouse		56.5	(13)	66.7	(12)	61.0	(25)	$X^2 = .01$
Own children ^b		34.8	(8)	33.3	(6)	34.1	(14)	$df=1$
Other ^b		8.7	(2)	0	(0)	4.9	(2)	$p = .92$
<i>Highest Level of Education</i>								
No formal -completed elementary		11.8	(7)	9.7	(7)	13.7	(14)	$X^2 = 5.12$
Some-completed secondary		61.0	(36)	40.0	(20)	51.4	(56)	$df=2$
Post-secondary or higher		27.1	(16)	46.0	(23)	35.8	(39)	$p = .08$
<i>Income</i>								
Somewhat to completely adequate		86.4	(51)	82.0	(41)	84.4	(91)	$X^2 = .41$
Somewhat inadequate to inadequate		13.6	(8)	18.0	(9)	15.6	(17)	$df=1$ $p = .52$
<i>Mother Tongue •</i>								
English		81.4	(48)	86	(43)	83.5	(91)	$X^2 = .42$
French ^c		8.5	(5)	8	(4)	8.3	(9)	$df=1$
Other ^c		10.2	(6)	6	(3)	8.3	(9)	$p = .52$

Legend: • Categories with the same identifiers (a-h) were collapsed for chi-square analyses. * statistically significant at $p < .05$

b) Group Differences: No statistically significant differences between the two groups with respect to age, marital status, living arrangements, education, income, and mother tongue were found. However, a significantly greater percentage of men, compared to women, were “high” actives.

5.3 Persons Who Advised and/or Assisted Respondents With Exercise

a) Total Sample: Table 5.2 describes key persons who advised and/or assisted respondents with their exercise. Over two-thirds of the respondents (67.9%) were advised to exercise: 55.4% by their doctors, 18.9% by physiotherapists, 12.2% by nurses, 5.4% by home care workers, 5.4% by family members, and 2.7% by chiropractors. Only 10.1% of the respondents received assistance with their exercise, 45.5% from home care workers, 27.3% from physiotherapists, and 27.3% from a spouse/partner.

b) Group Differences: No statistically significant differences between the two groups with respect to exercise “assistant” were found. However, a significantly greater percentage of high actives, compared to low actives, received advice to exercise from their doctors.

Table 5.2 Comparisons of Key Persons Who Advised and/or Assisted Respondents With Exercise

	<i>Low</i> (<i>N</i> =	<i>Actives</i> (<i>N</i>)	<i>High</i> (<i>N</i> =	<i>Actives</i> (<i>N</i>)	<i>Total</i> (<i>N</i> =	<i>Sample</i> (<i>N</i>)	
	%		%		%		<i>Statistic</i>
<i>Did anyone advise you to exercise?</i>							$X^2 = 2.78,$
Yes	61	(36)	76	(38)	67.9	(74)	$df = 1$
No	39	(23)	24	(12)	32.1	(35)	$p = .10$
<i>Who advised you to exercise? •</i>							
Doctor	38.9	(14)	71.1	(27)	55.4	(41)	$X^2 = 10.60,$
Nurse ^a	19.4	(7)	5.3	(2)	12.2	(9)	$df = 2$
Physiotherapist ^a	16.7	(6)	21.1	(8)	18.9	(14)	$P = .004 *$
Chiropractor ^b	2.8	(1)	2.6	(1)	2.7	(2)	
Home care worker ^b	11.1	(4)	0	(0)	5.4	(4)	
Other (specify, i.e. family) ^b	11.1	(4)	0	(0)	5.4	(4)	
<i>Does anyone assist you with exercise?</i>							$X^2 = .37,$
Yes	8.5	(5)	12	(6)	10.1	(11)	$df = 1$
No	91.5	(54)	88	(44)	89.9	(98)	$p = .54$
<i>Who assists you with your exercise •</i>							
Nurse ^c	0	(0)	0	(0)	0	(0)	<i>Fisher's Exact</i>
Physiotherapist ^c	0	(0)	50	(3)	27.3	(3)	<i>Test</i>
Home care worker ^d	60	(3)	33.3	(2)	45.5	(5)	$p = .18$
Spouse/partner ^d	40	(2)	16.7	(1)	27.3	(3)	

LEGEND: • Categories with the same identifiers (a-d) were collapsed for chi-square analyses. * statistically significant at $p < .05$

5.4 Health and Activity Characteristics:

a) Total Sample: As illustrated in Table 5.3, the majority of respondents (76.1%) rated their health as “good” “very good” or “excellent”, while 23.9% rated their health as “fair” or “poor”. Over one-third of respondents (36.7%) rated themselves as “ a little or a lot less active”, 34.8% rated themselves as “ a little more or a lot more active”, and 28.4% rated themselves as “about the same” as their peers. Over 40% of respondents (41.3%) reported that they were free of pain, or they had pain that did not prevent them from doing any of their activities. Over 20% of respondents (23.9%) reported that pain prevented a few of their activities. The remaining 34.9% of respondents reported that pain prevented some or most of their activities. Finally, 34.8% of respondents made no errors on the cognitive screen, 49.5% made one error, and 15.5% made two errors.

Table 5.3 Differences between “High” and “Low” Actives with Respect to Selected Health Variables

	<i>Low</i> <i>N=</i>	<i>Actives</i> <i>59</i>	<i>High</i> <i>N</i>	<i>Actives</i> <i>=50</i>	<i>Total</i> <i>N=</i>	<i>Sample</i> <i>109</i>	<i>Statistic</i>
<i>Health compared to their peers</i>							
Excellent/ very good/good	81.4	(48)	70.0	(35)	76.1	(83)	$\chi^2=1.92$
Fair /poor	18.6	(11)	30.0	(15)	23.9	(26)	$df=1$ $p=.17$
<i>Effect of pain/ discomfort on activity</i>							
Free of pain or pain with no activity restriction	52.5	(31)	28.0	(14)	41.3	(45)	$\chi^2=6.76$
Pain that prevents a few activities	18.6	(11)	30.0	(15)	23.9	(26)	$df=2$
Pain that prevent some or most activities	28.8	(17)	42.0	(21)	34.9	(38)	$p=.034^*$
<i>Activity compared to their peers</i>							
A little or a lot more active	28.8	(17)	42.0	(21)	34.8	(38)	$\chi^2=2.70$
About the same	33.9	(20)	22.0	(11)	28.4	(31)	$df=2$
A little or a lot less active	37.3	(22)	36.0	(18)	36.7	(40)	$p=.26$
<i># of errors on cognitive screen</i>							
0 error	35.6	(21)	34.0	(17)	34.8	(38)	$\chi^2=2.65$
1 error	44.1	(26)	56.0	(28)	49.5	(54)	$df=2$
2 errors	20.3	(12)	10.0	(5)	15.5	(17)	$P=.27$

Legend: * statistically significant at $p < .05$

b) Group Differences: As illustrated in Table 5.3, no statistically significant differences were found between the two groups with respect to most health variables. There was one exception. A higher percentage of high actives, compared to low actives, reported pain that prevented some or most of their activities.

5.5 Activities of Daily Living (ADLs)

a) Total Sample: Table 5.4 outlines the level of dependency with regard to six daily activities of living. The average PSMS score was 9.3 (SD 1.5, range 8-15). All respondents were independent with feeding (100%). The majority of respondents (82.6%) were independent with dressing, 13.8 % required minor assistance, and 3.7% required moderate assistance. The majority (80.7%) of respondents were independent with grooming, 16.5% needed occasional minor assistance, and 2.8% needed moderate and regular assistance.

Nearly all of the respondents (93.6%) required an assistive device for ambulation (i.e. 48.6% used canes, 39.4% used walkers, and 7.3% used wheelchairs). Over one-half of respondents (51.4 %) were independent in bathing, 38.5% could bath themselves but needed human assistance to get in or out of the tub, and 10.1% reported that they could wash their own face and hands, but needed assistance to wash the rest of their body.

Nearly two-thirds of respondents (65.1%) were independent with toileting, 33.9% reported rare episodes of incontinence (i.e. weekly at most), and only one respondent reported more frequent episodes of incontinence (i.e. > than once per week). Nearly all of the respondents (93.6%) reported regular grab-bar use due to either balance problems, fear of falling, and/or lack of muscle strength. Lastly, most respondents (97.2%) reported that they were able to rise from a chair without assistance. However, the investigator observed that many did so with difficulty.

Table 5.4 Comparisons of Activities of Daily Living Between High and Low Actives

	Low (N=	Actives 59)	High (N	Actives =50)	Total (N=	Sample 109)	
	%	(N)	%	(N)	%	(N)	Statistics
Feeding							
1.Eats without assistance	100	(59)	100	(50)	100	(109)	<i>all subjects on same level</i>
2. Eats with minor assistance	0	(0)	0	(0)	0	(0)	
3. Feeds self with moderate assistance	0	(0)	0	(0)	0	(0)	
4. Require extensive assistance for all meals	0	(0)	0	(0)	0	(0)	
5. Does not feed at all & resists all efforts	0	(0)	0	(0)	0	(0)	
Dressing •							
1. Dresses/undresses/ selects clothes by self	78.0	(46)	88.0	(44)	82.6	(90)	$\chi^2 = 1.89$ $df=1$ $p=.17$
2. Dresses & undresses with minor assistance ^a	16.9	(10)	10.0	(5)	13.8	(15)	
3. Need moderate assistance (dressing /selection) ^a	5.1	(3)	2.0	(1)	3.7	(4)	
4. Needs major assistance , but co-operates	0	(0)	0	(0)	0	(0)	
5. Completely unable to dress & resists efforts of others	0	(0)	0	(0)	0	(0)	
	0	(0)	0	(0)	0	(0)	
Grooming •							
1. Neatly dressed, groomed without assistance	67.8	(40)	96.0	(48)	80.7	(88)	$\chi^2 = 13.84$ $df=1$ $p = .001^*$
2. Grooms self with occasional minor help ^b	28.8	(17)	2.0	(1)	16.5	(18)	
3. Needs regular moderate assistance/supervision ^b	3.4	(2)	2.0	(1)	2.8	(3)	
4. Needs total grooming care	0	(0)	0	(0)	0	(0)	
5. Actively negates all efforts of others	0	(0)	0	(0)	0	(0)	
Ambulation •							
1. Goes around city or grounds	0	(0)	0	(0)	0	(0)	<i>Fisher's Exact Test</i> $p=.33$
2. Ambulates within one block or in residence ^c	3.7	(1)	6.0	(3)	3.7	(4)	
3. Ambulates with assistance of person or device ^c	96.3	(58)	94.0	(47)	96.3	(105)	
4. Sits unsupported in chair, unable to propel self	0	(0)	0	(0)	0	(0)	
5. Bedridden more than half of time	0	(0)	0	(0)	0	(0)	
Bathing							
1.Bathes self (tub/ shower/ sponge) without help	45.8	(27)	58.0	(29)	51.4	(56)	$\chi^2 = 2.47$ $df=2$ $p=.29$
2.Bathes self with help getting in & out of tub	40.7	(24)	36.0	(18)	38.5	(42)	
3.Washes face/ hands, but cannot bathe rest of body	13.6	(8)	6.0	(3)	10.1	(11)	
4.Does not wash self but is cooperative with others	0	(0)	0	(0)	0	(0)	
5.Does not try to wash self and resists all efforts of others	0	(0)	0	(0)	0	(0)	
Toileting •							
1. Self care at toilet completely, no incontinence	61.0	(36)	70.0	(35)	65.1	(71)	$\chi^2 = .96$ $df=1$ $p=.33$
2.Needs to be reminded, or needs help to clean self, or has rare (weekly at most) accidents ^d	39.0	(23)	28.0	(14)	33.9	(37)	
3.Soiling or wetting while asleep > once a week ^d	0	(0)	2	(1)	.9	(1)	
4.Soiling or wetting while awake >once a week	0	(0)	0	(0)	0	(0)	
5.No control of bowels or bladder	0	(0)	0	(0)	0	(0)	

Table 5.4 Continued: Comparisons of Activities of Daily Living Between High and Low Actives

	<i>Low (N=</i>	<i>Actives 59)</i>	<i>High (N</i>	<i>Actives =50)</i>	<i>Total (N=</i>	<i>Sample 109)</i>	
	<i>%</i>	<i>(N)</i>	<i>%</i>	<i>(N)</i>	<i>%</i>	<i>(N)</i>	<i>Statistics</i>
<i>Score on Physical Self-Maintenance scale (PSMS)</i>	74.6	(44)	94.0	(47)	37.6	(91)	$\chi^2 = 9.00$
8- 10	25.4	(15)	38.0	(3)	31.2	(18)	$df=1$
11-15							$p = .006^*$
<i>Ability to Rise from a chair</i>							<i>Fisher's</i>
Does not need help getting in and out of chair	94.9	(56)	100	(50)	97.2	(106)	<i>Exact Test</i>
Needs help in getting in and out of chair	5.1	(0)	0	(0)	2.7	(3)	$p = .25$
<i>Device Used for Ambulation •</i>							
None ^f	1.7	(1)	8.0	(4)	4.6	(5)	$\chi^2 = .29$
Railing ^f	0	(0)	0	(0)	0	(0)	$df=1$
Another person ^f	0	(0)	0	(0)	0	(0)	$p = .59$
Cane ^f	49.2	(29)	48.0	(24)	48.6	(53)	
Walker ^g	40.7	(24)	38.0	(19)	39.4	(43)	
wheelchair ^g	8.5	(5)	6.0	(3)	7.3	(8)	
<i>Bathtub Grab- Bar use</i>							<i>Fisher's</i>
Uses grab bar	94.9	(56)	92.0	(46)	93.6	(102)	<i>Exact Test</i>
Does not use grab bar	5.1	(3)	8.0	(4)	6.5	(7)	$p = .70$

Legend: • Categories with the same identifiers (a-g) were collapsed for chi-square analyses, PSMS: higher scores indicates greater dependency with the activities of daily living. * statistically significant at $p < .05$.

b) Group Differences: No statistically significant differences were found between the two groups with respect to the level of dependency on most of the ADLs and bathtub grab-bar use. There were a few exceptions. A significantly greater percentage of low actives (28.8%), compared to high actives (2.0%), required occasional minor assistance with their grooming. Lastly, a significantly greater percentage of low actives (25.5%), compared to high actives (4.0%), obtained scores between 11-15 on the PSMS, indicating greater dependency.

5.6 Type, Frequency, Duration & Intensity of Exercises:

a) Total Sample: Table 5.5 provides a summary of the reported type, frequency, duration and perceived intensity of exercises performed by the respondents. The most common activities were indoor walking (78%), light housework (65.1%), class chair exercises (45.9%), class stretching (43.1%), home stretching (41.3%), outdoor walking (35.8%), stair climbing (31.2%), home chair exercises (29.4%), and mall walking (25.7%). A smaller percentage of respondents reported doing the following activities: home weight training (11.9%), class weight training (6.4%), swimming (4.6%), stationary bicycle (3.7%), treadmill (1.8%), thera-ball (1.8%), heavy housework (.9%), gardening (.9%), dancing (.9%), or other exercises using equipment such as Nautilus (.9%), rowing machine (.9%), or pedal machines (.9%).

Seventy-eight percent of subjects indicated that they walked indoors for exercise. Many seniors commented that they walked for the purposes of reducing joint stiffness and to maintain mobility. Many of the indoor walkers commented that they used the corridors in their apartment buildings or the corridors at the day program facilities. The majority of indoor and outdoor walkers reported walking for 1-15 minutes per session, while the majority of mall walkers reported durations between 16-30 minutes. Overall, the majority of subjects reported walking as a “moderate” intensity exercise. None of the mall walkers participated in any formal mall-walking group. Most mall walkers reported living within one to two blocks of a shopping mall.

Typically, group chair exercise classes were 30-minutes in duration. Only two retirement residences incorporated an optional sandbag or hand weight component into their chair exercise program. None of the respondents reported using elastic resistance bands.

Table 5. 5 Type, Frequency, Duration & Intensity of Exercises (N =109)

Endurance ex	% (N)	freq /wk.	Duration in Minutes									% (N)	
			V/L	L	SM	M	V	1-15	16-30	31-60	>60		
Walking indoors	78.0(85)	1-7	13.8(15)	22(24)	18.3 (20)	20.2 (22)	3.7(4)	61.5 (67)	15.6 (17)	.9(1)			
Mall walking	25.7(28)	1-2	1.8(2)	2.8 (3)	3.7(4)	16.5(18)	.9(1)	3.7 (4)	11.9 (13)	4.6(5)			
Walking outdoor	35.8(39)	1-7		9.2(10)	5.5 (6)	19.3(21)	1.8(2)	18.3 (20)	12.8(14)	2.8(3)	1.8(2)		
Swimming	4.6 (5)	2-7	.9(1)	.9(1)	2.8(3)			.9 (1)	1.8(2)	1.8(2)			
Dancing	.9 (1)	1			.9(1)				.9(1)				
S. bicycle	3.7(4)	1-7				1.8(2)	1.8(2)	1.8 (2)	.9(1)	.9(1)			
Treadmill	1.8(2)	1-7				1.8(2)			1.8(2)				
Strength ex.													
chair ex. (home)	29.4(32)	1-7	4.6(5)	8.3(9)	8.3(9)	6.4 (7)	1.8(2)	21.1(23)	8.3(9)				
chair ex. (class)	45.9(50)	1-4	3.7(4)	8.3(9)	13.8(15)	16.5(18)	3.7(4)	1.8(2)	26.6(29)	17.4 (29)			
Carrying objects	12.8(14)	1-7	.9(1)	2.8(3)	4.6(5)	2.8(2)	1.8(2)	11.9(13)	.9(1)				
Climbing stairs	31.4 (34)	1-7	1.8(2)	1.8(2)	2.8(3)	6.8(7)		6.4(7)					
Weights (home)	11.9(13)	1-7	.9(1)	2.8(3)	.9(1)	6.4(7)	.9(1)	10.1(11)	.9(1)	.9(1)			
Weights (class)	6.4(7)	2-3	1.8(2)	1.8(2)	2.8(3)	6.8(7)		6.4(7)					
Gardening	.9(1)	1			.9(1)			.9(1)					
Housework (heavy)	.9 (1)	1	.9 (1)					.9(1)					
Arm ex. during transfers	.9(1)	7					.9(1)	.9(1)					
Nautilus	.9 (1)	3			.9(1)				.9(1)				
Rowing machine	.9(1)	3			.9(1)				.9(1)				
Pedlar (pedal machine)	.9(1)	3	.9 (1)						.9(1)				
Special exercises													
with physiotherapist	.9(1)	1			.9(1)					.9(1)			
Thera-ball	.9(1)	3			.9(1)			.9(1)					
Flexibility ex.													
Stretching (class)	43.1(47)	1-7	5.5(6)	11.9(13)	13.8 (15)	11.9(13)		41.3(45)	1.6(2)				
Stretching (home)	41.3 (45)	1-14	7.3(8)	10.1(11)	11.0 (12)	11.0(12)	1.8(2)	41.3(45)					
Light Housework	65.1(71)	1-7	10.1(11)	18.3(20)	15.6 (17)	18.3 (20)	2.8 (3)	56.9(62)	5.5(6)				
Stretching while quilting	.9(1)	7					.9(1)						
Thera-ball	.9(1)	4		.9(1)						.9(1)			
Foot stretches	.9(1)	7	.9(1)					.9(1)					

LEGEND: frequency= range of days per week , VL= very light intensity, L= light intensity, SM= somewhat moderate intensity, M= moderate intensity, Ex. = exercise

Approximately 80 % of stair climbers used stairs more than once per day, and 20 % used stairs less than once per week. The number of stairs climbed per session ranged from 5-32. Most respondents indicated that it took them about 1-2 minutes to climb and descend their stairs.

b) Groups Differences: Table 5.6 and Table 5.7 provide a summary of the statistically significant group differences with respect to type, frequency, duration and intensity of exercises. A more detailed outline of these differences is provided for the reader in Tables 5.8 to 5.10 (see Appendix M). The following statistically significance differences were found. A greater percentage of low actives, compared to high actives, reported walking indoors 1-3 times per week, reported the intensity of indoor/mall walking, and class/home stretching as very light/light. A greater percentage of high actives, compared to low actives were doing home chair exercises, home weights, and climbing stairs. Lastly, a greater percentage of high actives, compared to low actives, reported the intensity of home weight training as somewhat moderate to vigorous in intensity.

5.7 Total Exercise Score and Total Number of Exercises:

a) Total Sample: The Total Exercise Score (TES) ranged from 0-896 minutes per week. The average TES was 169.97 minutes (SD 142.38). The total number of different types of exercises performed ranged from 0-10. The average number of different exercises performed per senior was 4.48 (SD 4.00, mode = 4).

Table 5.6 Group Differences in Reported Exercise Characteristics

	LA (N=59)	HA (N=50)			LA (N=59)	HA (N=50)	
Walking indoors	% (N)	% (N)	Statistic	Chair Ex. (home)	% (N)	% (N)	Statistic
Yes	72.9 (43)	84 (42)	$\chi^2 = 1.94$	Yes	20.3 (12)	40 (20)	$\chi^2 = 5.04$
No	27.1 (16)	16 (8)	$df = 1$ $p = .16$	No	79.7 (47)	60 (30)	$df = 1$ $p = .025 *$
Freq/wk.			$\chi^2 = 4.69$	Freq/wk.			$\chi^2 = .75$
1-3	27.9 (12)	9.5 (4)	$df = 1$	1-3	22.5 (3)	40 (8)	$df = 1$
4-7	72.1 (31)	90.5 (38)	$p = .030 *$	4-7	75 (9)	60 (12)	$p = .387$
Duration				Duration			
8 min. ^a	88.4 (38)	69 (29)	<i>Fisher's</i>	8 min. ^d	83.3 (10)	65 (13)	$\chi^2 = 1.24$
23 min. ^a	11.6 (5)	28.6 (12)	<i>Exact</i>	23 min. ^d	16.7 (3.4)	35 (7)	$df = 1$
46 min	0 (0)	2.4 (1)	<i>Test</i>	46 min	0 (0)	0 (0)	$p = .264$
60 min	0 (0)	0 (0)	$p = .49$	60 min	0 (0)	0 (0)	
Intensity				Intensity			
VL/L	67.4 (29)	23.8 (10)	$\chi^2 = 16.29$	VL/L	75 (9)	25 (5)	$\chi^2 = 7.62$
SM/V	32.6 (14)	76.2 (32)	$df = 1$ $p = .001 *$	SM/V	25 (3)	75 (15)	$df = 1$ $p = .008 *$
Mall Walking	% (N)	% (N)	Statistic	Weights (home)	% (N)	% (N)	Statistic
Yes	22 (13)	30 (15)	$\chi^2 = .90$	Yes	5.1 (3)	20 (10)	$\chi^2 = 5.73$
No	78 (46)	70 (35)	$df = 1$ $p = .34$	No	94.9 (58)	80 (40)	$df = 1$ $p = .017 *$
Freq/wk.				Freq/wk.			
1-3	100 (13)	100 (15)	X	1-3	66.7 (2)	50 (5)	<i>Fisher's</i>
4-7	0 (0)	0 (0)		4-7	33.3 (1)	50 (5)	<i>Exact Test</i> $p = 1.00$
Duration				Duration			
8 min. ^b	23.1 (3)	6.7 (1)	$\chi^2 = .73$	8 min. ^e	100 (3)	80 (8)	<i>Fisher's</i>
23 min. ^b	46.2 (6)	46.7 (7)	$df = 1$	23 min. ^e	0 (0)	10 (1)	<i>Exact</i>
46 min. ^c	7.7 (1)	26.7 (4)	$p = .39$	46 min	0 (0)	10 (1)	<i>Test</i>
60 min. ^c	23.1 (3)	20 (3)		60 min	0 (0)	0 (0)	$p = 1.00$
Intensity				Intensity			
VL/L	40 (8)	10.5 (2)	$\chi^2 = 4.43$	VL/L	33.3 (1)	30 (3)	<i>Fisher's</i>
SM/V	60 (12)	89.5 (17)	$df = 1$ $p = .035 *$	SM/V	66.7 (2)	70 (7)	<i>Exact</i> <i>Test</i> $p = 1.00$

Legend: VL/L = very light/light intensity, SM/V = somewhat moderate, moderate, vigorous intensity, HA=high actives, LA=low actives, Categories collapsed for chi-squares analyses (a-e)

X: no statistic computed as all subjects in the same group, . *: Statistically significant $p < .05$

NB: Table illustrates only subjects who were doing the exercise

Table 5.7 Group Differences in Reported Exercise Characteristics

	LA (N=59)	HA (N=50)			LA (N=59)	HA (N=50)	
Stretching (class)	% (N)	% (N)	Statistic	Stair Climbing	% (N)	% (N)	Statistic
Yes	39 (23)	48 (24)	$\chi^2 = .89$	Yes	20.3 (12)	44 (22)	$\chi^2 = 7.06$
No	61 (36)	52 (26)	$df = 1$ $p = .34$	No	79.7 (47)	56 (28)	$df = 1$ $p = .008^*$
Freq/wk			Fisher's Exact Test	Freq/wk			Fisher's Exact Test
1-3	91.3 (21)	79.2 (19)		1-3	25 (3)	9.1 (2)	
4-7	8.7 (2)	20.8 (5)	$p = .42$	4-7	75 (9)	90.9 (20)	$p = .319$
Duration				Duration			
8 min ^a	100 (8)	91.7 (22)	Fisher's exact test	8 min.	100 (12)	100 (22)	
23 min ^a	0 (0)	8.3 (2)		23 min	0 (0)	0 (0)	X
46 min	0 (0)	0 (0)	$p = 1.00$	46 min	0 (0)	0 (0)	
60 min	0 (0)	0 (0)		60 min	0 (0)	0 (0)	
Intensity				Intensity			Fisher's Exact Test
VL/L	65.2 (15)	16.7 (4)	$\chi^2 = 11.49$	VL/L	0 (0)	9.1 (2)	
SM/V	34.8 (8)	83.3 (20)	$df =$ $p = .001^*$	SM/V	100 (12)	90.9 (20)	$p = .529$
Stretching (home)	% (N)	% (N)	Statistic	Light Housework	% (N)	% (N)	Statistic
Yes	33.9 (20)	50 (25)	$\chi^2 = 2.90$	Yes	59.3 (35)	72 (36)	$\chi^2 = 1.91$
No	66.1 (39)	50 (25)	$df = 1$ $p = .09$	No	40.7 (24)	28 (14)	$df = 1$ $p = .17$
Freq/wk				Freq/wk			
1-3	30 (6)	29.2 (7)	$\chi^2 = .004$	1-3	31.4 (11)	22.2 (8)	$\chi^2 = .77$
4-7	70 (14)	70.8 (17)	$df = 1$ $p = .95$	4-7	68.6 (24)	77.8 (28)	$df = 1$ $p = .38$
Duration				Duration			
8 min.	100 (20)	100 (25)		8 min ^b	94.3 (33)	80.6 (29)	Fisher's
23 min	0 (0)	0 (0)	X	23 min ^b	5.7 (2)	11.1 (4)	Exact
46 min	0 (0)	0 (0)		46 min ^c	0 (0)	5.6 (2)	Test
60 min	0 (0)	0 (0)		60 min ^c	0 (0)	2.8 (1)	$p = .24$
Intensity				Intensity			$\chi^2 = 10.34$
VL/L	60 (12)	28 (7)	$\chi^2 = 4.66$	VL/L	62.9 (22)	25 (9)	$df = 1$
SM/V	40 (8)	72 (18)	$df = 1$ $p = .031^*$	SM/V	37.1 (13)	75 (27)	$p = .001^*$

Legend: VL/L = very light/light intensity, SM/V = somewhat moderate, moderate, vigorous intensity, LA= low actives, HA= high actives, Categories collapsed for chi-squares analyses (a-c),

X: no statistic computed as all subjects in the same group, *: Statistically significant $p < .05$

NB: Table illustrates only subjects who were doing the exercise.

b) Group Differences: As illustrated in Table 5.11, a significantly greater percentage of high actives, compared to low actives, performed a greater number of different types of exercises.

Table 5.11 Group Differences With Respect to Number of Different Types of Exercises Performed

<i>Number of Different Types of Exercises Performed</i>	<i>Low actives (N=59) % (N)</i>	<i>High actives (N=50) % (N)</i>	<i>Total Sample (N=109) % (N)</i>	<i>Statistics</i>
0-3	44.1(26)	14.0(7)	30.3 (33)	χ^2 . 17.32
4-6	47.5(28)	62.0(31)	54.1 (59)	df=4
7-10	8.5(5)	24.0(12)	15.6 (17)	p= .002

Legend: # of exercises collapsed for chi-square analyses * statistically significantly p <.05.

5.8 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). All of the items met this criterion and no items had to be eliminated. Table 5.12 summarizes mean, range, standard deviation, and Cronbach's alpha coefficients for each scale. Cronbach's alphas were within acceptable values, ranging from .73 for indirect perceived behavioral control to .79 for indirect attitude.

Table 5.12 TPB Scale Statistics

<i>Statistics</i>	<i>Attitude Direct (N=109)</i>	<i>Attitude Indirect (N= 109)</i>	<i>SN Direct (N=109)</i>	<i>SN Indirect (N=109)</i>	<i>PBC Direct (N=109)</i>	<i>PBC Indirect (N=109)</i>
# of items	1	12	1	4	1	9
Mean (SD)	.62 (.88)	7.87 (6.39)	.60 (.97)	8.00 (9.30)	.50 (1.04)	-.11(5.85)
Range	-2 to + 2	-12 to + 21	-2 to +2	-16 to + 40.	-2 to +2	-16 to 15
Cronbach's alpha	-	.79	-	.79	-	.73

5.9 Relationships Among Various Components of the TPB Model, Sociodemographic & Health Variables

Table 5.13 presents Pearson correlation coefficients among age, health, pain/ activity restriction, and various components of the TPB. The strongest correlation among the TPB variables was between the two measures of SN ($r = .78, p < .01$). Generally, the correlations between the direct and indirect measures of the TPB constructs were significant. These correlations were: 1) indirect and direct attitude ($r = .35, p < .01$), 2) indirect SN and direct SN ($r = .78, p < .01$), and 3) indirect PBC and direct PBC ($r = .23, p < .01$).

Low, positive, statistically significant correlations were found between all of the TPB constructs and intentions to continue exercising with one exception; the relationship between indirect PBC and intentions ($r = .16$). In other words, belief-based control beliefs, but not the more global-based control beliefs (i.e. I could easily exercise) were associated with intentions to continue exercising. The other correlations ranged from $r = .22$ ($p < .05$) between intentions and attitudes to $r = .41$ ($p < .01$) between intentions and SN.

The associations between age, pain, and health and the components of the TPB model were also examined. Most of these correlations were non-significant. A few exceptions were found. Direct PBC had a negative correlation with pain $r = -.20$ ($p < .05$). That is, respondents who anticipated fewer barriers to exercise were more likely to report having no pain. Indirect attitude had a negative correlation with health $r = -.23$ ($p < .05$). That is, respondents who had more positive attitudes towards exercise were more likely to have better perceptions of their health. Indirect PBC had a negative correlation with health $r = -.21$ ($p < .05$). That is, respondents who anticipated fewer barriers to exercise were more likely to have better perceptions of their health. Intentions had a negative correlation with pain $r = -.19$ ($p < .05$). That is, respondents who had stronger intentions to continue exercising were more likely to report having no pain.

Table 5.13 Pearson Correlation Coefficients Among Age, Health, Pain, and the TPB Variables

Variable	Age	Pain/ activity restriction	Health	Direct Attitude	Indirect Attitude	Direct SN	Indirect SN	Direct PBC	Indirect PBC	Intentions to continue exercising
Age	1.00									
Pain/activity restriction	.047	1.00								
Health	-.133	.122	1.00							
Direct Attitude	.095	.009	-.127	1.00						
Indirect Attitude	.031	-.103	-.229*	.346**	1.00					
Direct SN	-.099	-.123	.037	.005	.379**	1.00				
Indirect SN	-.110	-.088	-.037	.112	.489**	.777**	1.00			
Direct PBC	.053	-.201*	-.136	.158	.234*	.166	.149	1.00		
Indirect PBC	.134	-.086	.206*	.317**	.230*	-.005	.058	.234*	1.00	
Intentions to continue exercising	-.052	-.192*	.019	.218*	.332**	.347**	.408**	.275**	.160	1.00

LEGEND * Correlation significant at $p < 0.05$ level; ** Correlation significant at $p < 0.01$;
SN: Subjective Norms; PBC: perceived behavioral control

5.10 Description of the TPB Measures

a) **Total Sample:** Means and standard deviations for the TPB dimensions appear in Table 5.14. Overall, this sample of seniors had favorable opinions toward exercise. All components of the TPB were in the positive direction, above the scale midpoint of zero, with the exception of indirect PBC.

Table 5.14 Differences in the TPB Variables Between High and Low Actives

<i>TPB Variables</i>	<i>Low actives Mean (SD) N=59</i>	<i>High actives Mean (SD) N=50</i>	<i>Total Sample Mean (SD) N=109</i>	<i>Statistics t</i>	<i>P Value</i>
<i>Attitude Direct^a</i>	.58 (.91)	.68 (.84)	.62 (.88)	<i>t</i> = -.612	<i>P</i> = .539
<i>Attitude Indirect^b</i>	7.54 (5.21)	8.26 (7.59)	7.87(6.39)	<i>t</i> = -.565	<i>P</i> = .573
<i>SN Direct^a</i>	.39 (1.02)	.8 (.87)	.60 (.97)	<i>t</i> = -2.49	<i>P</i> = .014 *
<i>SN Indirect^b</i>	7.07 (9.57)	9.10 (8.93)	8.00 (9.30)	<i>t</i> = -1.139	<i>P</i> = .257
<i>PBC Direct^a</i>	.44 (1.04)	.58 (1.05)	.50 (1.04)	<i>t</i> = -.694	<i>P</i> = .489
<i>PBC Indirect^b</i>	-1.10 (5.75)	1.06 (5.81)	-.11 (5.85)	<i>t</i> = -1.94	<i>P</i> = .054
<i>Intention to continue exercising^a</i>	.93 (.67)	1.38 (.57)	1.14 (.66)	<i>t</i> = -3.74	<i>P</i> = .0001 *

LEGEND: ^a items theoretically ranged from -2 to +2,

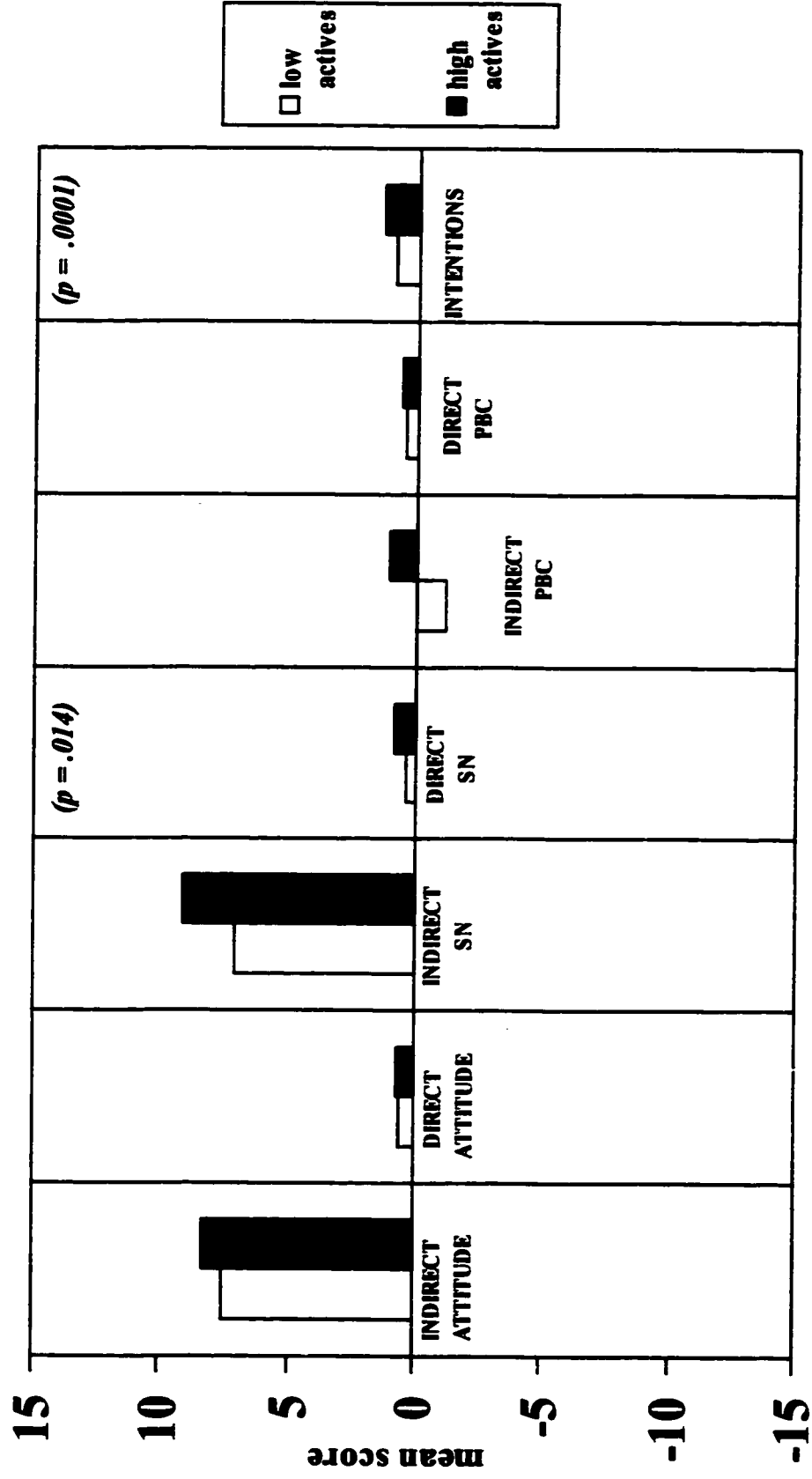
^b Composite scores theoretically ranged from -8 to + 40,

Higher means scores indicate more positive attitudes, SN, PBC

* statistically significant at $p < .05$.

b) **Group Differences:** Although high actives obtained higher scores on all components of the TPB model, with the exception of intentions to continue exercising and direct SN, the other components of the model failed to reach statistical significance. Figure 5.2 displays differences between high and low actives with respect to the TPB constructs.

Figure 5.2 Comparison of TPB Variables Between High and Low Actives



For a better understanding of these differences, a closer examination of the underlying beliefs was warranted. Table 5.15 (see page 75) presents descriptive statistics for outcome, normative, and control beliefs expressed by subjects. These beliefs were divided into three dimensions, psychological, functional, and safety outcomes. As shown in Table 5.15 both groups expected positive psychosocial, functional and safety outcomes from exercise. Both groups also held ambivalent perceptions about exercise. For example, both groups believed that exercising would be painful, but would also help to reduce pain. Although both groups believed that exercise would help prevent falls, a greater percentage of high actives, compared to low actives, held this belief.

With respect to normative beliefs, the majority believed that their family, doctor, and other health care workers would want them to exercise. However, the two groups were not equally influenced by the key referents. For example, fewer low actives, compared to high actives, believed that their friends, other HCWs, or doctor would want them to exercise.

Finally, with respect to control beliefs, both groups anticipated a number of barriers to exercise. However, some barriers were especially problematic for low actives. These barriers were: lack of transportation, lack of motivation, and lack of support. Notably, nearly twice as many low actives held the belief that at their age it was hard to get interested in doing regular exercise.

Table 5.16 (see page 76), presents the subjects' expressed motivations to comply with the four key referents. Overall, high actives compared to low actives, obtained higher mean scores, indicating stronger motivations to comply. Although both groups were equally motivated to comply with their family and friends, high actives compared to low actives, had stronger motivations to comply with their doctors.

Table 5. 15 Outcome, Normative and Control Beliefs of High and Low Actives

% Responding Likely or Very Likely			
Variable	LA (N=59) (%)	HA (N=50) (%)	Total Sample (N=109) (%)
Outcome Beliefs Exercising would....			
Psycho-social outcomes			
Help me meet new people	62.7	62.0	62.4
Would help me to enjoy life more	81.3	82.0	81.7
Help me to think more clearly	66.1	76.0	70.6
Make me feel more relaxed	78.0	80.0	78.9
Would be inconvenient*	20.3	18.0	19.2
Functional outcomes			
Would give me more energy	83.1	74.0	78.9
Make me feel too tired *	52.6	42.0	47.7
Make my muscle and bones stronger	86.4	88.0	87.1
Would be painful *	44.0	52.0	47.7
Would reduce my aches and pain	54.3	56.0	55.1
Would keep my joints flexible	98.3	90.0	94.5
Maintain my independence	86.5	82.0	84.4
Safety Outcomes			
Reduce my risk of falling	69.4	82.0	75.3
Normative Beliefs			
My family thinks I should exercise	66.1	64.0	65.1
My friends think I should exercise	45.8	52.0	48.6
My doctor thinks I should exercise	56.0	70.0	62.4
Other health care workers think I should exercise	66.1	76.0	70.7
Control Beliefs would discourage me from exercising			
Not knowing how	35.6	32.0	33.9
The cost of an exercise class	40.7	46.0	43.1
Fatigue	62.7	58.0	60.5
My health problems	56.0	52.0	54.1
Lack of transportation	71.2	62.0	66.9
Lack of someone to exercise with	40.7	36.0	38.5
Lack of motivation	49.2	32.0	41.3
Lack of support	33.9	22.0	28.5
At my age, it is hard to get interested in doing regular exercise	50.9	28.0	40.3

* These items represent negative outcome beliefs, these items were reverse coded for analysis;
 LA= Low actives; HA= high actives

Table 5.16 Motivations to Comply with Key Referents Among High and Low Actives

Referents	Low actives (N= 59) Mean score (SD)	High actives (N= 50) Mean score (SD)
Family	.66 (.98)	.64 (.90)
Friends	.24 (.93)	.32 (.89)
Doctor	.51 (.92)	.86 (.83)
Other HCW	.66 (.80)	.86 (.86)

Legend: Scores theoretically ranged from 1 = very little to 5 = a great deal ; HCW: Health care worker. Higher mean scores indicates greater motivation to comply.

5.11 Stratified Analyses: A stratified analysis was completed to determine if age, gender, health status, and pain/activity restriction influenced the results. Figures 5.3 to 5.6 are presented on pages 78 to 81. Tables 5.17 to Tables 5.20 in Appendix N summarize the stratified analyses.

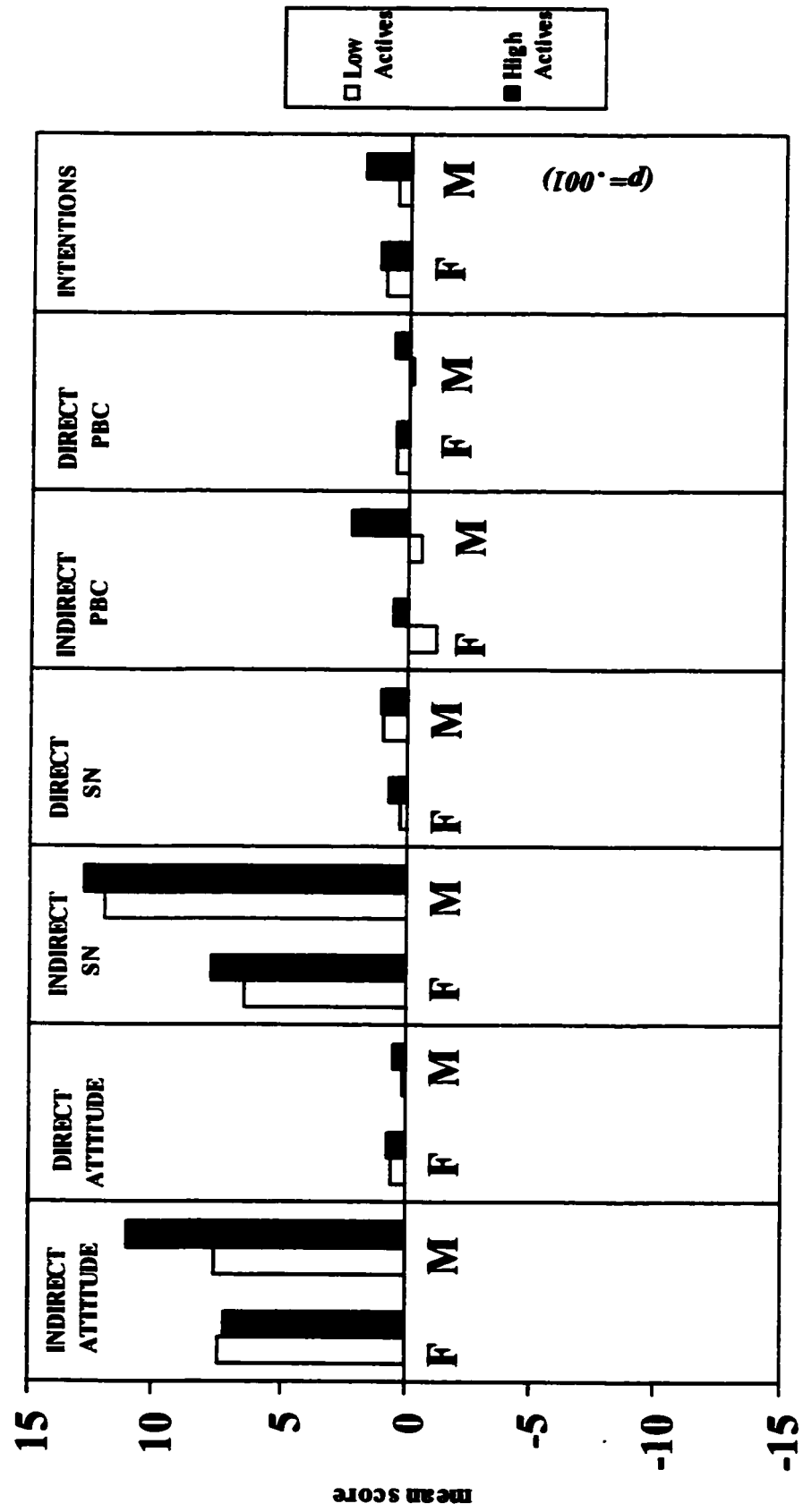
Figure 5.3 illustrates the mean scores with respect to the TPB constructs, stratified by *gender*. Non-significant group differences persisted with respect to both measures of attitudes, both measures of PBC, and indirect SN. Significant group differences with respect to direct SN no longer persisted. Significant group differences with respect to intentions were found only among men. High active men, compared to low active men had stronger intentions to continue exercising.

Figure 5.4 illustrates the results of the group differences with respect to the TPB constructs stratified by *age*. Subjects were divided into two age categories (i.e. < 80 years = younger; ≥ 80 years= older). Non-significant group differences persisted with respect to direct attitude, direct PBC and indirect SN. However, significant group differences with respect to direct SN no longer persisted. Significant group differences with respect to intentions were found in both age subgroups. High actives in both age subgroups, compared to low actives in both age groups, had stronger intentions to continue exercising. Significant group differences with respect to indirect PBC and indirect attitude were found only among subjects in the older age group. Older high actives, compared to older low actives, anticipated fewer barriers and had more positive attitudes towards exercise.

Figure 5.5 illustrates the group differences stratified by *health status*. Subjects were divided into two health status categories: 1) subjects who reported their health as excellent, very good, or good (i.e. positive), and 2) subjects who reported their health as fair or poor (i.e. negative). Non-significant group differences persisted with respect to direct attitude, both measures of PBC, and indirect SN. However, significant differences with respect to direct SN no longer persisted. Significant group differences with respect to intentions and indirect attitudes were found only in subjects with positive health perceptions. High actives with positive health perceptions, compared to low actives with positive health perceptions had more positive attitudes towards exercise and stronger intentions to continue exercising.

Figure 5.6 illustrates the results of the group differences stratified by *pain*. Subjects were divided in two groups: 1) subjects reporting no pain, or pain that did not prevent any activity (denoted as the no pain group), and 2) subjects reporting pain that prevented a few to most of their activities (denoted as the pain group). Non-significant group differences persisted with respect to both measures of attitude, and both measures of PBC. Significant group differences with respect to indirect SN emerged only in the no pain group. That is, high actives in the no pain group, compared to low actives in the no pain group, perceived greater social pressure to exercise. However, significant group differences persisted with respect to direct SN in both groups. That is, high actives in the pain or no pain group, compared to low actives in the pain or no pain group, perceived greater social pressure to exercise. Significant group differences with respect to intentions were found only in the pain group. That is, high actives in the pain group, compared to low actives in the pain group, had stronger intentions to continue exercising.

Figure 5.3 Comparison of TPB Variables Between High and Low Actives Stratified by Gender



5.4 Comparison of TPB Variables Between High and Low Actives Stratified by Age

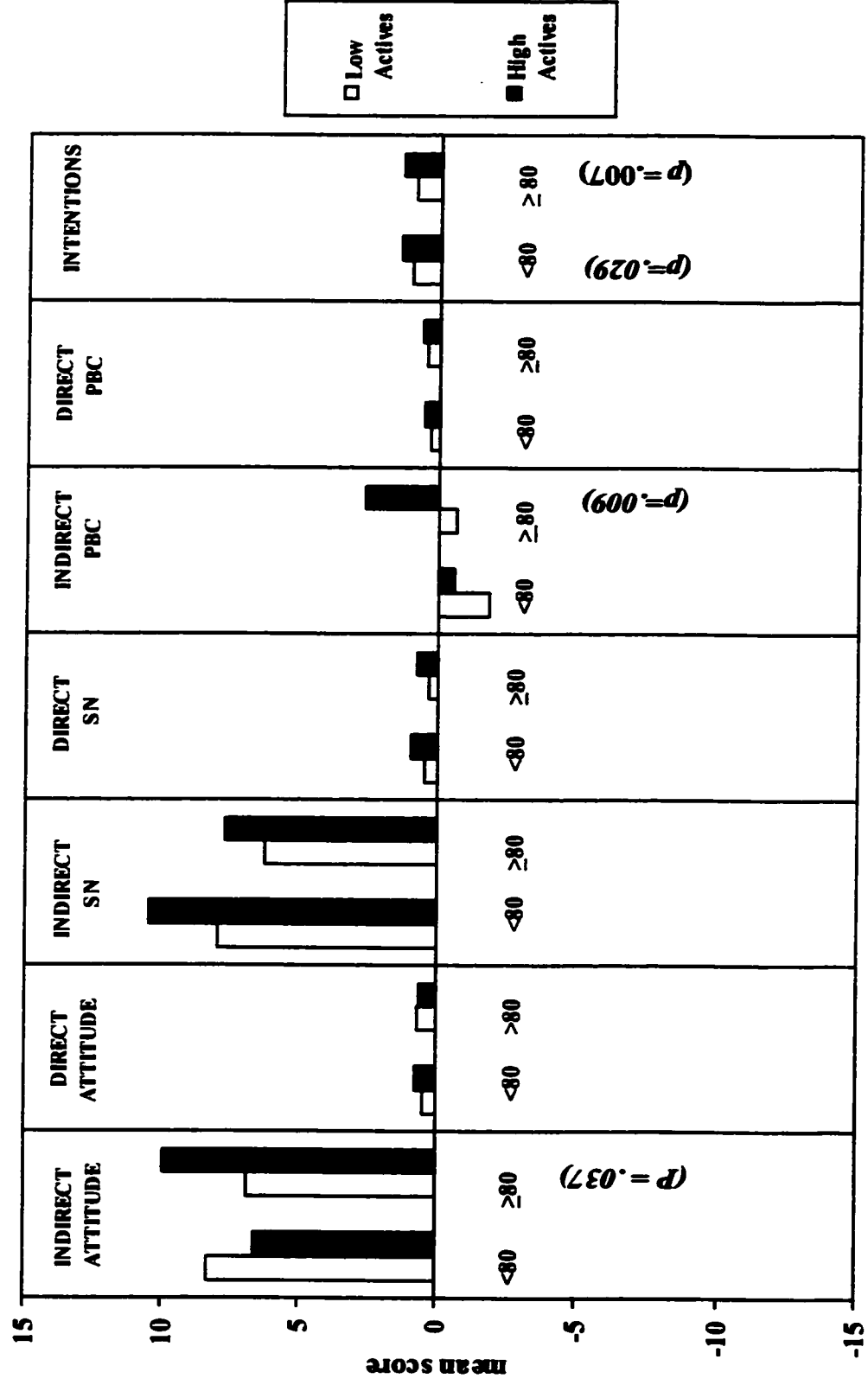


Figure 5.5 Comparisons of the TPB Variables Between High and Low Actives Stratified By Health Status

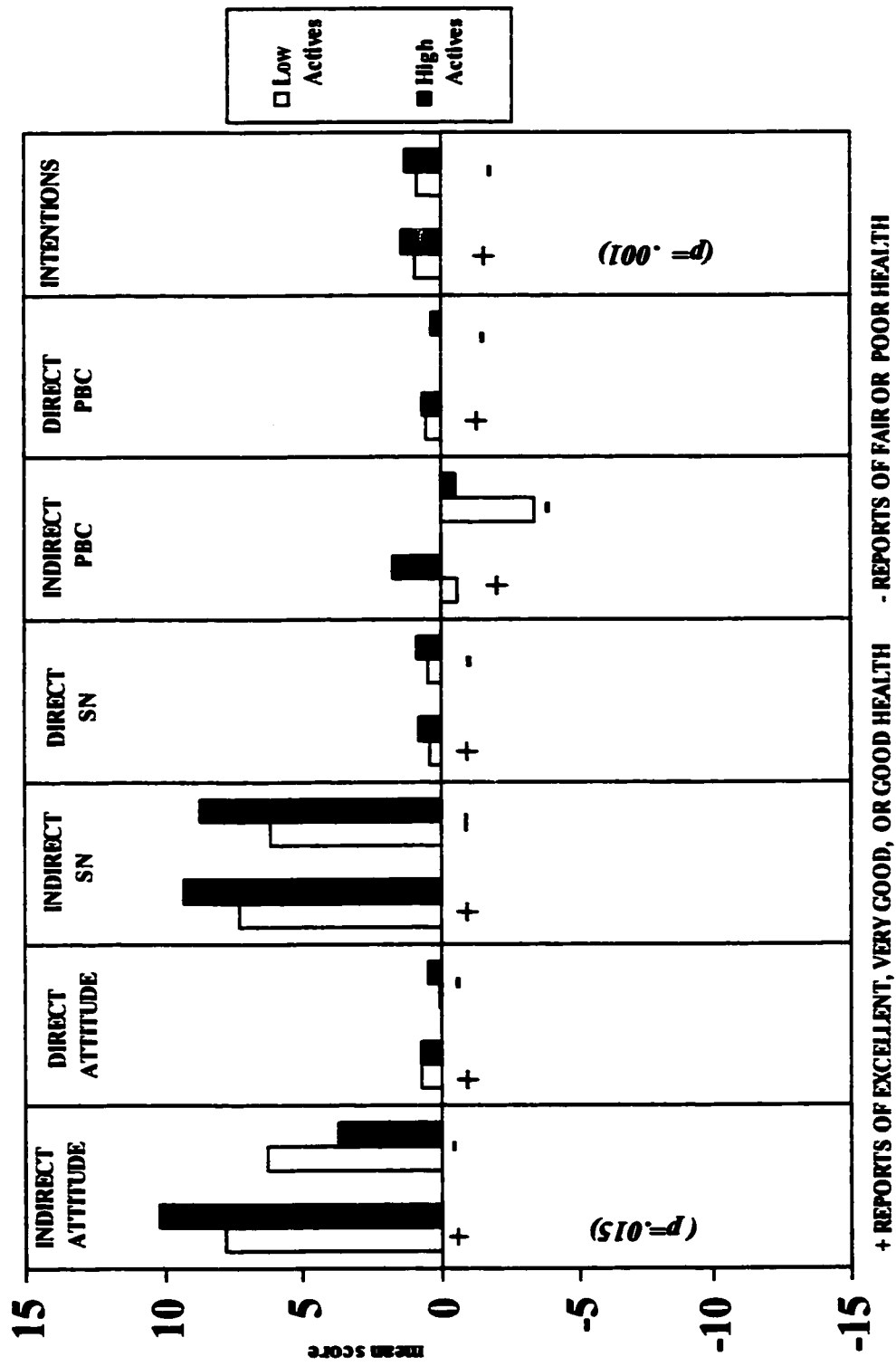
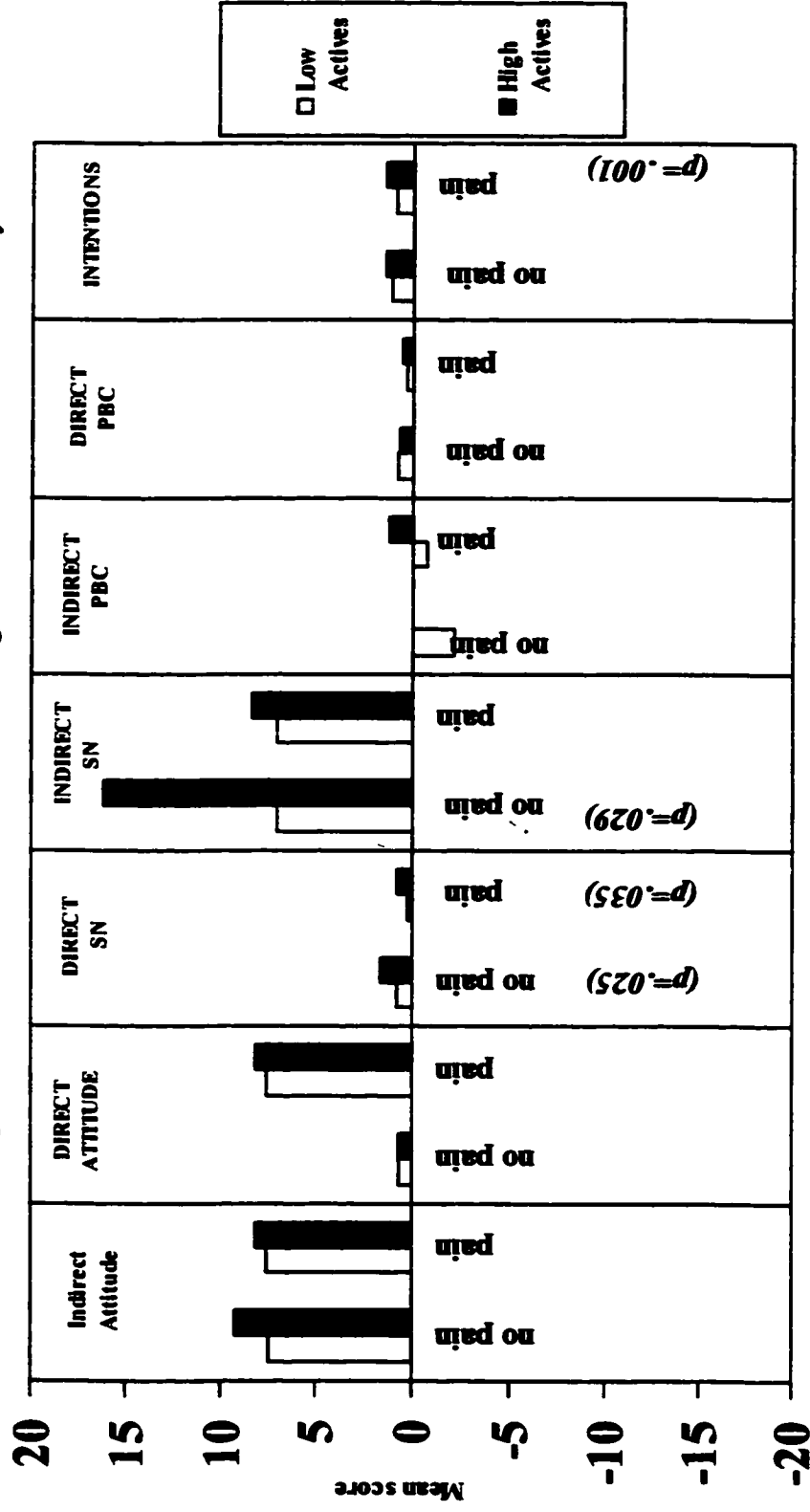


Figure 5.6 Comparison of TPB Variables Between High and Low Actives Stratified by Pain



CHAPTER SIX

DISCUSSION

This final chapter discusses the study results 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 reviewed in light of the study objectives. Finally, study limitations and the implications of the findings are presented.

6.1 Discussion of the Findings

6.1.1 Health, Functional Status, and Sociodemographic Characteristics:

A comparison of the sociodemographic profile of the study participants with data from the 1991 Census for Ottawa-Carleton indicates that seniors in the 65 to 74-year category, married, living with others, with less than high school, and reporting non-official languages as their mother tongue were underrepresented in the current study (Council on Aging, 1994). The sample characteristics are a reflection of the eligibility criteria and convenience sampling methods used in this study.

Overall, subjects had positive perceptions of their health and level of activity despite high reports of pain, activity limitations, and ADLs difficulties. These findings support previous research suggesting seniors' tendencies to rate their health as favorable, despite the presence of illness and functional decline and the tendency for people to lower their health expectations as they age (Aminzadeh, 1997; Graney & Zimmerman, 1980; LaRue, Bank, Jarvik, & Hetland, 1979). However, compared to other surveys, a larger percentage of seniors in this study rated their health as "fair" (21.1%). In the Ottawa-Carleton Seniors' Health Survey, 13.8% rated their

health as “fair”, while in the 1996-97 NPHS, 17% rated their health as “fair” (Davis, 1989; Statistics Canada, 1996-97). These findings primarily reflect the eligibility criteria of this study. This study targeted physically frail seniors, who were limited in at least one of their ADLs. Thus, all respondents needed assistance in at least one of their ADLS. In comparison with the results of the 1994-95 NPHS, 25% of seniors between 65 and 74 years living in private households needed help with one or more of the ADLs, while 51% of senior’s 75 years and older needed help with one or more of their ADLs (Wilkins & Parks, 1996).

Although most of the seniors in this study were independent with some of their ADLs, bathing and ambulation were especially problematic. Over one-third (38.5%) of respondents needed human assistance to get into and out of the bathtub. In comparison the Ottawa-Carleton Seniors’ Health Survey (Davis, 1989), reported that 11.5 % of seniors between the ages of 65-74 years and 21.5% of seniors 75 years and older had bathing and showering difficulties. In the current study, 48.6% of subjects used canes, 39.4% used walkers, and 7.3% used wheelchairs, while the Ottawa-Carleton Seniors’ Health Survey (Davis, 1989), found that only 15 % of seniors used canes, 2.5% used walkers, and 1.8% used wheelchairs.

Over 80% of subjects reported the presence of pain that limited their activities. A comparison of these findings with national surveys and prevalence studies on pain reveals some major differences. Results of the 1995 NPHS indicated that 31.9 % of people over the age of 65 years living in a private household experienced chronic pain or discomfort, while Birse and Lander (1998) reported a 44% prevalence rate of chronic pain among Canadian seniors (Statistics Canada, 1997 b). Overall, respondents in this study were more physically frail than a general population of seniors residing in the community.

6.1.2 Patterns of Exercise Behavior, Types of Exercise:

The most common type of endurance exercise reported in this study was indoor walking (78%). Other surveys have also identified walking as a common type of exercise among seniors. In the Ottawa-Carleton Seniors' Health Survey (Davis, 1989), 52.3% of people 65 years and older reported regular walking. In a more recent national survey (Cameron et al., 1999), 82% of people 65 years and older reported regular walking. Of the three types of walking in this study, indoor walking was the most common (78%), while outdoor walking (35.8%) and mall walking (25.7%) were the least common. Comments made by respondents during the interviews suggest some reasons for the reported walking patterns. None of the mall walkers participated in any formal mall-walking program. Most mall walkers lived one or two blocks from a shopping center. Although no consistent data were collected on seasonal differences in outdoor walking, some seniors indicated that they did not walk outdoors because of icy sidewalks, bad weather, and/or lack of a walking partner.

Since over 80% of the respondents were female, it is not surprising that light housework was the most common flexibility exercise reported in this study (65.1%). Comparisons of these findings with other surveys were not possible since light housework as a type of physical activity was not included in any of the surveys reviewed. In this study, only one respondent reported doing heavy housework such as vacuuming or washing floors. This finding is relatively consistent with the findings of the Ottawa-Carleton Seniors' Health Survey, which indicated that 79.5% of seniors had difficulties doing heavy housework (Davis, 1989).

Group chair exercise was the most common strength exercise reported in this study (45.9%) and nearly one-third (29.4%) of subjects reported doing chair exercises at home. A comparison of this finding with other local surveys was not possible because data on chair

exercises were not included in any of the surveys reviewed. However, according to the CFLRI, 12% of people 65 years and older reported participation in an exercise class (Cameron et. al, 2000). The high proportion of chair exercisers in this study can partly be explained by the fact that a chair exercise component was incorporated into the activities at the day hospital, seniors' day programs at the LTC facilities, and in the retirement residences. With the exception of the retirement residences, participation in the group chair exercise program was a compulsory component of treatment. None of the home chair exercisers in this study indicated the use of an audio or video exercise program. A few seniors commented on the lack of a suitable television exercise program. Interestingly, about two-thirds of home chair exercisers were not participants in any seniors' day programs.

Nearly one-third of seniors reported climbing stairs for physical activity (31.4%). All of the stair climbers, with two exceptions, lived in private two-storey dwellings. The two exceptions were: one woman who used stairs when visiting her spouse in a nursing home, and a man who used the stairs in his apartment building to get exercise. In the Ottawa-Carleton Seniors' Health Survey (Davis, 1989), 56.2 % of seniors reported climbing stairs for exercise. In this study, many respondents commented that they no longer climbed stairs because it was "just too hard".

Overall, few seniors performed any type of weight training either in their homes (11.9%) or in a group setting (6.4%). This finding is fairly consistent with other surveys. For example, weight training was listed as a popular activity by people between the ages of 45 and 64 years [(19%)(Cameron et al., 2000)]. However, for those age 65 years and older, weight training disappeared from the list of popular activities (Cameron et al., 2000). The small percentage of seniors reporting weight training in this study can be partly be explained by the fact that out of all of the locations (i.e. three seniors' residences, two day programs at LTC facilities, one health

promotion program) providing chair exercise programs, only the three seniors' residences incorporated the use of optional handweights or sandbags into their chair exercise program. Most respondents who did weight training at home indicated that they were introduced to weight training by physiotherapists during their rehabilitation.

Only 4.6% of respondents reported swimming and only 3.7% of subjects reported stationary bicycling. Findings are not consistent with other national and regional surveys. For example, 30% of people 65 years and older engaged in swimming as a form of recreational activity (Cameron et al., 2000). In the Ottawa-Carleton Seniors' Health survey, 28.8% of people aged 65 to 74 years, and 13.3% of people 75 years and older, reported either running, bicycling and/or swimming (Davis, 1989). Many subjects in the current study commented on lack of access to pools or difficulties using stairs in pools.

No subjects reported doing any tai chi or yoga. This finding is also in contrast to the findings of other regional and national surveys. Approximately, 11% of people 65 years and older reported participation in yoga or tai chi (Cameron et al., 2000), while 13.7% of people over the age of 65 years reported activities such as: tai chi, bowling, curling and golfing (Davis, 1989). Tai chi and yoga programs were not offered in any of the seniors' day programs where seniors were recruited for this study.

6.1.3 Patterns of Exercise Behavior: Frequency, Duration, and Intensity of

Exercises: Most subjects reported exercise frequencies ranging from 1-7 times per week. Only two subjects reported exercise durations exceeding 60 minutes. Typically longer exercise durations were associated with more formal exercise classes. With respect to exercise intensity, the most commonly reported intensity was somewhat moderate to vigorous. Overall, these

findings suggest that the majority of seniors in this study did short bouts of exercise and perceived the intensity of most of their exercises as moderate.

6.1.4 Barriers to Exercise: Common barriers to exercise reported in this study were: lack of transportation (66.9%), fatigue (60.5%), health problems (54.1%), the cost of an exercise class (43.1%), lack of motivation (41.3%), and age (40.3%). Less common barriers were: lack of an exercise partner (38.5%), not knowing how to exercise (33.9%), and lack of support (28.5%).

Although 15.5% of subjects had access to onsite exercise classes in their apartment buildings, 64.7% of these subjects reported lack of transportation as an important barrier. Over one-third (37.6%) of subjects attended exercise classes associated with the various day programs. All of these subjects were transported to these day programs by either family members or by Para-Transpo. Nearly two-thirds (63.4%) of these subjects reported lack of transportation as an important barrier. Finally, 46.7% of subjects reported exercising exclusively at home and 68.6% of these home exercisers reported lack of transportation as an important barrier. These findings suggest that regardless of whether exercise classes were onsite, incorporated into day programs, or done at home, lack of transportation was still perceived as a very significant barrier. These perceptions may be related to loss of independence related to the inability to drive oneself.

Consistent with other studies (Clark & Northwehr, 1999; Conn, 1998 a; Jones & Nies, 1996; Melillo et al., 1996; O'Neil & Reid, 1991), fatigue and health problems were among the three most common barriers reported in this study. Health problems and fatigue have been cited as major barriers in other studies. Nearly one-half of subjects believed that exercise would make them too tired (47.7%) and a similar percentage (47.7%) indicated exercise would be too painful. However, 78.9% believed that exercise would give them more energy and 55.1% believed that

consequences of exercise (e.g. exercise is energizing /tiring) have been cited in other studies (Melillo et al., 1996; Conn 1998 a).

Over 40% of subjects cited the cost of an exercise class (43.1%) and lack of motivation (41.3%) as important barriers to exercising. In the study by O'Neil and Reid (1991), 6% of subjects indicated that the cost of being physically active was too expensive. Interestingly, nearly twice as many low actives (50.9%), compared to high actives (28%) indicated that at their age it was hard to get interested in regular physical activity. This finding suggests that among seniors with low levels of activity, age is perceived as a negative influence on levels of motivation.

Finally, about one-third of subjects reported lack of any exercise partner and lack of knowledge as important barriers. These two barriers have been cited in other studies (Melillo et al., 1996; Conn, 1998 a). Interestingly, lack of knowledge on how to exercise was reported as a significant barrier despite the fact that most seniors were doing some form of exercise.

6.1.5 Advantages of Exercise: In this study, the most common advantages to exercise reported were: maintenance of joint flexibility (94.5%), improved muscular and skeletal strength (87.1%), maintenance of independence (84.4%), improved life satisfaction (81.7%), stress reduction (78.9%), increased energy (78.9%), and a reduced risk of falls (75.3%). These findings are fairly consistent with the findings of other studies (Conn, 1998 a; Conn et al., 1994; Melillo et al, 1996). However, these three published studies included only women.

In the current study, a similar percentage of men and women believed that exercise would maintain independence, improve life satisfaction, and reduce stress. However, differences were found with respect to the other major advantages. More men endorsed the strength, energy, and

fall prevention benefits of exercise, while more women endorsed the flexibility benefits of exercise.

6.2 Persons who Advised/Assisted Respondents with Their Exercises: About two-thirds of the respondents were advised to exercise by their doctors (55.4%), by physiotherapists (18.9%), or by nurses (12.2%). These findings are not unexpected since 89.4 % of seniors in a regional survey reported visiting a physician within the past twelve months, 15.1% reported a visit by a nurse, and 12.6% reported receiving help from physiotherapists (Davis, 1989). Similar findings have also been reported in national surveys. In the 1995 NPHS, 87.3% of people 65 years and older reported visiting a general practitioner within the past 12 months (Statistics Canada, 1997 b).

Only 10.1 % of respondents reported that they received assistance with their exercises. Of those receiving assistance, 45.5% received assistance from a home care worker, 27.3% from a physiotherapist, and 27.3% from a spouse. This reflects the fact that 44% of seniors in this study were receiving home care.

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

This research provided some evidence of the validity of the OAEQ developed to measure the constructs of the TPB model as they relate to exercise among physically frail community-living seniors. As discussed in Chapter Four, qualitative approaches were used to establish face and content validity of the instrument. Generally, a Cronbach's alpha of .70 or higher is recommended for a reliable scale (Polit, 1996; Streiner, 1993). In this study, results of

psychometric testing indicated that all subscales were within an acceptable range (i.e. alphas ranged from .73 -.79)

Construct validation, which is an ongoing process, requires several approaches to tap the various facets of a construct (Streiner & Norman, 1995). One technique to determine construct validity is the examination of the relationships based on the theory's predictions (Polit & Hungler, 1993). In this study, significant relationships between attitudes, SN and PBC according to the theory's prediction were found. Another technique, which is referred to as "known-group" technique examines whether the constructs discriminate between groups that are expected to differ with respect to the underlying constructs (Polit, 1996). In this study, the instrument was able to discriminate between two contrasting groups of "high" and "low" actives with respect to some of the components of the TPB model.

6.4 Objective Two: To Determine the Relationship Among Various Components of the TPB Model

The section examines the relationships between attitudes, SN, PBC, and intentions to continue exercising, and also the relationships between age, gender, health and pain status with the TPB constructs. Overall, this sample of seniors had favorable perceptions of exercise and strong intentions to continue exercising. With the exception of PBC, all means were in the positive direction, above the scale midpoint of zero.

According to Ajzen (1991), behavior is a joint function of intention and PBC and intention is determined by attitudes, SN, and PBC (Ajzen, 1991). Only attitude, SN and direct PBC significantly correlated with intention. Among the precursors of intention and behavior, PBC had the weakest correlations with intention and behavior. These findings may partly be

explained by the following. The TPB proposes that people will have stronger intentions to perform a behavior when they evaluate it positively, believe that important others think they should perform the behavior, and perceive the behavior to be under their own control (Ajzen, 1988, Courynea, 1995). In the current study, since all subjects with only one exception, were exercising. Therefore, the investigator was actually assessing intentions to continue exercising, rather than intentions to start exercising. The TPB predictors might be better predictors of intention to start exercising, rather than intentions to continue exercising.

In a comprehensive review of the application of the TPB to the exercise domain, Godin and Kok (1996) reported average correlations of .52 between behavior and intention and .41 between behavior and PBC (i.e. average correlations based on 8 studies). The correlations between intention and its precursors were .51, .30, and .50 for attitude, SN, and PBC, respectively [(i.e. correlations were based on 13 exercise studies)(Godin & Kok, 1996)]. All of these studies reviewed measured intentions to engage in various types of exercise. In this study, the correlations between intention and its precursors were .33, .40 and .27 for attitude, SN and PBC, respectively.

Since the TPB proposes that beliefs provide the basis for the formation of attitudes, SN and PBC (Ajzen, 1991), it was anticipated that appreciable correlations between the belief-based (i.e. indirect) and the more global-based (i.e. direct) measures of these constructs would exist. The results of this study found low significant correlations between the two measures of attitude $r = .35$, ($p < .01$), and the two measures of PBC $r = .23$ ($p < .05$), but a high correlation between the two measures of SN $r = .78$ ($p < .01$). These results suggest weak relationships between the two measures of attitudes and PBC, but a stronger relationship between the two measures of SN.

These results suggest that attitudes and PBC played a less significant role than SN in influencing the seniors' intentions to continue exercising in this study.

The associations between age, health and pain/activity limitation with the TPB variables were examined. Most of the associations were not significant. However, four exceptions were found. These exceptions were: 1) low negative correlation between direct PBC and pain, 2) low negative correlation between intentions and pain, 3) low negative correlation between indirect attitude and health, and 4) low negative correlation between indirect PBC and health. These correlations suggest that fewer perceived barriers and stronger intentions to continue exercising were associated with less pain/activity restriction. Lastly, more positive attitudes and fewer perceived barriers toward exercise were associated with more positive health perceptions.

6.5 Objective Three: To Examine the Differences Between High Actives and Low Actives:

Generally, with the exception of gender, no statistically significant differences between high and low actives with respect to various sociodemographic factors were found. Further research using more representative samples with longitudinal designs would help to gain a better understanding of the influence of various sociodemographic variables on frail seniors' decisions to exercise.

Four hypotheses were tested in this study. First, it was predicted that low actives would be older, report greater pain/activity restriction, and report poorer health status compared to high actives. Although a greater proportion of low actives, compared to high actives were older and reported poorer health, these differences failed to reach statistical significance. Although the two groups differed significantly with respect to pain, the results were in the opposite direction to what was hypothesized. A greater percentage of low actives, compared to high actives, reported

the absence of pain. A possible explanation for this may be related to the fact that high actives were exercising despite having pain because exercise afforded them with some degree of pain relief.

Secondly, it was hypothesized that low actives would report more negative attitudes towards exercise compared to high actives. Although a greater proportion of low actives, compared to high actives, reported more negative attitudes towards exercise, this finding failed to reach statistical significance.

The results of the stratified analysis with respect to age, indicated that older high actives (i.e. ≥ 80 years), compared to older low actives, had significantly more positive indirect attitudes towards exercise. These results emphasize the importance of understanding how age impacted on frail seniors' attitudes towards exercise. For example, an intervention program targeting older seniors would need to develop strategies to help change the more negative attitudes held by older seniors with low levels of activity, while strengthening the more positive attitudes held by seniors with higher levels of activity.

The results of the stratified analysis with respect to health status, indicated that high actives with positive health perceptions, compared to low actives with similar health perceptions, had significantly more positive indirect attitudes towards exercise. Similarly, an intervention program targeting seniors with positive health perceptions but low levels of activity would need to develop strategies that would capitalize on their existing positive health perceptions, while strategies directed to seniors with high activity and positive health perceptions would need to develop strategies aimed at encouraging maintenance of their exercise habits.

Thirdly, it was hypothesized that low actives, compared to high actives, would anticipate more barriers to exercise. Although a greater proportion of low actives, compared to high

actives, reported greater obstacles to exercise, this finding failed to reach statistical significance. Results of the stratified analysis with respect to age, found that older low actives, compared to older high actives, anticipated greater barriers to exercise. Again this finding could be helpful in developing strategies for an exercise intervention tailored for specific subgroups of seniors. For example, an intervention program targeting older seniors would need to develop strategies that would help reduce the barriers to exercise especially among older seniors with low levels of activity, while strengthening the more positive control beliefs held by seniors with higher levels of activity.

Lastly, it was hypothesized that low actives, compared to high actives would perceive less social pressure to exercise. Although the global-measures of SN (i.e. direct SN) reached statistical significance the more belief-based measures (i.e. indirect SN) failed to reach statistical significance. After controlling for age and health status, significant differences with respect to direct SN no longer persisted. However, after stratifying for pain, significant group differences persisted with respect to direct SN in both subgroups. That is, high actives with or without pain, compared to low actives with similar pain status, reported significantly greater social pressure to exercise. After controlling for pain, significant differences with respect to indirect SN persisted but only in the no pain subgroup. These findings suggest that exercise intervention programs targeting seniors without pain need to develop strategies to increase social pressures to exercise among seniors with low levels of activity.

A stratified analysis was done to determine if age, gender, health and pain status influenced the intentions of seniors to continue exercising. High active men, compared to low active men, had stronger intentions to continue exercising. Thus, if an intervention program was targeted to men, strategies could be developed to increase the weaker intentions held by men

with low levels of activity, while reinforcing the stronger intentions held by men with higher levels of activity. Based on the Transtheoretical Model, these findings may indicate that men who were high actives were in the maintenance stage of exercise behavior. The means by which intentions to continue exercising could be strengthened would be better informed by a larger sample, multivariate analyses and an assessment of stage of change (action or maintenance) for those exercising.

Finally, after controlling for health status, high actives with positive perceptions of their health, compared to low actives with similar health perceptions had stronger intentions to continue exercising. Based on these findings, one effective strategy would be to increase the weaker intentions held by seniors with low levels of activity, while strengthening the stronger intentions held by seniors with higher levels of activity.

Similarly, no differences with respect to intentions among high and low active seniors with pain were found following the stratified analysis. Therefore, an intervention tailored to seniors with pain would need to develop strategies that would strengthen the intentions equally among seniors with high and low levels of activity. A possible strategy would be to emphasize the beneficial effects of exercise with respect to pain control. This strategy has the potential of improving seniors' attitudes towards exercise, which in turn, might strengthen their intentions to continue exercising.

6.6 Study Limitations

This study was a preliminary investigation, which was subject to several design, measurement, and analytic limitations. Therefore results should be interpreted with caution.

6.6.1 Design Limitations: Two major design limitations of this study were: non-probability sampling techniques and the cross-sectional nature of the investigation (Polit & Hungler, 1991; Burns & Grove, 1999). Selection bias is a threat to the external validity of studies that recruit a convenience sample. In this study, 37.7% of subjects were attending day programs in which participation in the exercise component was compulsory. These subjects were also in a social milieu where exercising was highly promoted and exercise participation was the norm. Volunteers recruited from these programs may have been individuals who had already overcome some of the major barriers to exercise. The findings of this study should not be generalized beyond the participants (Polit & Hungler, 1995; Burns & Grove, 1999).

Although significant correlations were found among the majority of the constructs of correlations does not prove causation (Polit & Hungler, 1995). To claim causation, other criteria must be met. That is, it must be demonstrated that changes in the independent variable preceded changes in the dependent variable and that the theory predicted the causal relationship between the independent and dependent variable (Polit & Hungler, 1991; Davis, 1989). Multivariate analysis would be needed to determine the unique contribution of each of the TPB constructs, while a prospective rather than a cross-sectional design, would determine if attitudes, SN, and PBC actually preceded exercise intentions and behaviors.

6.6.2 Measurement Limitations: In this study, all health and health related measures were based on self-reports. Although self-reports are a common method of data collection, a major weakness of self-reports pertains to the accuracy of the information (Guralnik, Branch, Cummings & Curb, 1989; Jobe & Mingay, 1989; Polit & Hungler, 1995). There is growing trend

that challenges the psychometric superiority and utility of performance measures of functional status compared to the self-reports of seniors (Myers, Holiday, Harvey and Hutchinson (1993).

The outcomes of this study were assessed with a newly developed instrument. This instrument was not entirely successful in differentiating between high and low actives with regard to the TPB constructs. Further testing of this tool with a more representative sample is needed. Further testing of this tool should be conducted on a sample of frail seniors who are distinctly “non-exercisers” and “exercisers”. Ideally, the administration of this new tool on two different occasions would help to establish test-retest reliability (Streiner & Norman, 1995), while a factor analysis, which examines the relationships among the constructs, would help to determine the relative contribution of each of the TPB constructs in explaining variance (Polit, 1996).

Physical frailty for this study was measured with an instrument, which determined the amount of assistance needed to successfully complete the six ADLs. Lower and upper cut-points of 8 and 20 were used as inclusion criteria. It can be argued that a score of eight was too low to reflect a truly “frail” senior. For example, using the PSMS instrument, a senior with a score of eight could represent a person who is independent with feeding, bathing, grooming, but uses a cane to ambulate, and has an occasional episode of incontinence. Some clinicians and researchers would not consider such a person to be “frail”. Development of a consensus definition of the term “frail” would guide the selection of suitable eligibility criteria for future studies of this population.

The investigators’ primary objective for doing this study was to examine the determinants of exercise among seniors who were experiencing some degree of physical functional loss. Although exercise is beneficial for all seniors, seniors who are just beginning to experience

physical losses are an important subgroup to target. Seniors with a higher degree of frailty are also an important group for future studies.

Since most subjects in this study were doing some type of exercise, a set of criteria had to be developed to determine who would be classified as either “low” actives or “high” actives. The cut-point of 150 minutes was used to classify subjects as either high (i.e. > 150 minutes per week), or low actives (i.e. < 150 minutes per week). Health Canada recommends that seniors should try to accumulate 30-60 minutes of exercise most days of the week. Using five days per week as a reference point, this would equate to 150 to 300 minutes per week. Theoretically, a cut-point of 150 minutes per week could be used in future studies, since this cut-point represents the minimum amount of exercise needed to achieve health benefits from exercise. However, the findings of this study suggest that frail seniors prefer to do short bouts of exercise. Thus, if exercise practice guidelines were to be developed for frail seniors, it would be important to emphasize the cumulative benefits of physical activity.

A major measurement limitation in this study was related to the use of proxy measures for exercise duration. As discussed previously, seniors were provided with four possible choices for exercise duration. However, comments made by the seniors during the interviews, and observations made by the investigator during the exercise classes, indicated that most of the seniors were taking frequent rest periods during their exercise sessions. In order to calculate a total exercise score, the investigator assigned an average numerical value (i.e. 8, 23, 46, >60 minutes). In determining this total exercise score the frequency, duration and intensity of each exercise were considered. For example, a 1-15 minute walking session performed at a very light intensity was assigned a value of 0 minutes, but a walking session of 1-15 minutes performed at moderate intensity was assigned a value of 8 minutes, which contributed positively to the

seniors' total exercise score. It is possible that the assignment of a proxy measure for duration resulted in overestimation or underestimation of the total exercise score, resulting in the misclassification of seniors as either low or high actives. Future studies could adopt one of the following alternative strategies. The subject could be asked to estimate the actual duration, which then could be summed to provide a total exercise score. Alternatively, the duration options could be provided in smaller increments (e.g. values of 1-5 minutes, 5-10 minutes etc.).

In this study, two intentions were measured (i.e. intentions to start exercising and intentions to continue exercising). All subjects, with one exception, indicated that they were exercising. In response to the question on intentions to start exercising, most subjects chose the "neither" option. Only seven subjects chose an option other than the neutral position. As suggested by other researchers (Burns & Grove, 1993; Streiner & Norman, 1995) elimination of the neutral position forces respondents to commit themselves to one side or another. Thus, in future studies it would be beneficial to eliminate the neutral position on the intention scales.

6.6.3 Analytic limitations: Bivariate analyses were used in this study, which restricted the interpretation of the data. For example, this level of analysis precluded the possibility of establishing the relative contribution of each of the theoretical constructs in explaining the variance in exercise intentions or behavior. Ideally, a path-analytical approach would permit determination of the patterns of causation. A logistic regression would permit a comparison of the relative contribution of each of the constructs in predicting intention and behaviors (Polit 1996; Polit & Hungler, 1995; Burns & Grove, 1993).

Lastly, small sample sizes, especially for the stratified analyses, increased the risk of Type II error. As previously discussed, group differences in the TPB variables were examined

following stratified analyses by gender, age, health status, and pain. The sample sizes for these subgroups ranged from N=5 (e.g. subgroup of high actives with no pain) to N= 53 (e.g. subgroup of female low actives). Thus, the results of the stratified analyses should be interpreted with caution. Despite these limitations, the findings of this study bear some implications for the TPB model, clinical practice and future research.

6.7 Implications of the Findings

6.7.1 Implications For Theory: To the best of the author's knowledge this was the first application of the TPB to exercise behaviors among physically frail seniors. The results indicated that the relationships between the TPB constructs were often weak and non-significant. A number of factors could explain these weak and non-significant results. This study targeted frail seniors who were in many cases participants of formal exercise programs. In fact, all but one subject reported doing some form of exercise. It is possible that most of the subjects in this study were in the maintenance stage of change, which may have influenced their beliefs about exercise.

Observations made by Aminzadeh (1997) in applying the TPB to cane-use behavior have interesting implications for the application of the TPB to exercise behavior as well. In this study "low " and "high" actives were treated as two distinct groups. However, comments made by the respondents during the interviews suggest that more likely the participants were at different points on a continuum. For example, new admissions to the day hospital often expressed more ambivalent feelings about the consequences of exercise than less recent admissions. As pointed out earlier, recent theorizing has suggested that individuals may reside at one of five different stages of readiness to engage in regular physical activity, rather than just being at an active or inactive stage (Courneya, 1995). The integration of the Transtheoretical model has been

successful in understanding exercise behaviors of healthy older adults (Courneya, 1995) and numerous other behaviors. It is possible that integrating the Transtheoretical model would provide a better understanding of the exercise intentions of older frail seniors.

This observation is consistent with other researchers, who have suggested that the actual performance of behavior may lead to a feedback process that in turn influences attitudes and perceptions (Aminzadeh, 1997; Kok, De Vries, Mudde, & Stretcher, 1991; Liska, 1984). Most of the past exercise research on the TPB model has focused on the effect of attitude, SN, and PBC on behavior. More research on this theory needs to examine the possible interactions among the predictors of exercise and their impact on exercise behavior.

6.7.2 Implications for Clinical Practice: Recent campaigns in the Ottawa-Carleton region have been aimed at increasing physical activity among seniors. These campaigns have included activities such as: 1) development of partnerships with managers of shopping mall to promote mall-walking programs, 2) development of the “Active Sitting Program” with an audio chair exercise tape and exercise coordinator manual, 3) implementation of chair exercise programs for seniors in various shopping centers, and 4) development and pending release of an exercise video cassette for seniors. Community health nurses have played key roles in planning, implementing, and evaluating these programs. This study provides community health nurses with some direction for the design of more effective theory-based interventions for frail seniors.

In order to produce behavioral change, it is necessary to change the primary beliefs underpinning perceptions and attitudes (Ajzen & Fishbein, 1980). These beliefs are amenable to change via community educational campaigns and individualized interventions (Aminzadeh, 1997). Thus, any educational intervention should target seniors, the public, informal caregivers,

as well as health care providers. Findings emphasize the potentially influential role of physicians and other health care professionals with respect to encouraging regular physical activity health advice and the need to find ways to encourage professionals to use effective strategies for behavior change.

The complex health care needs of community-living elderly persons often require a multidisciplinary approach. As suggested by Aminzadeh (1997), nurses by virtue of the scope of their practice and recurring access to clients, play a vital role in identifying patient's needs and co-ordinating services. This places health care providers and care co-coordinators in an ideal position to take the lead in ensuring that the physical activity needs of frail seniors are addressed.

Programs to increase physical activity among frail seniors need to overcome the misconceptions associated with exercise. For example, chair exercise programs or Tai Chi programs could be presented in more positive ways to help dispel common misconceptions such as "only vigorous exercise is beneficial". Social marketing strategies are needed to portray more positive images of the types of exercise common among the frail population. For example, light housework could be marketed as an affordable, accessible, achievable and valuable form of exercise. Similarly, the use of an assistive device could be marketed as a tool, which could assist rather than impede physical activity. Another possible strategy to promote more positive images of frail seniors exercising would be the use of more positive role models with obvious functional limitations.

There is general support for the beneficial effects of strength training for most seniors including the very frail (Ettinger et al., 1997; Fiatarone et al., 1990; Lord et al., 1995). In fact, emerging studies examining the effectiveness of home-based resistance training programs using inexpensive rubber bands have shown promising results in reducing overall disability (Krebs, et

al., 1998; Jette et al., 1999). These home-based programs hold promise as a potential strategy to reach frail seniors who are often homebound. Weight training should be incorporated into existing chair exercise programs.

The built environment can also impact positively or negatively on seniors' levels of physical activity. Many seniors living in retirement residences and apartment buildings move to these locations because they can no longer navigate stairs at home. In a discussion paper, Shipp (1999) explained how the built environment could act as a persuasive force affecting physical activity levels in older adults. Shipp argued that physically challenging aspects of the environment, such as stairs, should be included in the design of living spaces for the elderly with the ultimate goal of encouraging greater daily physical activity and improved health. Comments provided by one elderly woman in this study with respect to stairs were particularly interesting. When the investigator questioned her on stair use, she made the following comments.

“ I just moved from my home to this apartment building two weeks ago. I used to get a lot of exercise climbing stairs at home, but now I use the elevator. I don't think anyone uses the stairs in this building. In fact, I have never seen the stairwell. Come to think of it, I will need to find an alternative activity to replace the exercise that I used to get climbing my stairs at home. If I don't, I will lose the ability to get around by myself”.

There is a growing trend to build one-storey housing for seniors (Shipp, 1999). One of the probable reasons for this trend is related to the concept of universal design. Since stairs are an inexpensive and often, built-in piece of exercise equipment, Shipp suggests that the trend towards one-storey design for seniors' housing may be placing seniors who can still navigate stairs at risk of losing their ability to climb stairs.

The findings of this study highlight the importance of accessibility. The training and integration of peer led exercise programs into existing seniors' social gatherings is a possible strategy to increase physical activity among seniors. Finally, programs are needed to reach frail homebound seniors. Possible modes of delivery for such programs are the home care support system or telephone contact and follow-up. These interventions call for close collaboration of community nurses with a range of disciplines and sectors such as home care providers, seniors, senior advocacy groups, community centers and the media.

Lastly, findings of the stratified analyses emphasize the importance of understanding how age, gender, health and pain status influence the exercise beliefs of frail seniors. This knowledge is essential for the design of exercise interventions for frail seniors. This knowledge can be used to tailor exercise interventions for specific subgroups of frail seniors.

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

6.7.3 Implications for Future Research: This is one of the first studies to apply a theoretical model to test cognitive determinants of exercise behavior among physically frail seniors. Findings provide some direction for future research.

Further refinement and psychometric testing of the newly developed instrument is needed to evaluate its validity and reliability in larger and more representative samples. For example, a factor analysis would shed light on how variables cluster which would further establish construct validation, while a longitudinal design would demonstrate change over time and which is one of

the criterion for establishing causation (Burns & Grove, 1999; Polit, 1996, Polit & Hungler, 1995). A replication study in other settings and among culturally diverse populations and more physically frail seniors would help to strengthen the generalizability of the findings (Burns & Grove, 1999; Polit & Hungler, 1996)

Lack of a consistent definition of the term “frail” is problematic for both researchers and clinicians. The Sisters of Charity of Ottawa have recently conducted a survey exploring the various conceptualizations of the term “frailty” among health care professionals. Results of this survey are pending. Further research studies exploring the dimensions of frailty are needed.

In this study, some sociodemographic variable not included in the TPB (i.e. pain, gender, health, and age) influenced the results. Studies using probability sampling would help to determine if these determinants hold true in a more representative sample. These variables may potentially help to further explain some of the variance in exercise intention and behavior.

Research on determinants of exercise among frail elderly need to be complemented by studies evaluating the effect of exercise in reducing the risk for falls, functional decline, and frailty. Well-controlled RCTs are needed in which falls, functional status and frailty are measured pre- and post-exercise prescriptions.

6.8 Conclusion

This cross-sectional descriptive comparative study of a convenience sample of 109 community-living seniors in the Ottawa-Carleton was an introductory step in research on the cognitive determinants of exercise behavior among seniors with minor to moderate physical impairments in physical function. With the exception of gender, pain, and ADL scores, there were no statistically significant differences between low and high actives with respect to

socidemographic characteristics, and health related characteristics. Although high actives, compared to low actives, obtained higher mean scores on all of the TPB constructs, with the exception of SN and intentions to continue exercising, all of the other components failed to reach statistical significance. However, the results of a stratified analyses indicated that age, gender pain and health status influenced the exercise beliefs of seniors in this study. This study has expanded the current knowledge on exercise behaviors and can be used to direct future research on this topic. The findings provide some direction for the design of theory-based exercise interventions to promote physical activity among seniors with minor to moderate limitations in physical functioning.

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APPENDIX A
EXERCISE INTERVENTION STUDIES

Table 2. 1 Selected Exercise Intervention Studies (RCTs) Illustrating Sample Characteristics Among Older Adults

<i>Study</i>	<i>N</i>	<i>Mean Age (SD)</i>	<i>Sample Inclusion Criteria Age/Health/ functional Characteristics</i>	<i>Sample Exclusion Criteria Health/ functional Characteristics</i>
Bucher et al. (1997) USA	105	75 yr. (1)	68 –85 yr., mild deficits in strength & balance	CV, pulm , bone disease, inability to walk, ADLs dependency, terminal illness
Campbell et al. (1997) USA	233	84.1 (3.2)	≥ 80 yr., some very frail. Average score on physical activity scale = 51.5 within a possible range of 0 to 400.	-
Ettinger et al. (1997) USA	439	68.5 yr. (6)	≥ 60 yr., pain in knee (s), disability, (e.g. walking, climbing stairs, rising from chair, cleaning, self-care, getting in & out of car, shopping), positive X-ray for OA.	ischemia, CHF, COPD, Type 1 diabetes, anemia, major psychiatric disorder, RA, exercising >1 /wk, unable to walk on treadmill or walk 420 ft. in 6 min. without assistive device
Jette et al. (1999) USA	215	75 yr. (6.7y)	≥ 60 yr., ≥ 1 functional limitations, ambulatory with or without assistive devices	No medical condition which would be contraindicated for exercise
Krebs et al. (1998) USA	132	74.4 yr. (6.5)	≥ 60 yr., ≥ 1 functional limitations, ambulatory with or without assistive devices	No medical condition which would be contraindicated for exercise
Leville et al. (1998) USA	201	77 yr. (5.2)	≥ 70 yr., non-participants in local senior center, receiving treatment for at least one chronic condition	Dementia, terminal illness, inability to walk, ADLs dependency, participant of senior center
Lord et al. (1995) Australia	197	71.6 yr. (5.4)	≥ 60 yr., ≥ 1 chronic illness, prescription drug use did not preclude participation in study	Immobile, hospitalized or ill.

Legend: SD: standard deviation, yr: year (S), mth: month(s), - sample characteristics not reported, ADLs: activities of living, CV: cardiovascular, CHF: congestive heart failure, pulm: pulmonary, HBP: high blood pressure, MS: multiple sclerosis, OA: osteoarthritis

Table 2. 2 Selected Exercise Intervention Studies (RCTs) Illustrating Sample Characteristics Among Older Adults

<i>Study</i>	<i>N</i>	<i>Mean Age (SD)</i>	<i>Sample Inclusion Criteria Health/functional Characteristics</i>	<i>Sample Exclusion Criteria Health/functional Characteristics</i>
Lord et al. (1996) Australia	112	71.6 yr. (5.4)	≥ 60 yr., ≥ 1 chronic illness, prescription drug use did not preclude participation in study	Immobile, hospitalized or ill.
McMurdo et al. (1995) USA	86	82 yr (4)	≥ 75 yr., limited walking ability, assistive device user, difficulties with ADLs requiring help at least weekly	Dementia, neurological disease, unstable CV disease
Messier et al. (2000) USA	103	68.4 yr. (1)	≥ 60 yr., OA of knee, pain, disability related to OA, in general seniors with medical conditions not excluded	Dementia, active CA, anemia, hepatic /renal disease, inability to walk for 128 ft. in 6 min unassisted.
Province et al. (1995) USA*	100 to 1323	60-75 yr.	inclusion criteria varied among studies, some studies specified functional limitations, past history of falls, and/or mobility problems	Varied from study to study.
Rejeski et al. (1997) USA/Canada	439	68.6 yr. (6)	≥ 60 yr., pain, disability related to OA. See Ettinger et al, 1991	See Ettinger et al., 1991
Thompson et al. (1988) USA	35	73.1 yr. (5.3)	≥ 64 yr., ambulatory, common chronic diseases, functional impairments	Dementia, cardiac conditions, medications that may affect responses to exercise

Legend: * meta-analysis (7 studies), SD: standard deviation, yr: year (s), mth: month(s), CV: cardiovascular, CA: cancer, CV disease: cardiovascular disease.

Table 2.3 Major Outcomes Measured in Selected Exercise Intervention Studies (RCTs) Among Older Adults

<i>Study (type, duration, frequency of training)</i>	<i>Gait</i>	<i>Balance</i>	<i>strength</i>	<i>Aerobic</i>	<i>Physical function</i>	<i>Pain</i>	<i>Falls</i>	<i>Other</i>	<i>Main Outcome</i>
Bucher et al. (1997) (ET, ST, ET) (3 x wk.x26 wk.)	X	X	X	X	X		*	* hospital use & costs	falls
Campbell et al. (1997) (general program) (.5 hr. 3 x wk x 6mth.)		*			X		*	* fall injury	falls fall injury
Ettinger et al. (1997) (AT & ST) (3x wk. x 18mth.)			*	*	*	*		X x-ray scores to determine changes in knee	disability
Jette et al. (1999) (ST) (.5 hr. 3 x wk. x 6 mth.)		*	*	*	*				disability
Krebs et al. (1998) (ST) (3x wk. x 35 min.)	*		*						gait stability
Leville et al. (1998) (general program) (3x wk. x 1 yr)					*			* Hospital use	disability
Lord et al. (1995) (general program) (1 hr. x2 x wk. x1 y.r)		*	*					* reaction time	falls

Legend: FT: flexibility training; AT: aerobic training, ST: strength training, MT: mobility training, BT: balance training.
 general program: program containing an aerobic, strength, and flexibility component, Yr: year(s), wk: week (s), mth: month(s), hr: hour (s),
 * : indicates statistical significant results, x : indicates outcome measured, but failed to reach statistical significance.

Table 2.4 Major Outcomes Measured in Selected Exercise Interventions Studies (RCTs) among Older Adults

<i>Study (Type/duration/frequency of training)</i>	<i>Gait</i>	<i>Balance</i>	<i>Strength</i>	<i>Aerobic</i>	<i>Physical function</i>	<i>Pain</i>	<i>Falls</i>	<i>Flex.</i>	<i>other</i>	<i>Main outcome</i>
Lord et al. (1996) (general program) (1 hr x 2/ wk x 1 yr)		*	*				x			falls
McMurdo et al. (1995) (ST, MT) (15 min x 7/wk x 6mth)	x				x			x		Physical function
Messier et al. (2000) (AT, ST) (3x wk x 18 mth.)		x								Postural sway
Province et al. (1995) Meta analysis (ET, FT, BT, RT, Tai Chi) 10 to 36 wks							*			Falls/fall injuries
Thompson et al. (1988) (general program) 3 hr x wk x 16wk			x	x				x		Serum lipids Treadmill Neuromotor function
Rjeski et al. (1997)			x	x						Compliance

Legend: FT: flexibility training, AT: aerobic training, ST: strength training, MT: mobility training, BT: balance training, Flexibility, general program: program containing an aerobic, strength, and flexibility component, Yr: year(s), wk: week (s), mth: month(s), hr: hour (s), *: indicates statistical significant results, x : indicates outcome measured, but failed to reach statistical significance

Table 2. 5 Types/Location/Duration of Selected Exercise Interventions Among Older Adults

Type of Training				Location/Duration			
Study	N	Mean Age (SD)	AT	ST	Other	Community Duration of intervention /months	Home Duration of intervention /months
Bucher et al.(1997)	105	75 yr. (1)	bicycle	machines	ET, ST	6	
Campbell et al. (1997)	233	84.1 yr. (3.2)	walking	cuffs	FT, BT		12
Ettinger et al (1997)	439	68.5 yr. (6)	walking	dumbbells, cuffs		3	15
Jette et al. (1999)	215	75 yr. (6.7)		bands	video		6
Krebs et al. (1998)	132	74.4 yr. (6.5)		bands	video		6
Leville et al. (1998)	201	77 yr. (5.2)			Combo	12	
Lord et al.(1995)	197	71.6 yr. (5.4)			Combo	12	
Lord et al. (1996)	112	71.2 yr. (5.4)			combo	12	
McMurdo et al. (1995)	86	82 yr. (4.1)		bands	MT, FT		6
Messier et al. (2000)	103	68.4 yr. (1.0)	walking	dumbbells, cuffs	health education	15	3
Province et al. (1995) *meta-analysis/ 7 studies.	100- 1323	78.7 yr. (5.5)			Tai Chi, RT, ET, BT, FT	6 studies duration 2.5 - 9 months	1 study
Thompson (1988)	35	73.1 yr.(5.3)			Combo	4	
Rejeski et al. (1997)	439	68.6 yr.(6)	walking	dumbbells, cuffs		3	15

Legend: SD: standard deviation, Yr.: year(s), mth: month (s), AT: aerobic training, ST: strength training,

FT: flexibility training, BT: balance training, ET: endurance training, MT: mobility training, Cuffs: weighted cuffs used around ankles or wrists,

Bicycle: refers to stationary bicycle, Combo program: combined endurance, strength and flexibility training

Bands: refers to elastic bands, color coded for different levels of resistance , video refers to exercise video.

APPENDIX B
CORRELATES & BARRIERS
TO EXERCISE

Table 2.6: Sociodemographic and Psychological Correlates of Exercise among Community-Living Older Adults

Variable	Courneya (1995)	Clark (1999)	Clark (1995)	Clark & Nothwehr (1999)	MacLeod & Stewart (1994)	O'Neil & Reid (1991)	Conn (1998 a)
Socio-Demographic							
Older age	-.*	-.*	-.*	-.*	-.*	-	-.*
Female gender	0	-.*		-.*		0	
Lower Education	0	-.*	-.*		-.*	0	
White race				-.*			
Lower income	0	0		-.*	0	0	
Marital Status (Not married)	0				0		
Living alone		+.*					
Psychological							
Attitude	+.*						
Perceived behavioural control	+.*						
Subjective norms	+.*						
Behavioural beliefs	+.*						
Control beliefs	+.*						
Intentions	+.*						
Lower Competency					-.*		
Knowledge of exercise				+.*			
Self- efficacy		+.*					+.*
Current exercise experience				+.*			
Discussed exercise with doctor		+					
Satisfaction with amount of walking			+.*				
Outcome expectancy							-.*
Belief that not exercising is harmful			+.*				
Perceived barriers		+.*					-.*

LEGEND: Blank association not studied/ reported, 0= No association detected, * significant predictor in multivariate analysis
+ positive association in bivariate analysis, - negative association in bivariate analysis,

Table 2.7: Health, Environmental, and Interpersonal Correlates of Exercise Among Community-Living Older Adults

<i>Variable</i>	<i>Courneya (1995)</i>	<i>Clark (1999)</i>	<i>Clark (1995)</i>	<i>Clark & Nothwehr (1999)</i>	<i>MacLeod & Stewart (1994)</i>	<i>O'Neil & Reid (1991)</i>	<i>Conn 1998</i>
Health/ health related							
Poorer perceived health		.*		.*			.*
Difficulty climbing stairs				.* a			
Difficulty walking a block				+ a			
Fear of SOB		.*		.*a			
Fear of chest pain				+a			
Pain with exercise				+ *			
Fear of falling				+ a			
Lower use of medications					+*		
Illness/handicap						+	
Satisfaction with health			+				
Cancer			+				
Depression			.*				
Lifelong exercise behaviour							+
Activity level							
Environmental							
						0	
Fear of crime				+ *			
Poor weather				+ a			
Poor/no sidewalks				+			
No place to sit down				+			
Interpersonal							
Verbal persuasion from family				+			
Verbal persuasion from doctor				+*a			

LEGEND: Blank association not studied/ reported, 0= No association detected, * significant predictor in multivariate analysis
+ positive association in bivariate analysis, - negative association in bivariate analysis,
association found only in women, association found only in men, a = association found only in older age group (70 + yr.)

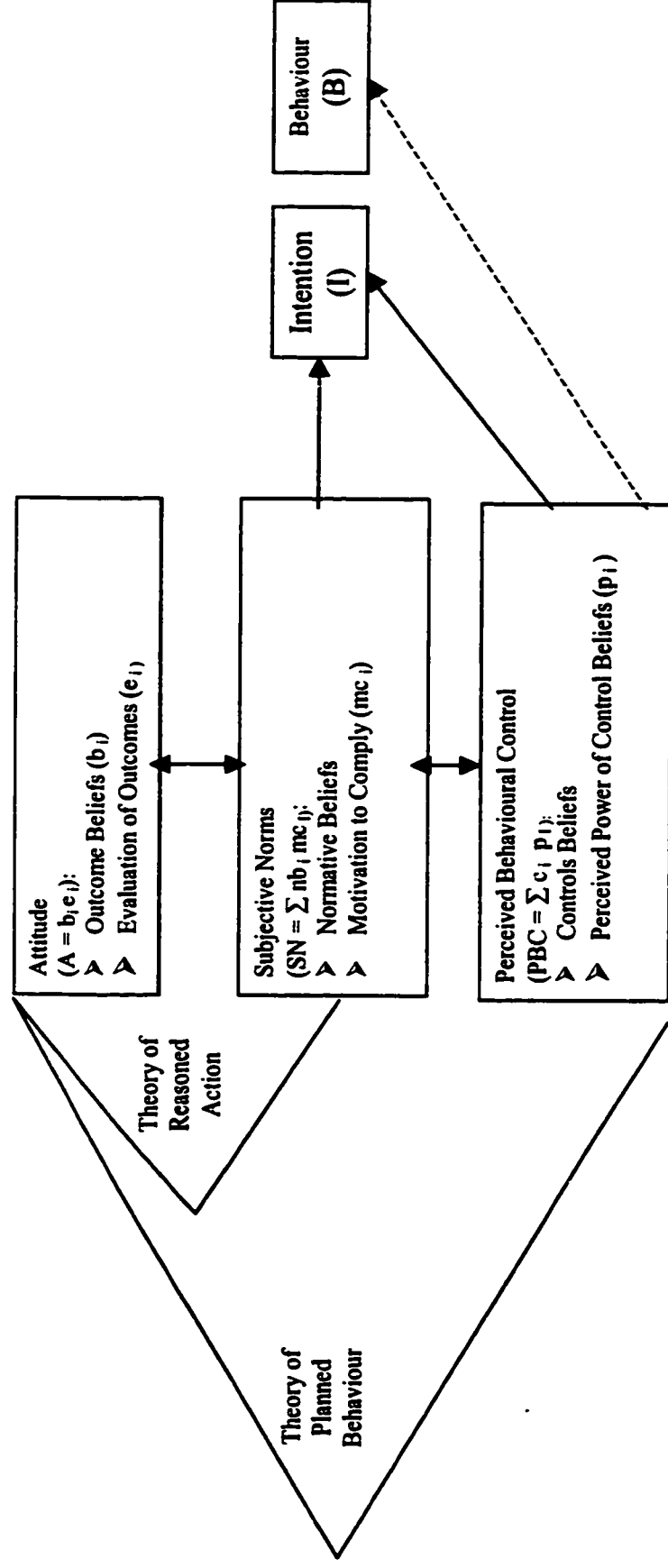
Table 2.8 Summary of the Major Barriers Cited Exercise Studies Among Older Adults

<i>Barriers</i>	<i>Conn (1998a)</i>	<i>Conn et al. (1994)</i>	<i>Melillo et al. (1996)</i>	<i>O'Neil & Reid (1991)</i>	<i>Jones & Nies (1996)</i>	<i>Clark & Northwehr (1999)</i>
<i>Type of Study</i>	Qualitative	Qualitative	Quantitative	Quantitative	Quantitative	Quantitative
Physical						
Health problems	✓	✓	✓	✓	✓	
Fatigue	✓			✓	✓	
Lack of energy	✓				✓	
Exercise is hard work					✓	
Pain when exercising						✓
Fear of chest pain						✓
Shortness of breath						✓
Swelling						✓
Joint problems or joint soreness	✓					
My doctor told me not to overextend myself				✓		
Psychological						
"I am too old to exercise"				✓		
Having an established schedule			✓			
Lack of motivation		✓				
Depression	✓					
Fear of falling				✓		✓
Exercising is not pleasant			✓			
Lack of discipline						
"I worked hard all of my life, I deserve rest now"				✓	✓	
Time constraints		✓	✓	✓	✓	
Social						
Lack of exercise partner (s)	✓		✓	✓		
Cost				✓		
Caregiving responsibilities	✓					
Environmental						
Weather (Bad)	✓	✓				✓
Unsafe neighborhood	✓				✓	✓
Lack of exercise facilities					✓	
No place to sit down						✓
No or poor sidewalks						✓
Transportation				✓		
Knowledge						
Not knowing how to exercise				✓		
I already get enough exercise				✓		
I do not need as much exercise at my age				✓		

APPENDIX C

SCHEMATIC DIAGRAM OF THE THEORY OF PLANNED BEHAVIOUR AND THE THEORY OF REASONED ACTION

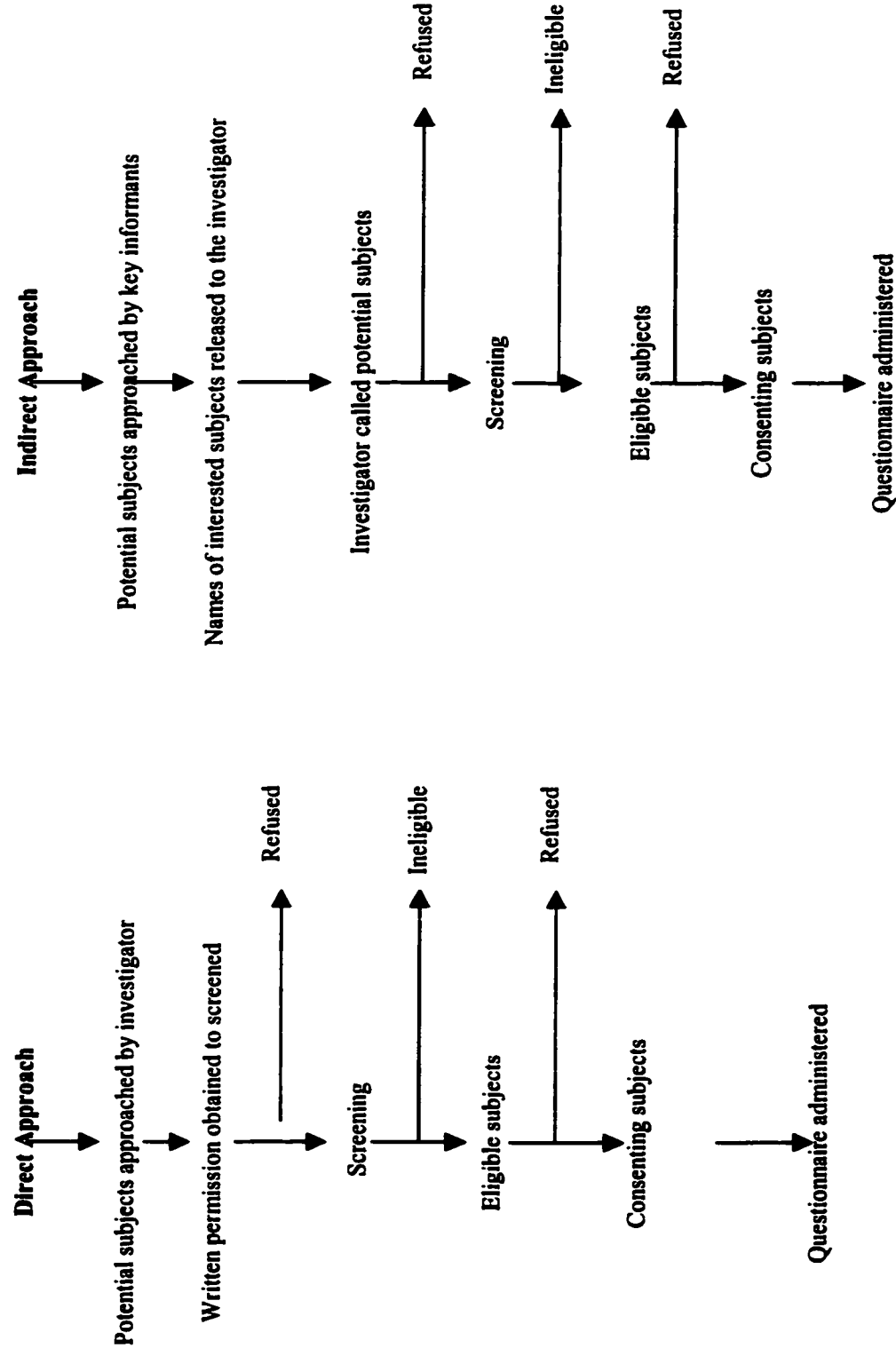
Figure 2.1 Schematic Diagram of the Theory of Planned Behavior and Theory of Reasoned Action



APPENDIX D

SUBJECT RECRUITMENT
AND
DATA COLLECTION PROCEDURES

Figure 3. 1 Subject Recruitment and Data Collection Procedures



APPENDIX E
LETTER FOR KEY INFORMANTS



Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé
École des sciences infirmières

Faculty of Health Sciences
School of Nursing

Letter of Information For Key Informants

To whom it may concern,

I am a student at the University of Ottawa currently working on my thesis for the Master of Science in Nursing program. I am conducting a survey to learn about seniors' participation and attitudes towards exercise. It is anticipated that the results of this study will assist in designing more appropriate exercise programs. These programs will help seniors improve their general well being, promote their independence and help reduce the risk for falls. My thesis advisor is Dr. Nancy Edwards, who is an associate professor in the Faculty of Health Sciences, Nursing, at the University of Ottawa.

I am requesting your assistance to recruit seniors that meet the following criteria:

- Age 65 years or older
- community resident of the Ottawa-Carleton region
- be able to read or speak English
- no apparent cognitive impairment
- physically frail (requires some level of assistance in one or more of their activities of daily living)
- exerciser or non-exerciser

Participation in this study requires the following:

1. Screening Process

- Subjects will be screened with the Physical-Self- Maintenance -Scale (PSMS, Lawton and Brody). Seniors will be asked six questions on their ADL functioning. A senior will be included in this study if h/she has difficulty and requires some form of assistance in performing two or more of their ADLS. (i.e. score of 8-20.) This screening test will take approximately 5-10 minutes.
- Subjects will be screened with The Short Portable Mental Status Questionnaire. This is a 10 questions screening tool for cognitive impairment. A senior who makes three or more errors on this cognitive screening tool will be excluded from this study. This will take approximately 2-5 minutes.

2. Exercise Questionnaire

- Subjects will be asked questions on their attitudes, perceptions and beliefs about exercise and their current exercise regime.
- Subjects will be asked questions on their perceived health status, pain and other sociodemographic variables.
- The Older Adults' Exercise Questionnaire will take about 30- 45 minutes.
- The total time required for this survey including screening is approximately 60 minutes. Seniors will be offered the option of dividing the interview into two 30 minute sessions

Participation in this study is *voluntary*. Seniors may refuse to participate, refuse to answer the questions or withdraw from the study at any time. All information will be kept strictly *confidential*. Seniors' names will not be recorded with their responses or identified in any way. The information that will be collected will not be used for any purposes other than research.

The level of emotional/psychological risk is expected to be very *low*. Some seniors may become anxious when asked question about their memory and recall. To reduce this risk the investigator will use a short and concise screening tool.

The level of physical/ psychological discomfort is expected to be very *low*. Frail seniors may find the interview tiring. To reduce this possibility, the investigator will ensure that 1) a comfortable and private setting is available 2) if the senior desires the interview can be divided into two 30-minute session and 3) visual references will be used to help the senior respond to the questions.

This study may not have a direct benefit to the senior, but this information will be used to help design better programs for frail seniors.

If you have any further questions or concerns about this study, please do not hesitate to contact: researcher, Kathleen Holdway, at xxx; study supervisor, Dr. Nancy Edwards, Faculty of Health Sciences, Nursing, University of Ottawa at xxx (ext.xxx). If you have any questions on the ethical conduct of the investigator, Kathleen Holdway, you may contact Lise Frigault, Protocol Officer for Ethics in Research, Tabaret, Hall Room 302, University of Ottawa, at (613) xxx ext.(xxx).

In summary could you please

- Inform your nurses about the study and ask them to inform their clients of the study.
- Ask your nurses to obtain their clients' permission to release their names and phone numbers to me.
- Call me with the names and phone numbers of interested seniors.
- I will call interested seniors to provide them with more information, assess their eligibility, obtain an informed consent and arrange for a meeting at a mutually agreed upon time and place.

Thank you

Kathleen Holdway RN BScN

APPENDIX F
LETTER OF INFORMATION FOR SENIORS ⁵

⁵ 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

WHAT YOU MIGHT WANT TO KNOW ABOUT THE OLDERS ADULTS' EXERCISE SURVEY

What is this all about?

My name is Kathleen Holdway. I am a student at the University of Ottawa working on my thesis for the Master of Science in Nursing Program. I am doing a survey to learn about seniors' opinions about exercise. This information will help in designing better exercise programs for seniors.

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

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 physical ability to do thing, your memory and recall, your opinions on exercise, and your background. This will take about an hour of your time. I will read the questions to your and will record your answers.

What good/harm will this do me?

There may be some risk to you. Some people become anxious when asked questions about their memory or recall. This can happen because some people are better at remembering recent events, while other are better at remembering past events. Your participation may have no benefits to you, but this information will be used to improve programs for other seniors.

What if I do not exercise?

I am interested in learning about the opinions of all seniors. Whether or not you are exercising, your opinions and experiences with exercise are very important.

451, ch. Smyth
Ottawa (Ontario) K1H 8M5 Canada

451 Smyth Rd.
Ottawa, Ontario K1H 8M5 Canada

(613) 562-5473 • Téléc./Fax (613) 562-5443

What if I do not know a lot about exercise?

There are no right or wrong answers to the questions. I am interested in learning about your ideas and experiences.

Is this confidential?

All information is highly confidential. Your name and address will not be recorded with your answers. A list with your name and address and a copy of your signed consent will be kept separate from your answers in a locked filing cabinet at the University of Ottawa until completion of the study, which will be in about one year. If this research is published, only information from the group will appear.

What if I have more questions whom do I call?

If you have any questions, concerns or comments about this study please feel free to call me KATHLEEN HOLDWAY, the investigator at XXX. You may also phone my advisor Dr. Nancy Edwards at the Faculty of Nursing, University of Ottawa, at XXX (ext.XXXX). If you have any questions on the ethical conduct of the investigator, Kathleen Holdway, you may contact Lise Frigault, Protocol Officer for Ethics in Research Tabaret, Hall Room 302, University of Ottawa, at (613) XXX ext(XXXX).

Can I get a copy of the results?

I would be glad to send you the general results and findings of this study. Please give me your telephone number and address. I hope to have the results ready in about 8-10 months.

THANKS FOR YOUR HELP

APPENDIX G**CONSENT FORM FOR THE PILOT SURVEY ⁶****CONSENT FORM FOR THE MAIN SURVEY ⁶**

⁶The 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 FOR THE PILOT SURVEY

My name is Kathleen Holdway. I am a student at the University of Ottawa working on my thesis for the Master of Science in Nursing Program. I am doing a survey to learn about seniors' opinions about exercise. This information will help in designing better exercise programs for seniors.

I am inviting you to participate in the pilot study for this survey. The purpose of the pilot 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 of my questions. You may also stop your participation in this study at any time. Whatever your decision, it will not influence the services you receive at _____.

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 opinions of exercise, your physical ability to do things, your memory and recall, and your background. I will read the questions to you and write down your answers. After completing the questionnaire, you will be asked to talk through some of the questions. I will also ask for any suggestions that 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 may be some risk to you. Some people become anxious when asked questions about their memory or recall. This can happen because some people are better at remembering recent events, while others are better at remembering past events. Your participation may have no benefits to you, but this information will be used to improve programs for other seniors.

What if I do not exercise?

I am interested in learning about the opinions of all seniors. Whether or not you are exercising, your opinions and experiences with exercise are very important.

What if I do not know a lot about exercise?

451, ch. Smyth
Ottawa (Ontario) K1H 8M5 Canada

451 Smyth Rd.
Ottawa, Ontario K1H 8M5 Canada

(613) 562-5473 • Téléc./Fax (613) 562-5443

What if I do not know a lot about exercise?

There are no right or wrong answers to the questions. I am interested in learning your opinions.

Is this confidential?

All information is highly confidential. Your name and address will not be recorded with your answers. A list with your name and address and a copy of your signed consent will be kept separate from your answers in a locked filing cabinet at the University of Ottawa until completion of the study, which will be in about one year. If this research is published, only information from the group will appear. A copy of

What if I have more questions?

If you have any questions, concerns or comments about this study please feel free to call me KATHLEEN HOLDWAY, the investigator at XXX. You may also phone my advisor Dr. Nancy Edwards at the Faculty of Nursing, University of Ottawa, at XXX(ext.XXXX). If you have any questions on the ethical conduct of the investigator, Kathleen Holdway, you may contact Lise Frigault, Protocol Officer for Ethics in Research Tabaret, Hall Room 302, University of Ottawa, at (613) XXX ext. XXXX.

Can I get a copy of the results?

I would be glad to send you the general results and findings of this study. Please give me your address. I hope to have the results ready in about 8-10 months.

This is to certify that _____ has received a copy of this consent form and the content of the consent has been reviewed with the respondent. One signed copy of this consent will be retained by the investigator. The respondent has provided written consent to participate in this study.

Date ____/____/____ Place _____ Time _____

Interviewer's Signature:

Respondent's signature:

THANKS FOR YOUR HELP



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 FOR THE MAIN SURVEY

My name is Kathleen Holdway. I am a student at the University of Ottawa working on my thesis for the Master of Science in Nursing Program. I am doing a survey to learn about seniors' opinions about exercise. This information will help in designing better exercise programs for seniors.

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

Is this confidential?

All information is highly confidential. Your name and address will not be recorded with your answers. Your name and address and a copy of your signed consent will be kept separate from your answers in a locked filing cabinet at the University of Ottawa until the end of this study, which will be about one year. If this research is published, only information from the group will appear.

What do I need to do?

If you agree to take part in this study, you will be asked a few questions on your opinion of exercise, your ability to do things, your memory and recall, and your background. I will read the questions to you and write down your answers. This will take about an hour of your time.

What good/harm will this do me?

There may be some risk to you. Some people become anxious when asked questions about their memory or recall. This can happen because some people are better at remembering recent events, while others are better at remembering past events. Your participation may have no benefits to you, but this information will be used to improve programs for other seniors.

What if I do not exercise?

I am interested in learning about the opinions of all seniors. Whether or not you are exercising, your opinions and experiences with exercise are very important.

What if I do not know a lot about exercise?

There are no right or wrong answers to the questions. I am interested in learning about your ideas and experiences.

What if I have more questions?

If you have any questions, concerns or comments about this study please feel free to call me KATHLEEN HOLDWAY, the investigator at XXX. You may also phone my advisor Dr. Nancy Edwards at the Faculty of Nursing, University of Ottawa, at XXX (XXX). If you have any questions on the ethical conduct of the investigator, Kathleen Holdway, you may contact Lise Frigault, Protocol Officer for Ethics in Research Tabaret, Hall Room 302, University of Ottawa, at (613) XXX ext (XXX).

Can I get a copy of the results?

I would be glad to send you the general results and findings of this study. Please give me address. I hope to have the results ready in about 8-10 months.

This is to certify that _____ has received a copy of this consent form and the content of the consent has been reviewed with the respondent. One signed copy of this consent will be retained by the investigator. The respondent has provided written consent to participate in this study.

Date: __/__/__/ Place: _____ Time: _____

Interviewer's Signature:

Respondent's Signature:

THANKS FOR YOUR HELP

APPENDIX H
SCREENING INSTRUMENTS
AND
OLDER ADULTS EXERCISE QUESTIONNAIRE
(OAEQ)

SCREENING INSTRUMENTS (CODED)

1. Administrative information

Variable	Range	Code	Values
1. Id number	1-109	id	
2. Location	1 2 3 4 5 6 7 8 9 10 11	locate	
3. Date of interview	dd/mm/yy	date	
6. Start time of interview		start	
7. Finish time of interview		finish	
8. Total time interview	(minutes)	totalin	
9. Gender	Female 1 Male 2	gender	
10. Date of birth	dd/mm/yy	dob	
11. Age		Age	
1. Lives in nursing home	Yes 1 No 2	LTC	

2. COGNITIVE SCREENING INSTRUMENT : Short Portable Mental Status Questionnaire SPMSQ *

1. When were you born? Can give month/ day/year	Yes 1 No 2	SPMS1	
2. So how old does that make you? Age Corresponds to DOB	Yes 1 No 2	SPMS2	
3. What is your telephone number? Can give an answer. Can repeat later.	Yes 1 No 2	SPMS3	
3 a. What is your street address? (Ask only if no telephone)	Yes 1 No 2	SPMS3a	
4. What is the name of this place? Correct answer given	Yes 1 No 2	SPMS4	
5. What day of the week is it? Gives correct answer.	Yes 1 No 2	SPMS5	
6. What is the date today? Dd/mm/yy Gives complete/correct answer.	Yes 1 No 2	SPMS6	
7. What was your mother's maiden name? Can not be verified.	Yes 1 No 2	SPMS7	
8. Who is the current Prime Minister of Canada? Can give correct answer.	Yes 1 No 2	SPMS8	
9. Who was the Prime Minister before him? Can give correct answer.	Yes 1 No 2	SPMS9	
10. Subtract 3 from 20 and keep subtracting each new number you get, all the way down. (20, 17, 14, 11, 8, 5, 2) Can give correct answer.	Yes 1 No 2	SPMS10	
Total errors (range 0-10)	___/___	errors	
.Eligible	Yes 1 No 2	Eligible	

* Source: Pfeiffer Eric, 1975 (A Short Portable Mental Status Questionnaire for the Assessment of Organic Brain Deficit in Elderly Patients, JAGS, 23 (10) p 440-441.

3. ADL Screening: Physical Self-Maintenance Scale (PSMS) *

	Code	Score
A. Feeding 1. Eat without assistance 2. Eats with minor assistance at meals time and/or with special preparation of food, or help in cleaning up. 3. Feeds self with moderate assistance and is untidy. 4. Requires extensive assistance for all meals. 5. Does not feed self at all and resists efforts of others to feed him	feed	1 2 3 4 5
B. Dressing 1. Dresses, undresses and selects clothes from own wardrobe. 2. Dresses and undresses self, with minor assistance. 3. Needs moderate and regular assistance or supervision in grooming. 4. Needs total grooming care, but can remain well-groomed after help from others. 5. Actively negates all efforts of others to maintain grooming.	dress	1 2 3 4 5
C. Grooming 1. Neatly dressed, well groomed, without assistance. 2. Grooms self adequately with occasional minor assistance, e.g., shaving. 3. Needs moderate and regular assistance or supervision in grooming. 4. Needs total grooming care, but can remain well groomed after help from others. 5. Actively negates all efforts of others to maintain grooming.	groom	1 2 3 4 5
D. Physical Ambulation 1. Goes about grounds or city. 2. Ambulates within residence or about one block. 3. Ambulates with assistance of (check one) another person (1) railing (2) cane (3) walker (4) wheelchair (5) () 1. get in and out of chair by self () 2. needs help (i.e. person) to get in and out of chair 4. Sits unsupported in a chair or wheelchair, but cannot propel self without help. 5. Bedridden more than half the time.	ambulate device chair	1 2 3 4 5 1 2 3 4 5 1 2
E. Bathing 1. Bathes self (tub, shower, sponge bath) without help. 2. Bathes self with help in getting in and out of tub. 3. Washes face and hands only, but cannot bathe rest of body. 4. Does not wash self but is cooperative with those who bathe h/him. 5. Does not try to wash self and resists efforts to keep h/him clean.	bath	1 2 3 4 5
5 a. Do you use grab bars? Yes 1 No 2	bars	1 2
E. Toilet 1. Cares for self at toilet completely, no incontinence. 2. Needs to be reminded, or needs help in cleaning self, or has rare (weekly at most) accidents 3. Soiling or wetting while asleep more than on 4. Soiling or wetting while awake more than once a week. 5. No control of bowels or bladder.	toilet	1 2 3 4 5
7. Total score on PSMS /30	PSMS	
8. Eligible Yes 1 No 2	elig	1 2

* Source: (From Lawton MP, Brody EM. Assessment of older people. Self- Maintaining and Instrumental Activities of Daily Living. Gerontologist 1969, 9:180, Table I) (N.B. question on use of grab bars not included in original ADL instrument) (N.B. grab-bar use and ability to rise from a chair was not calculated in the total ADL score)

Instructions for Completion of the SPMSQ

- Ask the subject question 1 to 10 in the above list and record all answers. All responses to be scored correct must be given by the subject without reference to a calendar, birth certificate or other aid to memory.
- Question 1 is to be scored correctly only when the exact month, exact date, and the exact year are given correctly.
- Question 2 is scored correct when stated age corresponds to date of birth.
- Question 3 should be scored correctly when the correct telephone number can be verified, or when the subject can repeat the same number at another point in the questioning.
- Question 4 should be scored correctly if any correct description of the location is given. (e.g. "My home", correct name of the city are all acceptable).
- Question 5 is self-explanatory.
- Question 6 is to be scored correctly only when the month, exact date, and exact year are all given.
- Question 7 does not need to be verified. It is scored correct if a female first name plus a last name other than the subject's last name is given.
- Question 8 requires only the last name of the Prime Minister.
- Question 9 requires only the last name of the previous Prime Minister.
- Question 10 requires that the entire series be performed correctly in order to be scored as correct. Any error in the series or unwillingness to attempt the series is scored as incorrect.

Scoring of the Short Portable mental Status Questionnaire

The data suggest that both race education and race influence performance on the SPMSQ and they must be taken into account in evaluating the score attained by an individual.

For purposes of scoring, three educational levels have been established: a) persons who have had only a grade school education; b) persons who have had high school education or who have completed high school; c) persons who have had any education beyond the high school level, including college, graduate school or business school.

For white subjects with at least high school, but not more than high school education, the following criteria have been established:

0-2	Errors	intact functioning
3-4	Errors	mild intellectual impairment
3-7	Errors	moderate intellectual impairment
8-10	Errors	severe intellectual impairment

Allow one more error if subject has had only a grade school education.

Allow one less error if the subject has had education beyond high school

Allow one more error for black subjects, using identical education criteria.

Source: Pfeiffer Eric, (1975) A Short Portable Mental Status Questionnaire for the Assessment of Organic Brain Deficit in Elderly Patients, JAGS, 23 (10) p 440-441.

OLDER ADULTS' EXERCISE QUESTIONNAIRE (CODED)

A: Older Adults Opinions About Exercise: Instructions to Participants:

“ The following are statements made by other seniors about exercise. I would like to know your opinions. I will read the statement and the 5 possible responses . I have written down the 5 options on this yellow card. If you wish, you may use this card to help you chose the answer that best describes your opinion.

Let me give you an example... Eating nutritious food would make me feel healthy....If you think that this statement is very likely...then you would indicate your response as ..very unlikely.

Attitudes					
Score	-2	-1	0	+1	+2
	Very unlikely	Unlikely	Neither	Likely	Very likely
	1	2	3	4	5
Reverse score	2	1	0	-1	-2

A: Your opinions about exercise	Code	Scale	score
---------------------------------	------	-------	-------

(Indirect Attitude: items 1-3, 5-13) (Direct attitude: item 4)

1	Exercising would make my muscles and bones stronger.	Opin1	1	2	3	4	5	
2	Exercising would make me feel too tired. (reverse code)	Opin2	1	2	3	4	5	
3	Exercising would reduce the risk of falling.	Opin3	1	2	3	4	5	
4	Exercising would be inconvenient. (reverse code)	Opin4	1	2	3	4	5	
5	Exercising would give me more energy.	Opin5	1	2	3	4	5	
6	Exercising would help me meet people.	Opin6	1	2	3	4	5	
7	Exercising would help me think more clearly.	Opin7	1	2	3	4	5	
8	Exercising would help me to enjoy life more.	Opin8	1	2	3	4	5	
9	Exercising would make me feel more relaxed.	Opin9	1	2	3	4	5	
10	Exercising would help me maintain my independence.	Opin10	1	2	3	4	5	
11	Exercising would keep my joints flexible.	Opin11	1	2	3	4	5	
12.	Exercising would be painful. (reverse code)	Opin12	1	2	3	4	5	
13.	Exercising would reduce my aches and pains.	Opin13	1	2	3	4	5	
			Total					

B. Opinions of others about you exercising (SUBJECTIVE NORM)

Instructions to Participants: " The following questions are about whether other people think you should exercise and how important their opinions are to you. There are no right or wrong answers. I am interested in your opinions. If you wish, you can use this new card to help you select your best answer.

B. Opinions of others about you exercising (SUBJECTIVE NORM)

Normative	Beliefs				
Score	-2	-1	0	+1	+2
	Very unlikely	Unlikely	Neither	Likely	Very likely
	1	2	3	4	5

B. Indirect SN (Normative beliefs)	Other	Scale					Score
1. Most members of my family think I should exercise.	Other1	1	2	3	4	5	
2. Most of my friends think I should exercise.	Other2	1	2	3	4	5	
3. My doctor thinks that I should exercise.	Other3	1	2	3	4	5	
4. Other health care workers (e.g.: my therapist, my nurse, etc.) think I should exercise.	Other4	1	2	3	4	5	
5. Most people who are important to me think I should exercise. (Direct SN)	Other5	1	2	3	4	5	
		TOTAL					

Motivation to comply					
	Very little	A little	Somewhat	A lot	A great deal
	1	2	3	4	5

Motivation to comply (Unipolar scoring)	Code	Scale					Score
6. Generally speaking, to what extent do you want to do what your family thinks you should do?	Other6	1	2	3	4	5	
7. Generally speaking, to what extent do you want to do what your friends think you should do?	Other7	1	2	3	4	5	
8. Generally speaking, to what extent do you want to do what your doctor thinks you should do?	Other8	1	2	3	4	5	
9. Generally speaking to what extent do you do what other health care workers (other than your doctor) think you should do?	Other9	1	2	3	4	5	
$SN = \sum nb_i mc_i$							

C. Difficulties You May Anticipate in Exercising

Instructions to Participants: “The next set of questions is about some difficulties seniors may experience in exercising. Please tell me how likely it is that the following difficulties would discourage you from exercising. There are no right or wrong answers.”

PBC					
Score	+2	+1	0	-1	-2
	Very unlikely	Unlikely	Neither	Likely	Very likely
	1	2	3	4	5
Reverse score	-2	-1	0	+1	+2

C. Difficulties You May Anticipate in Exercising (Indirect Control Beliefs)	Code	Scale	Score
1. Not knowing how to exercise would discourage me from exercising.	Diff1	1 2 3 4 5	
2. The cost of an exercise class would discourage me from exercising.	Diff2	1 2 3 4 5	
3. Fatigue would discourage me from exercising	Diff3	1 2 3 4 5	
4. My health problems would discourage me from exercising.	Diff4	1 2 3 4 5	
5. Lack of transportation would discourage me from exercising.	Diff5	1 2 3 4 5	
6. Lack of someone to exercise with would discourage me from exercising.	Diff6	1 2 3 4 5	
7. Lack of motivation would discourage me from exercising.	Diff7	1 2 3 4 5	
8. Lack of support would discourage me from exercising.	Diff8	1 2 3 4 5	
9. At my age, it is hard to get interested in doing regular exercise.	Diff9	1 2 3 4 5	
Direct PBC 10. If I wanted to, I could easily exercise (reverse code)	Diff10	1 2 3 4 5	

D. Your Intentions to Exercise

Instructions to Participants: “The next question are about your intentions to exercise. There are 5 possible options and I have them listed on this card. You may use this card to help you choose the option that best describes your intentions”...

Intentions					
Score	-2	-1	0	+1	+2
	Very unlikely	Unlikely	Neither	Likely	Very likely
	1	2	3	4	5

D. Your Intentions to Exercise	code	Scale	Score
1. I intend to start exercising in the next month.	intend1	1 2 3 4 5	
2. I intend to continue exercising within the next month	intend2	1 2 3 4 5	

Section E. Your Health

Instructions to Participants: "I would like to ask you some questions about your health, pain and level of activity. If you desire, you may use this yellow card to help you chose the option that best describes your choice.

Excellent 1	very good 2	good 3	fair 4	poor 5
1. Compared to people my own age, how would you rate your overall health at the present time?.....read 5 options			health	1 2 3 4 5

Section F. Your Activity Level

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

1. Compared to other people your on age, how would you rate your overall level of activity at the present time?.....read 5 options	activity	1 2 3 4 5
--	----------	-----------

Section G. Your Pain and Activity

1. Which one of the following sentences best describes the effect of pain or discomfort you usually experience? read option card	pain	1 2 3 4 5
---	------	-----------

Section H. Activity

Instructions to Participants: I would like to know more about your exercising. Exercise can be any type of activity that you do for the purpose of maintaining or improving your health or fitness level. These activities can be done at home, in an exercise class, or elsewhere.....done alone or in a group.....

Some people do exercises that improve their stamina or endurance like brisk walking. Have you participated in any of the following exercises within the past week?.....and how often did you do this activity within the past week.....On these yellow cards I have a list of four different times....Which options best describes the time that you spend doing this activity?.....Now I have another card with 5 options...Can you choose the option which best describes how intense this activity is for you....

Endurance					
Activity	Code		Activf	Activd	Activi
Walking (indoors)	Activ1	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Walking (mall)	Activ2	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Walking (outdoors)	Activ3	Yes 1 No 2		1 2 3 4	1 2 3 4 5
swimming	Activ4	Yes 1 No 2		1 2 3 4	1 2 3 4 5
aquafitness class	Activ5	Yes 1 No 2		1 2 3 4	1 2 3 4 5
dancing	Activ6	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Other Specify_____	Active7	Yes 1 No 2		1 2 3 4	1 2 3 4 5

Instructions to Participants Some people do exercises that work their muscles and increase their strength such as carrying groceries. The perceived intensity of this activity depends on a number of factors such as how long, how far and/or how heavy the bags are. Have you participated in any of the following within the past week? and how often did you do this activity within the past week? On these yellow cards I have a list of four different times....Which options best describes the time that you spend doing this activity?.....Now I have another card with 5 options...Can you choose the option which best describes how intense this activity is for you....

Strength	Code		Activf	Activd	Activi
chair exercises (home)	Active8	Yes 1 No 2		1 2 3 4	1 2 3 4 5
chair exercises (fitness class)	Active9	Yes 1 No 2		1 2 3 4	1 2 3 4 5
carrying objects (e.g. groceries, /laundry)	Active10	Yes 1 No 2		1 2 3 4	1 2 3 4 5
climbing stairs (home)	Active11	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Lifting weights and/or using rubber bands (home)	Active12	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Lifting weights and/or using rubber bands (class)	Active13	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Gardening (raking, cutting grass)	Active14	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Housework (e.g. vacuuming)	Active15	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Other Specify	Active16	Yes 1 No 2		1 2 3 4	1 2 3 4 5

Instructions to Participants: Some people do exercises that increase their general flexibility such as bending or stretching. Have you participated in any of the following within the past week? and how often did you do this activity within the past week? On these yellow cards I have a list of four different times....Which options best describes the time that you spend doing this activity?.....Now I have another card with 5 options...Can you choose the option which best describes how intense this activity is for you....

Flexibility	Code		Activf	Activd	Activi
Stretching exercises (fitness class)	Active17	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Stretching exercises (home)	Active18	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Tai chi (class)	Active19	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Tai chi (home)	Active20	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Bending, dusting, picking up objects	Active21	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Yoga (home)	Active22	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Yoga (class)	Active23	Yes 1 No 2		1 2 3 4	1 2 3 4 5
Other Specify	Active24	Yes 1 No 2		1 2 3 4	1 2 3 4 5
None of the above 1 = incorrect 2 = correct	Active25	1 2		1 2 3 4	1 2 3 4 5

Section I. Background Information On Your Exercise

Instructions to Participants: I am now going to ask you some questions about who advised you to exercise; and whether anyone assists you with your exercises. There are no right or wrong answers. Please answer with your best choice.

Questions		code	value
1. Did anyone advise you to exercise? If yes go to 1 a.	Yes 1 No 2	advise	1 2
1 a. Who advised you to exercise?		advisor	1 2 3 4 5 6
2. Does anyone assist you with your exercise? If yes go to 2 a.	Yes 1 No 2	assist	1 2
2 a. Who assists you with your exercises?		helper	1 2 3 4 5 6

Section J. Your Background:

Instructions to participants: "I would like to ask you a few questions about your general background so that I can learn a little more about seniors who participate in this study".

1. What is your present marital status?	marital	1 2 3 4
2. Does anyone live with you? If yes go to 2 a.	Yes 1 No 2	1 2
2a. Who lives with you? (check as many boxes)	occupant	1 2 3 specify
3. What is your mother tongue? 6specify	tongur	1 2 3 4 5 6 specify
4. How far did you go in school?	educ	1 2 3 4 5 6 7 8
5. In general, how well does your income and investments satisfy your needs?	income	1 2 3 4

Is there anything else that you would like to mention that I did not ask you? Your opinions will or may help health care professionals design better exercise programs for seniors.

Thank-you for your help!

APPENDIX I

**AGENCY APPROVALS
ETHICAL APPROVALS**



Université d'Ottawa • University of Ottawa

Cabinet du vice-recteur
à la recherche

Office of the Vice-Rector,
Research

HEALTH SCIENCES AND SCIENCE RESEARCH ETHICS BOARD

CERTIFICATION OF ETHICAL APPROVAL

This is to certify that the University of Ottawa Health Sciences and Science Research Ethics Board has examined the Application for Ethical Approval for the research project Attitudinal, Normative, and Perceptual Predictors of Exercise Among Physically Frail Older Adults Residing in the Community: An Application of the Theory of Planned Behavior submitted by Kathleen Holdway. The REB found that this project meets appropriate ethical standards as outlined in the Tri-Council Policy Statement and in the Procedures of the University of Ottawa Research Ethics Boards and accordingly gave it a Category Ia (Approval). This certification is valid for one year from the date indicated below.

Lise Frigault
Protocol Officer for Ethics in Research,
for the Chairperson of the Health Sciences and Science REB
Julian Roberts

Date

c.c. Julian Roberts
Nancy Edwards

Ms. Kathleen Holdway
3264 Uplands Drive
Ottawa, Ontario
K1V 0C7

Dear Ms. Holdway:

Re: Research proposal #007-1999 – Exercise among physically frail older adults in the community

Protocol approval valid until: September 1, 2000

On behalf of the Consents and Research Committee at the Queensway-Carleton Hospital, I am writing to inform you that this committee has reviewed and approved your research proposal.

Sincerely,



D. Crowe, Ph.D., C.Psych.
Chair, Consents & Research Committee

cc: Janice Lange, Health Records
 Dr. H. Rabinovitch, Chair Ethics Committee
 Dr. Ron Vexler, Chief of Staff, Chair MAC





29 March 2000

Kathleen Holdway
University of Ottawa
3264 Uplands Drive
Ottawa, Ontario, K1V 0C7

Dear Ms. Holdway:

Re: Ethics Review: Attitudinal, Normative, and Perceptual Predictors of Exercise Among Physically Frail Older Adults Living in the Community: An Application of the Theory of Planned Behaviour

I am pleased to inform you that your research project as submitted to the Research Ethics Board was approved on the basis of having already undergone an ethics review with the University of Ottawa Health Sciences Research Ethics Board. Please contact Ms. Maryan O'Hagan, Manager, Heart Health Branch to co-ordinate access to Health Department clients.

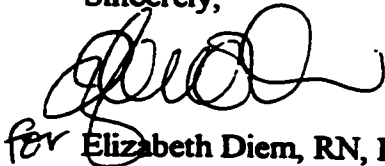
One question that arose during the review was how would seniors who failed the cognitive impairment test (as assessed through the Short Portable Mental Status Questionnaire) be notified that they had failed the test, and thus be ineligible for study? The concern expressed by the Board was that there be something in place to support research participants after being informed they had failed the test, and thus suffered from cognitive impairment. Please note that this concern does not affect your ethical approval, and will not prevent your project from going forward. All that is required is a response to this question which can be forwarded to Jennifer Pennock (tel: 724-4122, ext 3765).

Please note that upon project completion, we require an End of Project Report which is a one-page summary describing your study findings. I have attached the End of Project Report form to this letter for use at that time.



If you have any questions about the ethics review process, or any of the above material, please do not hesitate to contact myself at 239-0014, or Jennifer Pennock at the number given above. I wish you all the best with your research.

Sincerely,

A handwritten signature in black ink, appearing to read 'Elizabeth Diem', written over the printed name.

for Elizabeth Diem, RN, PhD

Chair, Region of Ottawa-Carleton Public Health Research Ethics Board
Assistant Professor, School of Nursing
University of Ottawa

cc: Maryan O'Hagan, Manager, Heart Health Branch



Victorian
Order
of Nurses

Infirmières
de l'Ordre
de Victoria

OTTAWA-CARLETON BRANCH
SUCCURSALE D'OTTAWA-CARLETON



Caring
for Life
Souci
de la Vie

July 26, 1999

TO WHOM IT MAY CONCERN:

The VON Ottawa-Carleton grants "*permission on principle*" to Kathleen Holdway to access VON clients for the purposes of collecting data for her thesis entitled "*Attitudinal, Normative, and Perceptual Determinants of Exercise among Physically Frail Older Adults Residing in the Community: An Application of the Theory of Planned Behaviour*"

"*Permission on principle*" is associated with two caveats:

- a) permission from the University of Ottawa Ethics Review Committee; and
- b) permission from CCAC to notify active VON clients i.e. clients who are currently receiving home care services.

In order to acknowledge the clients' right to privacy, the VON will call potential clients and ask their permission for Kathleen Holdway to contact them. If the clients grant permission, Ms. Holdway will contact them and proceed to the next steps in her study.

If you have any questions re the VON's participation in the study, please call me at 749-7557 ext. 129.

Sincerely,

Susan VanDeVelde-Coke
Executive Director

Centre St Laurent Shopping Centre
Box/C.P. 205
1200 St Laurent
Ottawa ON K1K 3B8
tel (613) 749-7557
fax (613) 749-4002
email von@vonottawa.on.ca



ST. PATRICK'S HOME OF OTTAWA INC.

164

2865 RIVERSIDE DRIVE,
OTTAWA, ON K1V 8N5
TEL: (613) 731-4660
FAX: (613) 731-4056
E-MAIL: here@stpats.ca

Kathleen Holdway
3264 Uplands Drive
Ottawa ON K1V 0C7

29 July 1999

Dear Ms. Holdway,

St. Patrick's Home Seniors' Day Program agrees to participate in the research project to assess the attitudes, perceptions, and subjective norms of exercise among the physically frail elderly living in the community. This research project will be conducted by Kathleen Holdway RN Sc. N.

Sincerely,


Maureen Goodspeed

Ottawa-Carleton
Community Care Access Centre (CCAC)
1223 Michael Street North
Suite 410
Gloucester, Ontario
K1J 7T2
Tel. (613) 745-5525
Fax. (613) 745-6984

Centre d'accès aux soins communautaires
d'Ottawa-Carleton (CASC)
1223, rue Michael Nord
Bureau 410
Gloucester (Ontario)
K1J 7T2
Tél. (613) 745-5525
Télécopieur (613) 745-6984

165

13 August 1999

Ethics Committee
University of Ottawa

To Whom It May Concern:

The CCAC has been approached by Kathleen Holdway to request access to some of our clients in order to collect the information for her Master's Research. Following a superficial review of her research proposal, we are prepared to grant her approval in principle.

We do, however, have a more formal review mechanism and her proposal will be forwarded to our Project & Research Review Advisory Committee for a more complete review in September.

Sincerely,



Judy Threinen, BSR, MHA
Director, Client Services

cc: Donna Nicholson
Judi Reid

APPENDIX J

**SCORING METHOD USED
TO CALCULATE
THE TOTAL EXERCISE SCORE**

Table 3.2 Illustration of the Scoring Method Used to Classify High and Low Actives

ID Case #	Activity	Frequency /wk	Intensity (assigned value)	Duration/ time (assigned value/ minutes)	Exercise Score = $F \times I \times T$ of one exercise (minutes)	Total Exercise Score (TES) = Σ (F.I.T) of all exercises	Low active ≤ 150 min. per wk.	High Active ≥ 151 min. per wk.
3	Home chair exercises	3	Somewhat Moderate (1)	1-15 (8)	24			
3	Home stretching	2	Very light (0)	1-15 (8)	0			
3	Light housework	3	moderate (1)	1-15 (8)	24	48 minutes	X	
11	Home chair Exercises	3	Moderate (1)	1-15 (8)	24			
11	Home stretching	4	Somewhat moderate (1)	16-30 (23)	92			
11	Light housework	3	Very light (0)	1-15 (8)	0	116 minutes	X	
22	Climbing stairs	7	Vigorous (1)	1-15 (8)	56			
22	Light housework	7	Very light (0)	1-15 (8)	0			
22	Home chair exercises	3	Moderate (1)	16-30 (23)	69			
22	Mall walking	3	Moderate (1)	31-60 (46)	138	263 minutes		X

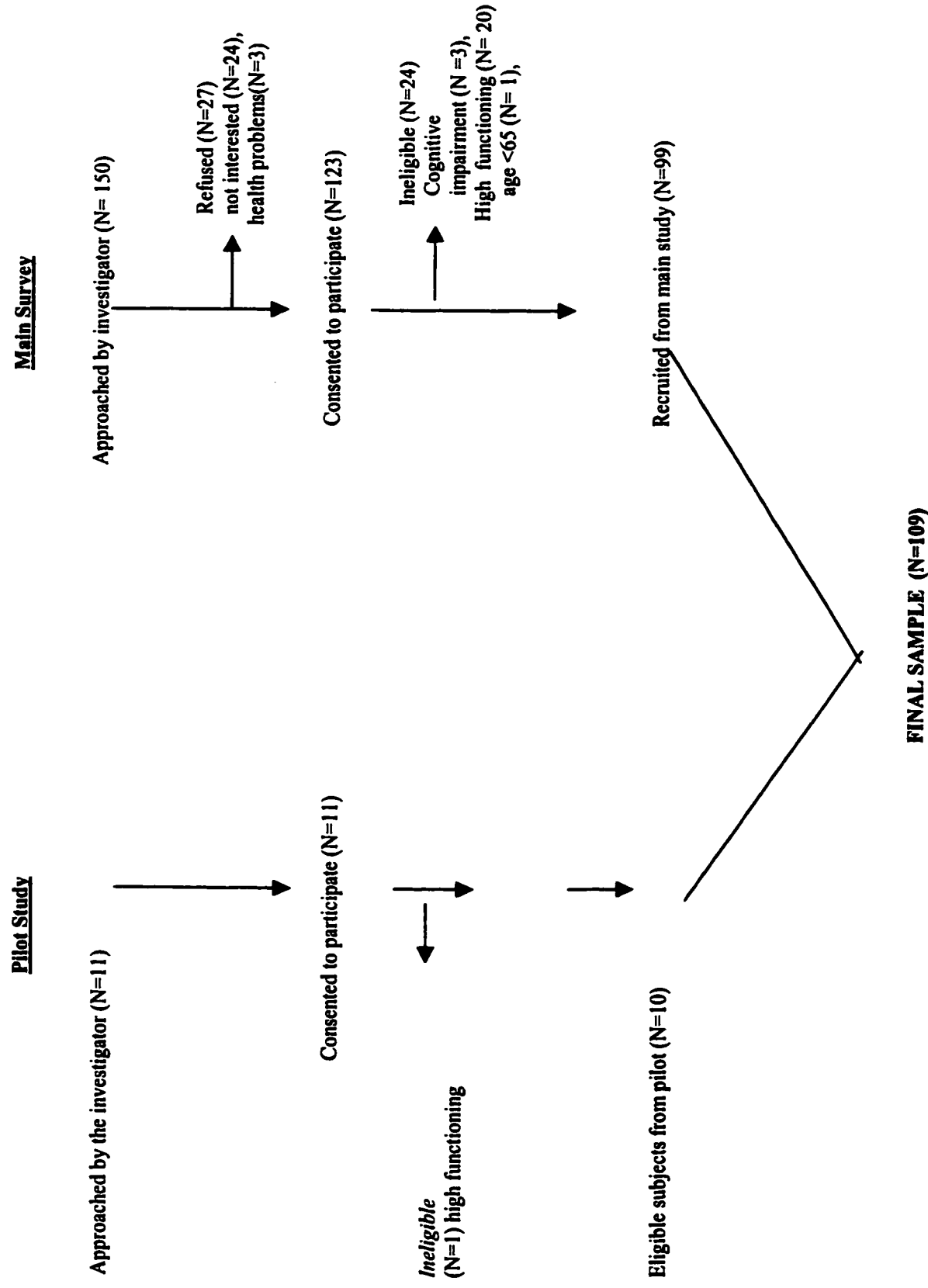
APPENDIX K
SOCIODEMOGRAPHIC AND HEALTH
CHARACTERISTICS OF
PILOT STUDY RESPONDENTS

Table 4.2 Sociodemographic and Health Characteristics of Pilot Study Respondents (N=10)

		(N)	Mean (SD)	Range
<i>Gender</i>	Male	4		
	Female	6		
<i>Mean age (SD)</i>			78.70 (6.93)	65-90
<i>Marital Status</i>	Never married/single	1		
	Married	4		
	Widowed	5		
<i>Education</i>	Completed elementary	1		
	Completed secondary	4		
	Some post-secondary/university or higher	5		
<i>Income</i>	Completely adequate	9		
	Somewhat adequate	1		
<i>Mother Tongue</i>	English	8		
	Other	2		
<i>cognitive screen</i>	0 errors	4		
	1 to 2 errors	6		
<i>Score on 1</i>	<i>Physical Self-maintenance Scale (PSMS)</i>		11.60 (2.2)	9-15
<i>Feeding</i>	Eats without assistance	10		
<i>Dressing</i>	Dresses, undresses, selects clothes by self	6		
	Dresses, undresses, with minor assistance	2		
	Needs moderate assistance	2		
<i>Ambulation</i>	Ambulates with the assistance of device	10		
	Devices: Cane	6		
	Walker	4		
	Does not need help getting in or out	10		
<i>Bathing</i>	Bathes self (tub, shower, sponge) without help	6		
	Washes face & hands only, but cannot bathe rest of body	4		
	Uses grab bars	7		
	Does not use grab bars to enter or exit tub or shower	3		
<i>Toileting</i>	Cares for self at toilet completely, no incontinence	9		
	Needs to be reminded/help in cleaning/ rare accidents	1		
<i>Health Status</i>	Very good/good	4		
	Fair	3		
<i>Activity Level</i>	A lot & a little more active	3		
	About the same	2		
	A little or a lot less active	5		
<i>Effect of pain on activity</i>	Free of pain or discomfort	2		
	Pain or discomfort that does not prevent any activities	2		
	Pain or discomfort that prevents a few or some activities	6		
<i>Person who advised subject to exercise</i>	Number of subjects who were advised to exercise	8		
	Doctor	1		
	Physiotherapist	5		
	Chiropractor/spouse	2		
<i>Who assists with exercise</i>	Physiotherapist	2		
	Health care worker	1		
	Spouse	3		

APPENDIX L
RECRUITMENT PROCESS

Figure 5.1 Flow Chart of Recruitment Process



APPENDIX M
GROUP DIFFERENCES IN EXERCISES

Table 5. 8 Group Differences in the Characteristics of Endurance Exercises

	LA (N=59)	HA (N=50)			LA (N=59)	HA (N=50)	
Dancing	% (N)	% (N)	statistic	Outdoor Walking	% (N)	% (N)	statistic
Yes	1.7 (1)	0 (0)	<i>Fisher's Exact Test p=1.0</i>	Yes	33.9 (20)	38 (19)	$\chi^2=.19$ $df=1$ $p=.656$
No	98.3 (58)	100 (50)		No	66.1 (39)	62 (31)	
<u>Freq./wk.</u>				<u>Freq./wk.</u>			$\chi^2=.26$
1-3	100 (1)	0 (0)	X	1-3	55 (11)	63.2 (12)	$df=1$ $p=.605$
4-7	0 (1)	0 (0)		4-7	45 (9)	36.8(7)	
<u>Duration</u>				<u>Duration</u>			<i>Fisher's</i>
8 min	0 (0)	0 (0)	X	8 min ^a	70 (14)	31.6 (6)	<i>Exact Test p=.18</i>
23 mi	0 (0)	0 (0)		23 min ^a	25 (5)	47.4 (9)	
46 min	100 (1)	0 (0)		46 min ^b	5 (1)	10.5 (2)	
60 min	0 (0)	0 (0)		60 min ^b	0 (0)	10.5 (2)	
<u>Intensity</u>				<u>Intensity</u>			<i>Fisher's</i>
VL/L	0 (0)	0 (0)	X	VL/L	30.8 (4)	6.7(1)	<i>Exact Test p=.15</i>
SM/V	100 (1)	0 (0)		SM/V	69.2 (9)	93.3 (14)	
Other Endurance Ex.	% (N)	% (N)	statistic	Swimming	% (N)	% (N)	statistic
Yes	16.7 (1)	10(5)	<i>Fisher's Exact Test p=.09</i>	Yes	1.7 (1)	8 (4)	<i>Fisher's Exact test p=.17</i>
No	98.3 (58)	90(45)		No	98.3 (58)	92 (46)	
<u>Freq./ wk.</u>				<u>Freq./wk.</u>			
1-3	0 (0)	60 (3)	<i>Fisher's Exact Test p= 1.00</i>	1-3	100 (1)	50 (2)	<i>Fisher's Exact Test p=1.00</i>
4-7	100(1)	40 (2)		4-7	0 (0)	50 (2)	
<u>Duration</u>				<u>Duration</u>			
8 min ^c	100 (1)	40 (2)	<i>Fisher's Exact Test p= 1.00</i>	8 min ^d	0 (0)	25 (1)	<i>Fisher's Exact Test p = .40</i>
23 min ^c	0 (0)	40 (2)		23 min ^d	0 (0)	50 (2)	
46 min	0 (0)	20 (1)		46 min	100 (1)	25 (1)	
60 min	0 (0)	0 (0)		60 min	0 (0)	0 (0)	
<u>Intensity</u>				<u>Intensity</u>			
VL/L	0 (0)	0 (0)	X	VL/L	100 (1)	0 (0)	<i>Fisher's Exact Test p=.20</i>
SM/V	100(1)	100 (5)		SM/V	0 (0)	100 (4)	

Legend: VL/L = very light/light intensity, SM/V = somewhat moderate, moderate, vigorous intensity, Categories collapsed for chi= squares analyses (a-d)

X: no statistic computed for all subjects in the same group,

NB: Table illustrates only subjects who were doing the exercise. * : Statistically significant $p < .05$.

Table 5. 9 Group Differences in the Characteristics of Strength Exercises

	LA (N=59)	HA (N=50)			LA (N=59)	HA (N=50)	
Carrying objects	% (N)	% (N)	statistic	Weights (class)	% (N)	% (N)	statistic
Yes	13.6 (8)	12 (6)	$\chi^2=.05$	Yes	5.1 (3)	8 (4)	<i>Fisher's</i>
No	86.4 (51)	88 (44)	$df=1$ $p=.809$	No	94.9 (56)	92 (46)	<i>Exact</i> <i>Test</i> $p=.70$
Freq./wk.			<i>Fisher's</i>	Freq./wk.			
1-3	100(8)	83.3 (5)	<i>Exact</i>	1-3	100 (3)	100 (4)	X
4-7	0 (0)	16.7 (1)	<i>Test</i> $p=.429$	4-7	0 (0)	0 (0)	
Duration				Duration			
8 min ^a	100 (8)	83.3(5)		8 min	100 (3)	100 (4)	
23 min ^a	0 (0)	16.7(1)	X	23 min	0 (0)	10 (0)	X
46 min	0 (0)	0 (0)		46 min	0 (0)	10 (0)	
60 min	0 (0)	0 (0)		60 min	0 (0)	0 (0)	
Intensity			<i>Fisher's</i>	Intensity			<i>Fisher's</i>
VL/L	37.5 (3)	16.7 (1)	<i>Exact</i>	VL/L	66.7 (2)	0 (0)	<i>Exact</i>
SM/V	62.5 (5)	83.3 (5)	<i>Test</i> $p=.58$	SM/V	33.3 (1)	80 (4)	<i>Test</i> $p=.14$
Other Strength Ex.	% (N)	% (N)	statistic	Chair Exercises (class)	% (N)	% (N)	statistic
Yes	1.7 (1)	0 (0)	<i>Fisher's</i>	Yes	44.1 (26)	48 (24)	$\chi^2=.17$
No	98.3 (58)	100 (50)	<i>Exact</i> <i>Test</i> $p=1.00$	No	55.9 (33)	52 (26)	$df=1$ $p=.68$
Freq./wk.				Freq./wk.			<i>Fisher's</i>
1-3	100 (1)	0 (0)		1-3	96.2 (25)	95.8 (23)	<i>Exact</i>
4-7	0 (1)	0(0)	X	4-7	3.8 (1)	4.2 (1)	<i>Test</i> $p=1.00$
Duration				Duration			
8 min	0 (0)	0 (0)		8 min ^b	3.8 (1)	4.2 (1)	<i>Fisher's</i>
23 min	0 (0)	0 (0)	X	23 min ^b	69.2 (18)	45.8 (11)	<i>Exact</i>
46 min	100 (1)	0 (0)		46 min	26.9 (7)	50 (12)	<i>Test</i>
60 min	0 (0)	0 (0)		60 min	0 (0)	0 (0)	$p=1.00$
Intensity				Intensity			$\chi^2=.64$
VL/L	0 (0)	0 (0)	X	VL/L	30.8 (8)	20.8 (5)	$df=1$
SM/V	100 (1)	0 (0)		SM/V	69.2 (18)	79.2 (19)	$p=.42$

Legend: VL/L = very light/light intensity, SM/V = somewhat moderate, moderate, vigorous intensity, Categories (a-b) collapsed for chi= squares analyses,

X: no statistic computed for all subjects in the same group, * : Statistically significant $p<.05$

NB: Table illustrates only subjects who were doing the exercise

Table 5. 10: Group Differences in the Characteristics Of Strength and Stretching Exercises

	LA (N=59)	HA (N=50)			LA (N=59)	HA (N=50)	
Gardening	% (N)	% (N)	Statistic	Other Stretching Ex.	% (N)	% (N)	statistic
Yes	0 (0)	2 (1)	<i>Fisher's Exact Test P=.46</i>	Yes	1.7 (1)	4.0 (2)	<i>Fisher's Exact Test p= .59</i>
No	100 (59)	98 (49)		No	98.3 (58)	96 (48)	
<u>Freq./ wk</u>				<u>Freq./ wk</u>			
1-3	0 (0)	100 (1)	X	1-3	0 (0)	0 (0)	X
4-7	0 (0)	0 (0)		4-7	100 (1)	100 (2)	
<u>Duration</u>				<u>Duration</u>			<i>Fisher's</i>
8 min ^a	0 (0)	100 (1)	X	8 min ^b	100 (1)	0 (0)	<i>Exact Test p=.54</i>
23 min ^a	0 (0)	0 (0)		23 min ^b	0 (0)	50 (1)	
46 min	0 (0)	0 (0)		46 min ^c	0 (0)	0 (0)	
60 min	0 (0)	0 (0)		60 min ^c	0 (0)	50 (1)	
<u>Intensity</u>				<u>Intensity</u>			<i>Fisher's</i>
VL/L	0 (0)	0 (0)	X	VL/L	100 (1)	0 (0)	<i>Exact Test P=.33</i>
SM/V	100 (1)	0 (0)		SM/V	0 (0)	100 (1)	
Heavy Housework	% (N)	% (N)	statistic				
Yes	1.7 (1)	0 (0)	<i>Fisher's Exact Test P= 1.00</i>				
No	98.3 (58)	100 (50)					
<u>Freq./ wk</u>							
1-3	100 (1)	0 (0)	X				
4-7	0 (0)	0 (0)					
<u>Duration</u>							
8 min ^d	100 (1)	0 (0)	X				
23 min ^d	0 (0)	0 (0)					
46 min ^e	0 (0)	0 (0)					
60 min ^e	0 (0)	0 (0)					
<u>Intensity</u>							
VL/L	100 (1)	0 (0)	X				
SM/V	0 (0)	0 (0)					

Legend: VL/L = very light/light intensity, SM/V = somewhat moderate, moderate, vigorous intensity, Categories (a-e) collapsed for chi= squares analyses,

X: no statistic computed for all subjects in the same group, * : Statistically significant $p < .05$

NB: Table illustrates only subjects who were doing the exercise.

APPENDIX N
STRATIFIED ANALYSES

Table 5. 17 Group Differences in the TPB Variables Stratified By Gender

TPB Variables	Low Actives F (N=53) Mean (SD) M (N= 6) Mean (SD)		High Actives F (N=37) Mean (SD) M (N= 13) Mean (SD)		High & Low F Mean (SD) M Mean (SD)	Statistics Mann-Whitney U P value	
					Total sample M & F Mean (SD)		
Attitudes Indirect ^a	F	7.53 (5.25)	F	7.30 (7.83)	F	7.43 (6.40)	p= .62
	M	7.67 (5.35)	M	11.00 (6.32)	M	9.95 (6.10)	p= .33
					7.87(6.39)		
Attitude Direct ^a	F	.62 (.86)	F	.73 (.73)	F	.67 (.81)	p= .57
	M	.17(1.33)	M	.54 (1.13)	M	.42 (1.17)	p= .49
					.62 (.88)		
SN Indirect ^b	F	6.51 (9.71)	F	7.78 (9.77)	F	7.03 (9.70)	p= .40
	M	12.00 (7.01)	M	12.85 (4.34)	M	12.58 (5.14)	p= .69
					8.00 (9.30)		
SN Direct ^a	F	.32(1.03)	F	.76(.93)	F	.50 (1.01)	p= .06
	M	1.00 (.63)	M	1.08 (.64)	M	1.05 (.62)	p= .80
					.60 (.97)		
PBC Indirect ^a	F	-1.17 (5.50)	F	.62 (5.23)	F	-.43 (5.43)	p= .11
	M	-.50 (8.29)	M	2.31 (7.31)	M	1.42 (7.52)	p= .66
					-.11 (5.85)		
PBC Direct ^a	F	.51 (.99)	F	.57 (.93)	F	.53 (.96)	p= .82
	M	-.17 (1.33)	M	.62 (1.39)	M	.37 (1.38)	p= .20
					.50 (1.04)		
Intentions to continue exercising ^a	F	.98 (.66)	F	1.22 (.53)	F	1.08 (.62)	p= .09
	M	.50 (.55)	M	1.85 (.38)	M	1.42 (.77)	p= .001*
					1.14 (.66)		

LEGEND: ^a Scores theoretically ranged from -2 to +2, ^b Composite scores theoretically ranged from - 8 to +40, Higher means scores indicates more positive attitudes, SN, PBC. * statistically significant at *p* <.05

Table 5.18 Group Differences in the TPB Variables Stratified By Age

TPB Variables	<u>Low Actives</u> <80 (N=25) Mean (SD)		<u>High Actives</u> <80 (N=25) Mean (SD)		<u>Total Sample</u> < 80 (N= 50) Mean (SD)		Statistics Mann-Whitney U P value
	≥ 80 (N= 34) Mean (SD)		≥ 80 (N= 25) Mean (SD)		≥ 80 (N=59) Mean (SD)		
					<u>Total sample Mean (SD)</u>		
Attitudes Indirect ^a	<80	8.36 (4.48)	<80	6.64 (8.47)	<80	7.50 (6.76)	p= .63 p= .037*
	≥ 80	6.94 (5.68)	≥ 80	9.88 (6.35)	≥ 80	8.19 (6.10)	
	7.87(6.39)						
Attitude Direct ^a	<80	.48 (1.0)	<80	.72 (.79)	<80	.60 (.90)	p= .36 p= .96
	≥ 80	.65 (.85)	≥ 80	.64 (.91)	≥ 80	.64 (.87)	
	.62(.88)						
SN Indirect ^b	<80	8.04 (11.41)	<80	10.48 (7.31)	<80	9.26 (9.56)	p= .19 p= .44
	≥ 80	6.3 (8.07)	≥ 80	7.72 (10.27)	≥ 80	6.93 (9.01)	
	8.00(9.30)						
SN Direct ^a	<80	.48 (1.0)	<80	.92 (.64)	<80	.70 (.86)	p= .14 p= .12
	≥ 80	.32 (1.04)	≥ 80	.76 (1.05)	≥ 80	.51 (1.06)	
	.60(.97)						
PBC Indirect ^a	<80	-1.80 (6.73)	<80	-.52 (5.92)	<80	-1.16 (6.30)	p= .67 p= .009*
	≥ 80	-.59 (4.96)	≥ 80	2.64 (5.35)	≥ 80	.78 (5.33)	
	-.11(5.85)						
PBC Direct ^a	<80	.36 (1.08)	<80	.56 (1.04)	<80	.46 (1.05)	p= .46 p= .61
	≥ 80	.50 (1.02)	≥ 80	.60 (1.08)	≥ 80	.54 (1.04)	
	.50(1.04)						
Intentions to continue exercising ^a	<80	1.00 (.65)	<80	1.40 (.58)	<80	1.20 (.64)	p= .029* p= .007*
	≥ 80	.88(.69)	≥ 80	1.36 (.57)	≥ 80	1.08 (.68)	
	1.14(.66)						

LEGEND: ^a Scores theoretically ranged from -2 to +2, ^b Composite scores theoretically ranged from -8 to +40

Age categories: <80 = 65-79 years; ≥ 80 = 80-94 years,

Higher means scores indicates more positive attitudes, SN, PBC

*statistically significant at $p < .05$

Table 5.19 Group Differences in the TPB Variables Stratified By Health Status

TPB Variables	Low Actives + (N=48) Mean (SD) - (N=11) Mean (SD)	High Actives + (N=35) Mean (SD) - (N= 15) Mean (SD)	Total Sample + (N=83) Mean (SD) - (N=26) Mean (SD) Total sample Mean (SD)	Statistics <i>Mann-Whitney U</i> <i>P value</i>
<i>Attitudes Indirect^a</i>	+ 7.83 (4.99) - 6.27 (6.18)	+ 10.20 (7.01) - 3.73 (7.13)	+ 8.83 (6.00) - 4.81 (6.74) 7.87(6.39)	<i>p</i> = .015* <i>p</i> = .40
<i>Attitude Direct^a</i>	+ .73 (.79) - -.0090 (1.14)	+ .77 (.81) - .47 (.92)	+ .75 (.79) - .23 (1.03) .62 (.88)	<i>p</i> = .74 <i>p</i> = .16
<i>SN Indirect^b</i>	+ 7.29 (10.30) - 6.09 (5.65)	+ 9.29 (9.98) - 8.67 (6.10)	+ 8.13(10.05) - 7.58 (5.94) 8.00 (9.30)	<i>p</i> = .19 <i>p</i> = .22
<i>SN Direct^a</i>	+ .38 (1.06) - .45 (.82)	+ .83 (.98) - .87 (.52)	+ .57(1.05) - .69 (.68) .60 (.97)	<i>p</i> = .06 <i>p</i> = .20
<i>PBC Indirect^a</i>	+ -.58 (5.04) - -3.36 (8.10)	+ 1.74 (5.81) - -.53 (5.68)	+ .40(5.47) - 1.73 (6.81) -.11 (5.85)	<i>p</i> = .07 <i>p</i> = .39
<i>PBC Direct^a</i>	+ .54 (.99) - .00 (1.18)	+ .69 (.99) - .33 (1.18)	+ .60(.99) - .19(1.17) .50 (1.04)	<i>p</i> = .43 <i>p</i> = .44
<i>Intentions to continue exercising^a</i>	+ .94 (.70) - .91 (.54)	+ 1.43 (.56) - 1.27 (.59)	+ 1.14 (.68) - 1.12 (.59) 1.14 (.66)	<i>p</i> = .001* <i>p</i> = .12

LEGEND: ^a Scores theoretically ranged from -2 to +2, ^b Composite scores theoretically ranged from - 16 to +40,

+ = subjects reporting excellent, very good or good health, - = subjects reporting fair or poor health.

Higher means scores indicates more positive attitudes, SN, PBC

* statistically significant at $p < .05$

Table 5.20 Group Differences in the TPB Variables Stratified By Pain

TPB Variables	Low Actives		High Actives		Total Sample		Statistics Mann-Whitney U p value
	Pain (N=46) Mean (SD)	No pain (N=13) Mean (SD)	Pain (N=45) Mean (SD)	No pain (N=5) Mean (SD)	Pain (N=91) Mean (SD)	No pain (N=18) Mean (SD)	
					Total sample Mean (SD)		
<i>Attitudes Indirect^a</i>	Pain	7.57 (5.55)	Pain	8.16 (7.59)	Pain	7.86 (6.61)	$p = .39$ $p = .26$
	No pain	7.46 (3.95)	No pain	9.20 (8.38)	No pain	7.94 (5.31)	
					7.87(6.39)		
<i>Attitude Direct^a</i>	Pain	7.57 (5.55)	Pain	8.16 (7.59)	Pain	.65 (.86)	$p = .59$ $p = .86$
	No pain	.61 (.88)	No pain	.69 (.85)	No pain	.50 (.99)	
					.62 (.88)		
<i>SN Indirect^b</i>	Pain	7.07 (10.07)	Pain	8.32 (8.79)	Pain	7.68 (9.43)	$p = .27$ $p = .029^*$
	No pain	7.08 (7.91)	No pain	16.20 (7.56)	No pain	9.61(8.68)	
					8.00(9.30)		
<i>SN Direct^a</i>	Pain	.20 (1.05)	Pain	.76 (.86)	Pain	.52 (.98)	$p = .035^*$ $p = .025^*$
	No pain	.77 (.83)	No pain	1.60 (.55)	No pain	1.00 (.84)	
					.60 (.97)		
<i>PBC Indirect^a</i>	Pain	-.80 (5.72)	Pain	1.18 (5.94)	Pain	.18 (5.88)	$p = .13$ $p = .46$
	No pain	-2.15 (5.97)	No pain	0 (4.90)	No pain	-1.56(5.64)	
					-.11(5.85)		
<i>PBC Direct^a</i>	Pain	.35 (1.08)	Pain	.58 (1.08)	Pain	.46 (1.08)	$p = .25$ $p = .63$
	No pain	.77 (.83)	No pain	.60 (.89)	No pain	.72 (.83)	
					.50 (1.04)		
<i>Intentions to continue exercising^a</i>	Pain	.89 (.74)	Pain	1.38 (.58)	Pain	1.13 (.70)	$p = .001^*$ $p = .11$
	No pain	1.08 (.28)	No pain	1.40 (.55)	No pain	1.17 (.38)	
					1.14(.66)		

LEGEND: ^a Scores theoretically ranged from -2 to +2, ^b Composite scores theoretically ranged from -8 to +40, Higher means scores indicates more positive attitudes, SN, PBC

* statistically at $p < .05$

No pain = no reports of pain/ no activity restriction,

Pain = subjects who reported pain which prevented a few to most activities.