The Effects of an Intervention on Exercise Adherence in Older Adults discharged from Geriatric Day Hospital:

A Pilot Study

BY

Nancy Ryan-Arbez

A Thesis
Submitted to the Faculty of Graduate Studies
In Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE (REHABILITATION)

School of Medical Rehabilitation
Faculty of Medicine
University of Manitoba
Winnipeg, Manitoba

THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

*****

COPYRIGHT PERMISSION

The Effects of an Intervention on Exercise Adherence in Older Adults discharged from Geriatric Day Hospital:

A Pilot Study

by

Nancy Ryan-Arbez

A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University of Manitoba in partial fulfillment of the requirement of the degree

of

Master of Science

ACKNOWLEDGEMENTS

There were a number of organizations and individuals who supported this research project and whose support I wish to acknowledge:

Riverview Health Centre – for awarding me the Jean Cumming Bursary, providing financial assistance for this pilot study and granting a leave of absence from my clinical position to pursue my graduate degree.

University of Manitoba, School of Medical Rehabilitation – for awarding me the Jal Tata Award in support of my graduate degree.

Val Goodman, Merrilynne Bjornson, Pat Huntley, Jennifer Pawluk, Jaclyn Beaudry and Rita Morier, physiotherapists in the four Geriatric Day Hospital Programs - for their support in helping me recruit participants.

Participants in the study – for graciously inviting me into their home and sharing their beliefs and thoughts about physical exercise.

DEDICATION

I am very fortunate in my personal and professional lives to be surrounded by individuals who seek to understand the world and in their own way make it a better place. This project is fondly dedicated to those individuals and I thank them for inspiring me to complete my graduate degree:

To Pierre and Jacques, my sons, who encouraged me throughout the marathon of writing my thesis and who never once complained that I spent too much time at the computer (when I did);

To Colleen and Keith Ryan, my parents, who are the most curious people I know and who instilled that sense of curiosity in me;

To Sarah McKendry, Edna Ryan, Mamie Ryan, Dorothy Ryan, Mary Ryan and George Ryan, my family elders who helped shape my personal beliefs and influenced my choice in career. They showed me that no matter what one's age, there are stories to tell and lessons to learn;

To Dr. Archie Cooper, my advisor, who believed in my project and had infinite patience in guiding me through the research and writing of my thesis. I will never forget her kindness that helped me achieve my goal;

To Dr. Leah Weinberg, on my graduate committee, who generously shared her knowledge in care for older adults;

To Dr. Dexter Harvey, on my graduate committee, who encouraged me to broaden the scope of my study to include health promotion interventions; and

To Marc, my husband, who taught me the art of spread-sheets and who parented "toute seule" during times I was engrossed in studying, researching or writing. His constant encouragement, respect for my goal and humour made completing this project possible and meaningful.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

DEFINITIONS

Adoption of exercise: Adoption of exercise refers to the acquiring of exercise behavior (King, 1994).

Disability: Everyday activity is limited due to a health-related (mental or physical) condition or problem (Statistics Canada, 2001)

Disability-free life expectancy: The average number of years an individual is expected to live free from disability if current patterns of mortality and disability continue to apply (Last, 2001). This concept introduces quality of life and at least one activity limitation (Statistics Canada, 2004).

Exercise Adherence: Exercise adherence refers to the level of participation in an exercise regime (proportion of prescribed treatment sessions) once the exercise behavior has been established (Oman and King, 2000).

Geriatric Day Hospital: A multidisciplinary outpatient program offering rehabilitation services exclusively to older adults living in the community whose overall purpose is to prolong independent living for this population (Forster, Young, & Langehorn, 1999).

Heart Rate Reserve: A formula which effectively determines training heart rate. Heart rate reserve (HRR) is calculated as follows: HRR = HR max - Resting Heart Rate (Whaley, Brubaker, & Otto, 2006).

The Kinsmen Reh-Fit Centre's :" ...is a volunteer-driven, not-for-profit, community-based organization, dedicated to building community wellness. Its mission is to provide "personalized professional health and fitness services through assessment, education, exercise and encouragement in a caring environment for the benefit of health conscious adults" (Reh-fit Centre, n.d.)

Life Expectancy: "The average number of years an individual of a given age is expected to live if current mortality rates continue to apply" (Last, 2001, p. 65).

Outcome expectancy: A psychological construct defined as, "a person's estimate that a given behavior will lead to certain outcomes" (Bandura ,1977, p 193) or an individual's judgment regarding the potential controllability of an outcome (Rodin,1990).

Physiotherapists: Physiotherapists are university educated, health care professions responsible for helping individuals whose function may be threatened by injury, disease or the process of ageing maintain or restore physical function (Canadian Physiotherapy Association, 2005)

Quality of Life: An individual's perception of his situation in life in relation to the culture and value systems as well as his interests and expectations (World Health Organization, 2006),

Sarcopenia: Sarcopenia is a reduction in muscle mass due to ageing (Frontera et al, 2000).

Sedentary Lifestyle: Lack of physical activity and/or exercise.

Self-efficacy expectations: A psychological construct defined as an individual's judgment or belief regarding his/her self-confidence in being able to carry out a certain behavior (Bandura, 1977).

Self-efficacy of exercise: A psychological construct defined as an individual's belief of self-confidence in one's own ability to successfully perform a specific behavior such as exercise (Purdie & McCrindle, 2002).

Social Cognitive Theory: The SCT is a cognitive-behavioral theory which considers cognition as playing "a prominent role in the acquisition and retention of new behavior patterns" (Bandura, 1977, p. 192).

Young Men's Christian Association: The YMCA is a charitable association which operates nationally and internationally. One of its health concepts "focuses on prevention, rehabilitation, self-management and the social support needed to grow in spirit, mind and body" (YMCA, n.d.).

ABBREVIATIONS

ACSM:	American College of Sports Medicine
ADP:	Adult Day Program
BBS:	Berg Balance Scale
C:	Control group
CBEP:	Community-based exercise programs
GDH:	Geriatric Day Hospital
HBEP:	Home-based exercise programs
HRQoL:	Health-Related Quality of Life
HVI:	Home intervention group
MMSE:	Mini-Mental Status Examination
PEP:	Prescribed exercise programs
PT:	Physiotherapist
R^2:	Multiple correlation coefficients squared
RCT:	Randomized control trial
SCT:	Social cognitive theory
SEE:	Self-efficacy for exercise
TI:	Telephone intervention group
TUG:	Timed Up and Go test
YMCA:	Young Men's Community Association

ABSTRACT

Although physiotherapists prescribe exercise programs for older adults in order to improve or maintain their mobility, it is unknown if these exercise programs are adhered to, especially after discontinuing physiotherapy treatment. The objectives of this mixed-method study were: to determine adherence to exercise of older adults who were given home-based exercise programs to continue after being discharged from a Geriatric Day Hospital (GDH); to test the effectiveness of telephone and home visit interventions centered on improving self-efficacy for exercise; to determine if there is a relationship between self-efficacy for exercise, adherence to exercise and mobility; and to explore older adults' perceptions of the barriers to and outcome expectations of home exercise programs.

The mixed method study involved 18 participants randomly assigned to one of three groups: home visit, telephone or control. One week after GDH discharge, all participants were assessed for mobility and cognition and self-efficacy for exercise. At 4 and 7 weeks after discharge, participants in the intervention groups received telephone calls or home visits. These interventions included strategies to improve self-efficacy of exercise. At 10 weeks, all participants were reassessed and adherence to exercise rates were determined. In addition, all participants were interviewed about perceived barriers to exercise and outcome expectations for exercise.

Results indicated no significant differences among groups in self-efficacy for exercise, adherence to exercise rates, and mobility. Forty-one percent of participants under-exercised and the primary reasons for non-adherence were illness and perceived lack of time to exercise. Ninety percent of the participants in the intervention groups experienced technique problems with their exercise program.

Recommendations for clinical practice include formal evaluation of adherence to exercise and intention/self-efficacy for exercise. Recommendations for research include a larger follow-up study and a refined research protocol.

CHAPTER ONE

Introduction

The number of Canadians growing older is getting larger. The segment of the population 65 years and older is currently 13% of the total population (Statistics Canada, 2004) and it is predicted that this segment will constitute 23% of population by 2041 (Government of Canada, 1999). Although this increase in the ageing population may be considered a "great success of the 20th century…this success is not without its consequences" (Khaw, 1997, p. 1929); older adults experience higher incidence of disability resulting from three factors: the physiological changes associated with ageing, chronic disease and physical inactivity.

Older adults experience physiological changes associated with ageing that may result in disability. As adults age, there is a decline in vision, hearing, bone density and muscle mass (Khaw, 1997). The loss of muscle mass (sarcopenia) results in decreased muscle strength (Frontera et al., 2000) which impacts negatively on the older adult's ability to walk (Dipietro, 2001). The decrease in bone density (osteopenia) can progress to osteoporosis, a skeletal disorder characterized by compromised bone strength predisposing to increased risk of fracture, particularly in the hip, vertebrae and wrist (National Institutes of Health, 2000).

Adults 65 years and older have the highest incidence and prevalence of chronic diseases which result in disability (Fried & Guralnik, 1997). Chronic

diseases are those that are expected to last or have at least lasted 6 months or more and are rarely cured or resolve spontaneously (Marks, 2003; Statistics Canada, 2000). The Heart and Stroke Foundation (2003) estimates that one in four adults over the age of 70 has heart disease and stroke. While the highest prevalence of osteoarthritis occurs in men and woman 65 years of age and over (Health Canada/The Arthritis Society, 2003), it is estimated that one in four women and one in eight men over the age of 50 have osteoporosis (Osteoporosis Canada, 2006). Additionally, adults 65 years and older have a 4 to 5 times greater incidence of diagnosed cancer than younger adults (Public Health Agency of Canada, n.d.a). In 2004, the incidence of diagnosed diabetes was over five times higher among adults aged 65-79 years (14.9 per 1000 population) than adults less than 45 years of age (2.9 per 1000 population) (Public Health Agency of Canada, n.d.b). Furthermore, neuro-psychiatric disorders are common in older adults in developed countries (Murray & Lopez, 1997).

Chronic conditions such as arthritis, cancer, heart disease and stroke are associated with pain and mobility restriction which in turn may lead to mobility-related disability (Haq, Murphy, & Dacre, 2003; Odding, Valkenburg, Stam, & Hofman, 2001). Mobility restriction can act as a barrier for physical activity in the older adult and it has been shown that inadequate amounts of physical activity are associated with increased disability (Visser et al., 2005). In Canada, older adults have been found to be the least physically active of all age groups with

only 15% of older adults reporting to be sufficiently active to maintain their health Statistics Canada (2003).

A consequence of an ageing population with physiological decline (a function of the body function and structure), high rates of chronic disease (a function of health), and low rates of physical activity is chronic physical disability (Dipietro, 2001; Fried & Guralnik, 1997; Visser et al., 2005). Older adults have the highest incidence of disabilities (Statistics Canada, 2001). The World Health Organization (2001) produced the International Classification of Functioning, Disability and Health (ICF) which recognized the interactions between health conditions, body functions and structures, and personal and environment factors and how these interactions influence an individual's activities and participation in these activities. The ICF is a model that can be used to describe health and disability (WHO, 2001).

Evans and Pollock (1999) found that a combination of reduced levels of activity coupled with sarcopenia is associated with increased physical disability in older adults. Older adults are likely to experience disability in the last 10 years of their lives and, of all Canadians experiencing disability, 41% of these are adults 65 years and older (Statistics Canada, 2004). The most prevalent type of disability reported by older Canadian adults is mobility-related disability which includes difficulty walking on a level surface, climbing stairs, rising from sitting, or carrying an object while walking (Statistics Canada, 2001). Chronic disability

(greater than six months in duration) may be the consequence of any or all of the ageing process, chronic diseases and physical inactivity.

At the level of the individual, chronic disability disturbs the fine balance of the relationship between an individual's physical self and the environment; this compromises a person's quality of life (WHO, 2001). For example, cardiovascular and musculoskeletal conditions may impact quality of life by affecting physical function, pain and mental health (Reginster, 2002). In 1996 it was found that 14% of Canadian adults 75 years and older lived in institutions because they could no longer sustain themselves in the community (Statistics Canada, 1996). Romanow (2002) stated that hospital, rehabilitation or long term care may be required to respond to the older adult's health needs.

The impact of chronic disability on society is costly. In 1998, cardiovascular disease, diabetes, musculoskeletal conditions and cancer accounted for $18.5, $9, $16.4, and $14.2 billions of dollars respectively, spent in direct and indirect health care costs in Canada (Health Canada, 2002). In addition to disease-specific health care costs, the economic burden attributed to physical inactivity is estimated at $2.1 billion (Katzmarzyk, Glenhill & Shepard, 2000). Furthermore, Romanow (2002) reported that the average annual per capita cost for both private and public health expenditures more than doubles between the ages of 64-74 and over 85 years. Any intervention strategy which would maintain health and function of older adults would be beneficial to both the individual and society.

Physical exercise has been shown to be beneficial to older adults (Mazzeo et al., 1998). Endurance exercise in older adults reduces risk factors associated with diabetes and heart disease (Blair, Wells, Weathers, & Paffenbarger, 1994; Whaley, Brubaker, & Otto, 2006). These risk factors include elevated blood glucose, blood pressure and lipids. Physical exercise increases muscle strength, flexibility and endurance translating into improved mobility including walking, rising from a chair and improved balance (Campbell, Robertson, Gardner, Norton, & Buchner, 1999a; Carter, Kannus & Khan, 2001; Hruda, Hicks & McCartney, 2003; Judge, Lindsey, Underwood, & Wineskins, 1993; Maire et al., 2003; and Mazzeo et al., 1998). Improvement of mobility in older adults as a consequence of exercise may delay dependency and institutionalization (Shepard, 1994) and can enhance quality of life (Evans & Pollock, 1999: Blair et al., 1994). Moreover, physical exercise is beneficial psychologically as it has been shown to positively affect cognitive function, decrease symptoms of depression and improve self-confidence (Martin & Dubbert, 1985; Whaley, Brubaker, & Otto, 2006). Regular, low level physical activity has also been shown to have positive effects on physical health (Whaley, Brubaker, & Otto, 2006). Physical activity is a means to maintain mobility in older adults and can be used as an intervention in many settings.

Because of the complexity of health status in older adults, specific health care programs have been designed to address their special needs. One such program is the Geriatric Day Hospital (GDH), a multidisciplinary outpatient program offering rehabilitation services exclusively to older adults in the

community (Forster et al., 1999). GDH programs promote physical exercise in older adults. The physiotherapist is a key member of the GDH care team whose role is to prescribe, teach and counsel older adults regarding physical exercise. During exercise counseling the physiotherapist helps the older adult problem solve barriers to exercise to encourage the client to exercise at home (Jette et al., 1999). Physiotherapy intervention may occur over several months while the client attends the GDH; however there may be little or no long-term monitoring of the older adult's mobility in the community once he or she is discharged from the GDH. Malone, Hill, & Smith, (2002) found that although older adults improved their functional mobility by the time of GDH discharge, this improvement was short-lived. The reason for this decline of mobility status is not entirely clear.

Non-adherence to prescribed exercise is a possible factor contributing to the decline in mobility in GDH clients. Adherence to exercise refers to the level of participation in an exercise regime (proportion of prescribed treatment sessions) once the exercise behavior has been established (Oman & King, 2000). Although it has been established that reduced health status, the ageing process and physical inactivity contribute to a decline in mobility in older adults, it is unknown if or how these factors affect the older adult immediately after finishing a GDH program. In itself, non-adherence to home exercise programs has been found to jeopardize the long-term benefits of exercise (Martin & Sinden, 2001; Sullivan, Allegrante, Peterson, Kovar, & MacKenzie, 1998).

Adherence to exercise is intimately related to the psychological construct of "self-efficacy of exercise" which is defined as a belief or self-confidence in

one's ability to successfully perform a specific behavior such as exercise (McAuley & Mihalko, 1998). Exercise behavior research indicates a strong relationship between exercise adherence and self-efficacy of exercise, (McAuley and Mihalko, 1998). Therefore, designing interventions such as counseling older adults face to face or via the telephone may influence self-efficacy of exercise which, in turn, may improve adherence to exercise and ultimately mobility. However, little research could be found that studies the effect of physiotherapy intervention on self-efficacy of exercise and exercise adherence in older adults.

In summary, older adult adherence to prescribed exercises after discharge from GDH is unknown. Similarly, there is a gap in the knowledge regarding post-discharge mobility of GDH clients and the influence of self-efficacy of exercise intervention on exercise adherence behavior. For that reason, the overall purpose of this pilot study was to examine the effects of two types of intervention: a) direct intervention via home visits and b) indirect intervention via telephone contact on self-efficacy of exercise, adherence to exercise, and mobility of community-dwelling older adults following discharge from a GDH.

CHAPTER TWO

Review of Literature

Ageing and Mobility

Mobility in the older adult is supported by many physical, psychological and environmental factors (Kane, Ouslander & Abrass, 2004); however the ageing process is accompanied by a depletion of physical reserves. For example, there are changes in the cardiovascular system such as a reduction in maximum oxygen uptake (Dehn & Bruce, 1972; Weiss, Spina, Holloszy & Ehsani, 2006). There is also a reduction in heart rate response to exercise, reduced stroke volume of the heart and thus an overall reduction in cardiac output (Whaley, Brubaker, & Otto, 2006). These changes in the cardiovascular system result in a reduced capacity for physical activity and exercise in older adults.

The musculoskeletal system is also affected by the ageing process. There is a decrease in muscle strength (Macaluso & De Vito, 2004; Narici, Susta, Diuffreda, Ferri, Scaglioni, & Capodaglio, 1999) and muscle power (Skelton, Young, Greig, & Malbut, 1995) in the older adult. The reduction in strength is related to the following factors:

1. Sarcopenia, an age-related loss of muscle mass resulting from decreased number of muscle fibres and in the size of muscle fibres, predominantly type II (Lexell, 1995);

2. A reduction in motor unit activation capacity (Harridge, Kryger & Stensgaard, 1999);
3. An increase of coactivation of antagonist muscles (Macaluso et al., 2002);
4. A reduction in single fibre-specific muscle tension (Larsson & Frontera, 1997);
5. A reduction in protein synthesis due to decreased growth hormone production (Rudman et al., 1990); and
6. A decrease in tendon stiffness resulting from a decrease in elasticity and increase of viscosity of the tendon structure. (Kubo et al., 2003).

In addition, Skelton et al., (1995) suggested the decrease in muscle power is greater than the decrease in muscle strength in older adults. Macaluso and DeVito (2004) proposed that the decrease in power is due to the selective atrophy of type II fibres with ageing. Other changes attributed to ageing include a decrease in lean body mass, an increase in fat mass and a loss of flexibility. The loss in flexibility is due to a decrease in elastic tissue in muscle and an increase in connective tissue in ligaments, tendons and muscle (ACSM position stand, 1998).

The physical changes related to ageing have implications for functional activities. In a study comparing aerobic demands of walking in older and younger adults, Martin, Rothstein and Larish (1992) found that walking placed a greater metabolic load on muscle fibres and resulted in a greater energy cost in walking in older adults than younger adults. They speculated that "...declines in

force-generating capacity of muscle in the aged may require recruitment of additional motor units and perhaps an additional proportion of less economical fast twitch muscle fibers to generate necessary forces" (Martin et al., p.200). Older adults with sarcopenia have been shown to have greater difficulty with walking and climbing stairs than do older adults with normal muscle (Janssen, Heymsfield & Ross, 2002). Bassey et al (1992) found a significant positive correlation between leg extensor power and the ability to successfully complete chair rising, stair climbing and walking in a sample of older adults in a long term care institution. Decreases in muscle power and strength have been found to contribute to a higher susceptibility of older adults to falls and to injuries resulting from falls (Deschenes, 2004; Lipsitz, et al., 1994). A literature search revealed no information research investigating the reduction of muscle flexibility in older adults and impact on function.

Chronic diseases such as osteoarthritis, osteoporosis, heart disease and stroke have also been shown to have a negative influence on mobility and function in older adults. Osteoarthritis is a degenerative joint disease (Minor & Kay, 1997) which may cause pain and depression, restrict activities in daily living, and reduce quality of life (Verbrugge & Juarez, 2006). Osteoporosis is a systemic skeletal disease in which low bone mass and deterioration of bone tissue lead to skeletal fragility and fractures after minimal trauma (National Institutes of Health, 2000). Johnell and Kanis (2004) found that osteoporotic hip fractures may lead to prolonged mobility disability with an average duration of disability of 2.98 and 3.60 years for men and women respectively. In a study of osteoporotic vertebral

fractures in older women, respondents reported that vertebral fractures caused chronic pain and interfered with their personal lives (Bianchi et al., 2005).

In addition to the changes related to normal ageing, the prevalence of chronic diseases increases with age. Chronic diseases common in older adults such as heart disease and stroke may be implicated in decreasing older adult mobility. Coronary artery disease may result in angina, a recurring chest discomfort related to myocardial ischaemia without cell death (Mithal, Mann & Granger, 2001); angina associated with physical effort has been shown to limit an individual's function (Pinsky, Jette, Branch, Kannel & Fienlieb, 1990). Congestive heart failure (CHF), another chronic heart condition, may result in the heart being unable to deliver adequate oxygen to metabolizing tissues (Myers, 1997). CHF has been shown to be associated with reduced functional capacity and limited mobility (Sullivan & Hawthorne, 1995). Stroke or cerebral vascular accident has also been shown to reduce mobility; stroke is a result of vascular insufficiency to the brain and may result in motor, sensory, perceptual, visual field, cognitive, and/or communication impairments (Palmer-McLean & Wilberger, 1997). Stroke has been shown to be associated with prolonged physical disability (Lai, Studenski, Duncan & Perera, 2002).

Diabetes is a chronic health condition involving the body's inability to produce or utilize insulin resulting in an inability to absorb glucose from the blood stream (Public Health Agency of Canada (n.d.). This condition may result in peripheral neuropathies, retinal, kidney and heart damage (Public Health Agency of Canada (n.d.). In a study reviewing the complications of diabetes in community

dwelling older athletes, Tilling, Darawil and Britton (2006) found an increased risk of falling was associated with poorly controlled diabetes and diabetic complications such as diabetic neuropathies.

In addition to the contributions of the ageing process and chronic disease to disability, a sedentary lifestyle or low level of physical activity may affect mobility in older adults. Intensity of physical activity can be classified using a specific caloric expenditure measurement termed metabolic equivalents (METS) (Whaley, Brubaker & Otto, 2006). Health Canada (1999a) has defined low levels of activities as those which expend less than1.5 METS per day while the American College of Sports Medicine (Whaley, Brubaker, & Otto, 2006) has defined low levels of activities as those which expend less than 2 METS per day.

Older adults who are sedentary have been reported to be at higher risk for stroke, heart disease, type 2 diabetes, hypertension, osteoporosis and injuries from falls (Centres for Disease Control and Prevention, 1996). Similarly, physical inactivity has been shown to be associated with an increased risk of metabolic syndrome (Lakka, et al., 2003). Metabolic syndrome or insulin resistance syndrome is a condition in which a number of coronary heart disease risk factors (dyslipidemia, insulin resistance, elevated blood pressure, impaired fibrinolysis and chronic low-grade inflammation) are clustered together (Whaley, Brubaker, & Otto, 2006). And finally, Thune and Furberg (2001) reviewed observational studies that examined the effects of occupational and leisure time physical activity on overall and site-specific cancer; their review suggested that physical

inactivity has been shown to be associated with higher overall risks of cancer (Taylor et al., 1962 cited by Thune and Furberg).

In conjunction with the increase in chronic disease risk factors, sedentary lifestyle results in muscle disuse and consequently muscle weakness. Muscle weakness as a result of disuse occurs through a reduction in size of muscle fibres (Ferretti et al., 1997) in contrast to the situation in normal ageing in which there is a reduction in the number of muscle fibres (Larson, Li, & Frontera, 1997). As noted previously, decreased muscle strength and power have been shown to diminish an older adult's ability to rise from a chair, walk and maintain balance (Bassey et al., 1992; Deschenes, 2004; Lipsitz, et al., 1994).

Physical Exercise and the Older Adult

Physical exercise is defined by the American College of Sports Medicine as "a type of physical activity planned, structured and repetitive bodily movement done to improve or maintain one or more components of physical fitness" (Whaley, Brubaker, & Otto, 2006, p.3). This is in contrast to *physical activity* which encompasses a broader spectrum of bodily movements involved in activities of daily living such as gardening. This literature review will focus on prescribed physical exercise, and not on physical activity.

Physical exercise has been shown to affect the risk of heart disease and stroke; specifically, endurance training has been found to decrease the risk factors for heart disease and stroke by improving glucose and insulin

metabolism, reducing plasma LDL cholesterol and triglyceride levels, increasing plasma HDL cholesterol levels, reducing body fat, and reducing blood pressure and resting heart rate (Whaley, Brubaker, & Otto, 2006). In addition to reducing risk factors, endurance training studies with older adults as subjects, reveal that peak maximal oxygen uptake was increased in healthy older women (Haykowsky et al., 2005). Huang, Shi, Davis-Brezette, and Osness, (2005) performed a meta-analysis of 41 controlled clinical trials which quantified the effect of aerobic exercise on maximum oxygen uptake (VO_2 max.) of older adults; results showed a 16.4 % improvement in VO_2 max. of the exercising group compared to that of the control groups.

In addition to evidence that physical exercise improves the cardiovascular system, randomized controlled trials provide evidence that strength of the older adult is significantly increased with exercise (Seguin & Nelson, 2003). Macaluso and DeVito (2004) reviewed the effects of resistance training on muscle strength and power in older adults. A portion of the review focused on 8 studies which used varying resistance training methods, for example knee extension, hip extension, arm pull and bench press. Different parameters of exercise were also used, for example intensity varied from 50-80% of 1 repetition maximum (RM); the number of repetitions varied from 4-15; there were predominantly 3 sets for each exercise; frequency of training was 2-3 times per week; and training occurred over 12-16 weeks. The review found that power gains varied from 10% in knee extension and arm pull in older adults who exercised for 12 weeks, two times a week, with three sets of 8-12 repetitions of 80% of 1 RM to 97% power

gain in high velocity leg press in older adults who exercised for 16 weeks, 3 times per week, with three sets of 8-10 repetitions of 70% of 1RM.

In another section of the review paper, Macaluso and De Vito reviewed 16 studies which measured the effect of resistance training on muscle strength and size of the quadriceps muscle in older adults. Again, there were various training methods reported (e.g., knee extension, leg press, general weight bearing exercises) as did parameters of exercise, for example, intensity varied from 50-80% of 1RM or isokinetic training; the number of repetitions varied from 4-12; the number of sets varied from 3-6; the frequency of the training was 1-7 times per week; and training periods varied over 4-84 weeks. Results suggested that resistance training improved the percentage of one repetition maximum from 26-107%; and the cross sectional area of both Type I and II muscle fibers was increased. Hunter, McCarthy and Bamman (2004) also reviewed 15 studies of knee extensor resistance training programs with older adults; nine of the fifteen studies found increases in vastus lateralis muscle strength and size of both Type I and II muscle fibers. There also is evidence that older women do not have as great a response to strength training as men (Bamman, et al., 2003).

Physical exercise, in addition to reducing risk factors for chronic disease and mitigating muscle weakness in healthy older adults, can also affect symptoms related to chronic diseases such as osteoarthritis and chronic obstructive pulmonary disease (COPD). The Ottawa Panel for Evidenced-Based Clinical Practice Guidelines (Brosseau et al., 2005) reviewed 26 randomized controlled trials (RCT) and clinical trials on the effects of therapeutic exercise on

people with osteoarthritis (a variety of types of exercise regimes were included such as strengthening exercises, exercises in water, yoga, general movement and manual therapy [sic]). Topp et al (2002) found significant differences between a number of intervention groups (lower extremity isometric strengthening exercises) and control groups with the intervention groups demonstrating decreased pain and faster walking on a level surface, climbing stairs and getting up from the floor. Evcik and Sonel (2002) found that home strengthening exercises lessened pain and increased functional status while van Baar et al (1999) found that strength training contributed to a reduction of pain and improvement in walking in older individuals with osteoarthritis of the hip and knee.

Progressive resistance exercises have been shown to improve upper and lower limb muscle strength in older individuals with COPD (O'Shea, Taylor & Paratze, 2004). Emery, Schein, Hauck, and MacIntyre (1998) conducted a RCT involving adults 50 years and older with COPD. There were three groups in the study: an intervention group which exercised plus received education and stress management education; and an intervention group which received only education and stress management; and a control group whose members were put on a waiting list. The results of the study found that the intervention group which included exercise had significantly improved in work and VO_2 max. as compared to the other two groups which had no exercise component.

There is a large body of research focused on cardiac rehabilitation including exercise prescription and the effects on older adults with cardiac

conditions. This research is not within the scope of this paper and therefore will not be discussed.

In addition to improving muscle strength, exercise has been shown to improve bone density. Taylor et al (2004) reviewed the effects of physical exercise intervention on health benefits such as bone health in older adults. There has been some controversy about the effects of exercise on bone health in older adults; however Welsh and Rutherford (1996) showed that high impact aerobic exercise resulted in an increase in mineral density of the proximal femur. Similarly, Uusi-Rasi, Sievanen, Pasanen, Oja, and Vuori (2002) found that physical exercise improved bone density in the tibia in older women as measured with peripheral quantitative computed tomography.

Older adults may experience broader benefits from physical exercise, for example, improvement in mobility activities such as balance and walking. Muscle strength has been shown to be a key component of mobility activities such as walking and balance (Bassey et al., 1992; Berg, Wood-Dauphinee, Williams, & Gayton, 1989; Dipietro, 2001). Campbell et al., (1997) carried out a RCT studying the effect of individually tailored exercise programs on the total number of falls in community-living older adults. In the study, a physiotherapist visited 4 times in the first 2 months with the participant exercising 3 times per week, for 30 minutes each time. The exercises focused on lower limb strength, balance and included walking outside 3 times per week. Results of the study indicated that the intervention group had a significantly lower fall rate than the control group at the end of one year. Carter, Kannus and Khan (2001) reviewed

13 RCT's involving exercise with older adults and found evidence that exercise was of value in fall prevention. Steadman, Donaldson, and Kalra (2003) performed a RCT with adults 60 years and older with balance problems and studied the effects of exercise on balance; results suggested that strengthening exercises and balance training improved balance.

In addition to the evidence that it improves mobility, there is some evidence that physical exercise decreases symptoms of depression and improves cognitive function. Emergy, Schein, Hauck, and MacIntyre (1998) conducted a RCT involving older adults (50+ years) with chronic obstructive pulmonary disease. The intervention group received exercise training in addition to education and stress management while the control group received only education and stress management education. They measured depression using the Hopkins Symptom Checklist and found a significant difference between groups with improved scores in the intervention group; cognition was measured with a number of tests from the Halstead-Reitan battery and the Weschler Adult Intelligence Test; verbal fluency was the only area of cognition which improved significantly ($p < .001$) in the intervention group. A larger study by Strawbridge, Deleger, Roberts and Kaplan (2002) supported the claim that physical exercise is protective for both prevalent depression and incident depression with participants followed over 5 years.

Perhaps the most important benefit of physical exercise from an older adult's view point is improvement in his/her quality of life. Health-related quality of life (HRQoL) is defined as, "the extent to which health impacts on an

individual's ability to function and his or her perceived well-being in physical, mental and social domains of life" (Helbostad, Sletvold, & Moe-Nilssen, 2004, p. 499). HRQoL in older adults has been shown to have a positive correlation with amount of physical exercise (Stewart et al., 2004). Helbostad et al., measured HRQoL with the SF-36 and found that home exercise training including balance and strength exercises and a combination of group exercise training, and home exercise both improved HRQoL; however the combined regime appeared to have greater effects on perceived participant benefits. Furthermore, older adults have reported an improvement in quality of life, measured by the Nottingham Health Profile, after 7 months of strength and aerobic training (Teixeira-Salmela et al., 2005). In summary, there is evidence that physical exercise offers the older adult a defense against functional decline despite the multi-factorial threats to older adult mobility.

In order to gain the benefits of exercise, the American College of Sports Medicine (ACSM) (Whaley, Brubaker, & Otto, 2006) recommended that exercise for healthy older adults include aerobic, strength and flexibility training with explicit instructions regarding duration, intensity and frequency of these exercises. Aerobic training (e.g., walking, swimming, and cycling) should be light to moderate in intensity (50-60% of maximum heart rate) to improve health or moderate in intensity (40-60% of heart rate reserve) to stimulate cardiovascular adaptation, should be 30 minutes in duration, a minimum 3 times per week with a maximum of 5 times per week. Poorly conditioned older adults may have their exercise prescription altered such that their training threshold minimum value

may be as low as 40% of heart rate reserve. Also, shorter, more frequent exercise sessions may be more suitable for the de-conditioned older adult (ACSM, 1998). It should be noted that the ACSM (2006) guidelines were not revised to address the frail older adult; therefore the ACSM position stand for older adults (1998) still applies.

Strength training or progressive resistive training intensity is recommended to be 65-85% of 1 repetition maximum, single or 2-3 sets of 8-10 repetitions, 2-3 non-consecutive days per week (ACSM, 1998). Although flexibility training is recommended for older adults, there has not been a systematic design of exercise programs to improve flexibility in older adults (ACSM, 1998).

Although exercise prescription has been shown to produce benefits in older adults, an older adult must accept exercise as part of his/her own repertoire of behaviors in order to reap the benefits of exercise. Exercise behavior research suggests that there are three levels of exercise behavior: adoption, adherence (i.e., maintenance) and drop outs. Adoption of exercise refers to the acquiring of exercise behavior (King, 1994). Exercise adherence refers to the level of participation in an exercise regime (proportion of prescribed treatment sessions) once the exercise behavior has been established (Oman & King, 2000). For example, if a physiotherapist (PT) prescribes 3 exercise sessions per week to an older adult and the older adult performs one exercise session per week, then the exercise adherence rate is 33%. It is suggested that adherence to exercise be measured once exercise behavior has been maintained for six

consecutive months (Dishman, 1994). In addition to adherence rates data, the drop out rate is an important phenomenon common to all exercise adherence research. Drop outs are referred to as persons who discontinue involvement in their exercise program (Eccelestone, Myers & Paterson, 1998).

Using these levels of exercise behavior, additional evidence has been gathered regarding adherence to exercise rates. Exercise behavior research has shown that adherence to exercise rates in older adults are variable. Two exercise adherence rate research reviews will be discussed: Martin and Sinden (2001) who focused on randomized control trials (RCT) and Ecclestone, Myers & Paterson (1998) focused on community based exercise programs (CBEP).

Martin and Sinden (2001) performed a literature review and summarized the results of 21 RCT studying older adults' exercise adherence behavior. The analysis included studies of community-living adults older than 55 years of age with a variety of co-morbid conditions who were involved in a supervised exercise intervention with variable durations and types of intervention. The adherence measure was defined as the proportion of bouts completed relative to the number of bouts prescribed. Table 1 summarizes examples of studies from this review and that relevant to the present study.

Table 1: *Adherence to Exercise Rates in Older Adults. (Martin & Sinden, 2001)*

STUDY	MEAN AGE (YEARS)	NUMBER OF SUBJECTS	STUDY DURATION (WEEKS)	CO-MORBID CONDITIONS	ADHERENCE RATE[a]	EVALUATION INTERVAL (WEEKS)	DROP OUT RATE[b]
Ettinger et al., 1997	69	439	78	Arthritis	68% (aerobic) 70% (strength)	78	17%
Emery et al., 1998	67	79	10	COPD	86% (aerobic)	10	8%
Schenkman et al., 1998	71	51	10-13	Parkinsons Diease	100% (flexibility)	10-13	10%

[a] Adherence rate refers the proportion of exercises done compared to the prescribed exercises in those participants who completed the study
[b] Drop outs refer to the proportion of the total individuals who ceased participating prior to completing the study.

The overall analysis of the 21 RCT's calculated adherence to exercise rates by two methods – adherence rates including drop out adherence rates, and adherence rates excluding drop out rates. The mean adherence rate calculated from the studies which excluded drop outs from the adherence data, was 88.37%; it was significantly different $p<.001$ from the adherence rate of 63.33% for those studies which included drop outs in adherence data. Ecclestone, Myers, & Paterson (1998) reported adherence to exercise and drop out rates of 541 older adults with a variety of co-morbid conditions in a community-based exercise program (CBEP). The CBEP offered various types of exercise: Tai Chi, aerobic training, strength training, and specific exercise programs designed for individuals with arthritis, diabetes and osteoporosis. Exercise adherence was defined as the number of sessions attended relative to the total number of sessions. Table 2 summarizes those exercise programs studied by Ecclestone et al. that are relevant to the present study.

Table 2: *Adherence and Drop out Rates in a Community-Based Exercise Program over a 1 Year Period (Eccelstone et al., 1998)*

PROGRAM NAME	NUMBER OF PARTICIPANTS	ADHERENCE RATE	DROP OUT RATE	PARTICIPANTS WHO TRANSFERED TO ANOTHER PROGRAM
ARTHRITIS	51	64%	64%	4%
DIABETES	36	70 %	70%	11%
OSTEOPOROSIS	67	58%	27%	37%

[1] Adherence rate is the proportion of exercises done the prescribed exercises in those participants who completed the study
[2] Dropout is the proportion of the total individuals who cease participating prior to completing the study.

The entire CBEP adherence rate was 68% with an overall drop out rate of 57% at the end of a 3-year period. The drop out rate was calculated at 1, 2, 3, 6, 12, 24 and 36 month periods and it was found that the number of drop outs increased as time progressed. Although the community-based exercise program (CBEP) appeared to have lower adherence rates than was reported in the RCT study review, the evaluation period for the CBEP's was longer than that of most of the RCT's, therefore making a comparison of adherence rates difficult.

The interpretation of adherence to exercise research is difficult because of the different adherence to exercise measurements, populations sampled and interventions. In reviewing the literature it was noted that a variety of measures of exercise adherence were used and the measures used were not always reported. The timing of measurement also varied from study to study. Most often, researchers reported adherence information only during the time the program was running and "there is little information regarding adherence subsequent to treatment termination" (Martin & Dubbert, 1985, p. 138). In addition to the

measurement issues, the duration of a study influences adherence rates – the longer the evaluation period or study, the lower the adherence to exercise rate (Dishman, 1994).

Selection bias and variations in recruitment strategies and interventions further confound interpretation of exercise behavior research. For example, co-morbid conditions and previous physical activity habits (Dishman & Sallis, 1994) are important variables to note. Likewise, recruitment strategies differed between those studies using individuals participating in community exercise programs and those studies which utilized inclusion and exclusion criteria (Ecclestone, Myers, & Paterson, 1998). Differences in the interventions (e.g., type of exercise, supervision versus no supervision, etc.) also make it difficult to interpret and compare adherence rates.

Exercise drop out rate information requires similar scrutiny and thoughtful interpretation. The timing of drop out rate measurement varies between studies. Both the CBEP and the RCT reviews supported previous findings on exercise drop out rates; as time progressed, drop out rates increased. Drop out rates in community exercise programs were found to increase as the duration of an exercise program increased (Ecclestone, Myers, & Paterson, 1998). The largest drop out rate occurred in the first three months of the community based exercise program. Similarly, drop out rates in the studies in the RCT meta-analysis varied from 4% at 16 weeks (Blumenthal et al., 1989) to 17% at 78 weeks (Ettinger et al., 1997). Although drop out rates may indicate a reduction of prescribed exercise this phenomenon does not necessarily reflect a reduction in overall

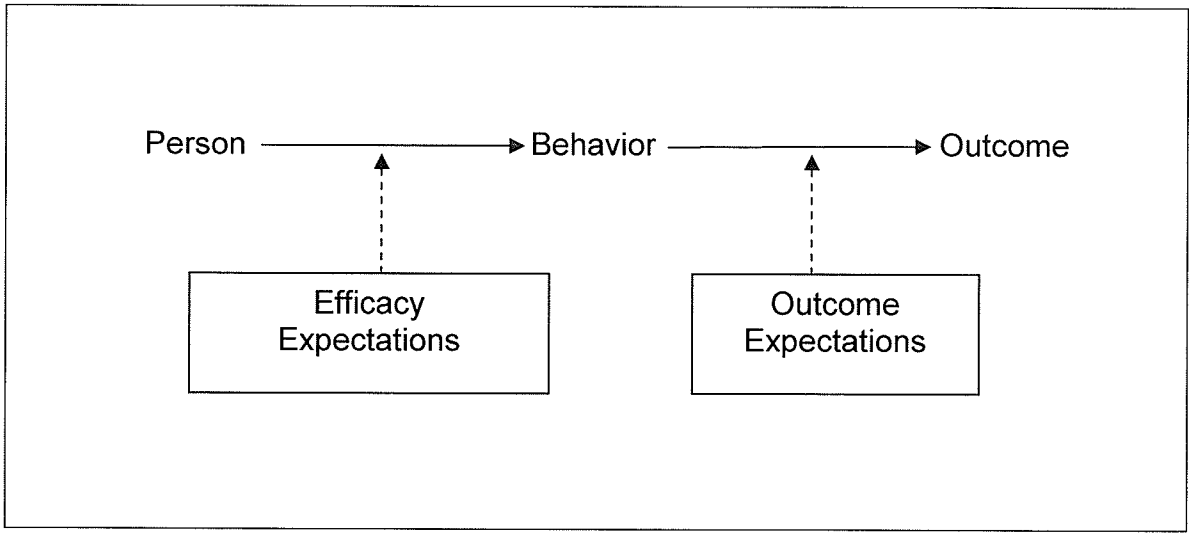
physical activity. Other physical activities such as gardening or walking for transportation may replace formal physical exercise; however little research was found regarding replacement activities.

Influences on Adherence to Exercise

Personal Beliefs and Adherence to Exercise

Personal beliefs have been shown to influence adherence to exercise (McAuley & Blissmer, 2000). Social Cognitive Theory (SCT) is one of many psychological theories adopted to explain individual behavior (Bandura, 1997). This is a cognitive-behavioral theory which considers cognition as playing "a prominent role in the acquisition and retention of new behavior patterns" (Bandura, 1977, p. 192). The theory proposes that human behavior may be explained, predicted or modified by understanding the dynamic and reciprocal relationships between a person's behavior, their environment and personal factors. Bandura incorporated a number of psychological constructs in this theory, two of which are pertinent to this study: "self-efficacy expectations" and "outcome expectations". These constructs are recognized as influencing behavior patterns (Bandura, 1977; McAuley & Blissmer, 2000) and are depicted in Figure 1.

Figure 1: *Social Cognitive Construct Relationships and Behavior* (Bandura, 1977, p. 193)



Bandura (1977) suggested that personal behaviors are influenced by "efficacy expectations" hence the construct has been renamed "self-efficacy expectations". The term "self-efficacy expectations" is defined as an individual's judgment or belief regarding his/her confidence in being able to carry out a certain behavior (Bandura, 1977). This definition has evolved to include an individual's judgment or beliefs in his/her capability to execute necessary courses of action to satisfy situational demands (Bandura, 1986). SCT posits that the judgments are a consequence of an internal debate where different sources of cognitive information are evaluated by the individual (Feltz & Chase, 1998). Although SCT proposes a model for behavior, the cognitive process resulting in a final judgment of task/situation-specific confidence remains hidden in a "black box".

Bandura's original definition of self-efficacy expectations has been studied of a variety behaviors such as anxiety (Maddox, Norton, & Stoltenberg, 1986) and exercise behavior. The 1990's saw considerable use of an adapted self-efficacy expectations construct in exercise behavior research; this was termed "self-efficacy of exercise" and is defined as an individual's belief or confidence in his/her own ability to successfully perform a specific behavior such as exercise (McAuley & Milhalko, 1998).

Interventions to enhance self-efficacy of exercise have been used to influence exercise behavior that is, adopting exercise and adhering to exercise. DuCharme and Brawley (1995) studied 63 novice female exercisers with a mean age of 26 (± 8.7 years) and measured self-efficacy of exercise (barrier and scheduling self-efficacy measures). They found a weak relationship ($r = 0.12$, $p < .05$) between self-efficacy of exercise and adopting exercise behavior. No such relationship between the SCT construct (adherence-efficacy) and adoption of exercise was found in a more recent study involving 189 middle to older-aged woman (Litt, Kleppinger, & Judge, 2002). These different results could be attributed to the use of measuring the different types of self-efficacy constructs.

The amount of effort (intensity) and duration (adherence) of components of exercise behavior have been found to relate more consistently to the construct of self-efficacy of exercise. McAuley and Mihalko (1998) reviewed self-efficacy of exercise research and found low to moderate relationships ($r = .15$ to $.47$, $p < .05$) between adherence patterns to exercise and self-efficacy of exercise (Duncan, McAuley, Stoolmiller & Duncan, 1993; McAuley 1993). Moreover, there is

evidence that self-efficacy of exercise behaves in a curvilinear fashion over time, i.e., self-efficacy increases over the first 6 months followed by a decrease after this time (McAuley et al., 1999; Litt, Kleppinger, & Judge, 2002). This pattern of self-efficacy is similar to exercise adherence patterns over time. After an initial increase in the rate of adherence to exercise (and self-efficacy of exercise), exercise behavior declines (as well as self-efficacy of exercise) as time progresses.

McAuley and Mihalko (1998) reviewed 85 studies employing the self-efficacy of exercise construct as either a determinant or an outcome of exercise behavior. They identified five different types of self-efficacy utilized in exercise behavior research:

1. Exercise efficacy – referring to self-assessment of beliefs regarding individuals' abilities to participate in increasing amounts (e.g., frequency, duration or intensity) of physical activity (Courneya & McAuley, 1994);
2. Barriers efficacy or self-regulatory efficacy – referring to self-assessment of beliefs in ability to overcome environmental, social and personal barriers when exercising (Marcus, Eaton, Rossi, & Harlow, 1994;
3. Disease-specific/health behavior efficacy – referring to self-assessment of beliefs in individuals that participate in secondary prevention of disease through exercise rehabilitation (Buckelew, Murray, Hewette, Johnson, & Huyser, 1995);
4. Perceived behavior control – referring to the perceived ease or difficulty of performing a behavior (Ajzen, 1991). This latter construct is similar to

"self-efficacy expectations"; however perceived behavior control integrates outcome expectations within the construct.

5. General efficacy – referring to a global measure of self-assessment of beliefs relating to physical activity such as the Physical Self-Efficacy scale (Ryckman, Robbins, Thornton & Cantrell, 1982)

Considering the variation in definition from the original self-efficacy expectations construct, it is difficult to interpret research related to self-efficacy expectations. Analysis of findings requires careful attention to the definition of the construct and the instrument used for measurement.

Keller, Fleury, Gregor-Holt and Thompson (1999) performed a "critical systematic review" of 27 studies (including descriptive, correlational or observational; pre-or quasi-experimental; explanatory and randomized control trial studies) which explored the relationship between physical activity and "self-efficacy of exercise" in adults. The results of this review concurred with the findings of McAuley and Mihalko (1998): self-efficacy of exercise instruments were found to be moderately to highly reliable (Table 3). However, neither review cited information about construct validity for the self-efficacy of exercise instruments used in this research. McAuley and Mihalko (1998) suggested that validity of self-efficacy instruments is implicit in research as self-efficacy is compared to the behavior that it attempts to predict.

One final challenge to interpretation of exercise behavior research is that researchers may not distinguish between physical activity and exercise. These two behaviors can be subtly different in that physical activity may or may not

have a physical exercise component in it. Interpretation of research findings must be examined in relation to the particular context in which a specific behavior is defined and measured.

Table 3: *Psychometric Properties of Exercise Efficacy Measures in Exercise Research*

STUDY	AGE OF PARTICIPANTS (YEARS)	STUDY DURATION (WEEKS)	CO-EXISTING CONDITION/ SITUATION	SCALE	RELIABILITY
McAuley, Courneya et al., 1994	45-64	12	Sedentary	Adherence efficacy	r=0.92
Oka et al., 1996	33-91	2 days	Congestive Heart Failure	General Self-efficacy to Activity	Internal consistency .82-.99
Litt, Kleppinger & Judge, 2002	59-78	52	Low Bone Density	Adherence efficacy	"Alpha= 0.97"
McAuley, Marquez et al., 2002	60-75	52	Sedentary	Physical Self-efficacy Scale	Internal consistency 0.81

"Outcome expectation" is the other SCT construct associated in personal beliefs concerning exercise. This is defined as,"...a person's estimate that a given behavior will lead to certain outcomes" (Bandura, 1977, p 193) or an individual's judgment regarding the potential controllability of an outcome (Rodin, 1990). Outcome expectation, as well as self-efficacy, has been applied to exercise behavior. For example, if an individual feels that he/she can influence health through exercise, then there is potentially greater motivation to exercise. Conversely, if an individual perceives he/she has no influence over his/her health, it is unlikely that the person will engage in activities to improve health.

There is an important difference between outcome and self-efficacy expectations. If an individual believes that behaving in a certain manner may produce a desired outcome, the person has high outcome expectancy. On the other hand, if the individual is confident that he/she can perform the necessary behavior, the person has high self-efficacy.

As in self-efficacy of exercise, there have been various measurement tools developed to measure outcome expectation of exercise; however, no definitive measurement tool has been developed to quantify outcome expectations for exercise in older adults. Resnick, Zimmerman, Orwig, Furstenburg and Magaziner (2000) developed an instrument which rates nine consequences to exercise (makes me feel better physically, makes my bones stronger, makes me feel like I am accomplishing something, makes my mood better etc.). The items were rated 1 (low likelihood that there is the outcome) to 5 (a high likelihood that there is the outcome). The authors reported that the Outcome Expectancy for Exercise Scale, has acceptable internal consistency, alpha = 0.89, and test-retest reliability (r=.79). Other instruments rate potential outcomes of exercise (such as fitness, weight, energy, appearance, eating habits, sleep, tension, confidence, depression, coping with stress, mood, concentration and alertness, appetite) (Resnick, Zimmerman, Orwig, Furstenburg, & Magaziner, 2000).

The influence of outcome expectation on exercise behavior is much less studied than self-efficacy in exercise behavior. Outcome expectations (OE's) have been shown to have moderately positive relationship with exercise (r=0.40 - 0.66, $p < .05$) (Resnick, 2001; Resnick & Nigg, 2003, respectively). In addition to

having a positive relationship with exercise, Brassington, Atienza, Perczek, DiLorenzo, King, (2002) suggested that OE's act as a mediator between exercise counseling and longer term exercise adherence.

Social Cognitive Theory proposes that there are four sources of self-efficacy and outcome expectations:

1. Past performance accomplishments (past performance accomplishment is an individual's perception of how well he/she performed a behavior; mastery of a behavior appears to be a significant positive predictor for future behavior [McAuley & Blissmer, 2000].
2. Vicarious experience (Vicarious experience or modeling involves an individual's observation of another person's behavior and allows for social comparison; this comparison influences an individual's self-appraisal of competency to perform a certain behavior [Bandura, 1986]).
3. Verbal persuasion (Verbal persuasion involves motivating an individual to influence his/her behavior), and
4. Emotional or physiological arousal (Bandura, 1977, 1997).

Wise and Trunnell (2001) studied the effects of three of the sources of self-efficacy (i.e., verbal persuasion, modeling, and performance accomplishment) on 48 women who were being taught to do a bench press exercise. The women ranged in age from 18-40 years of age and were randomly assigned to 1 of 6 groups. Initial instruction involved all participants being given identical written information about the bench press. Individuals were exposed to different combinations of three separate sources of efficacy information

(performance accomplishment, modeling and verbal persuasion) and self-efficacy beliefs about bench press performance were then measured after each exposure. The researchers found that performance accomplishment improved self-efficacy more than modeling ($t=1.82$, $p=.04$), which in turn was more influential than verbal persuasion ($t=1.81$, $p=.19$). Also, performance accomplishment influence was enhanced when it followed one or both of the other sources of self-efficacy ($t=-2.47$, $p=.02$); verbal persuasion (positive feedback) was most effective when it followed performance accomplishment ($t=-3.59$, $p=.004$).

Not only is the type of feedback (positive in the above study) important to influencing behavior, but also who provides the feedback also impacts on the behavior. Feedback is more effective when given by "knowledgeable others" (Bandura, 1997, p. 110) such as physicians or physiotherapists.

Emotional or physical arousal occur when a stimulus invokes an emotional response (fear, joy etc.) or a physical response (sweating, shortness of breath etc.). Fear and doubt are often associated with autonomic arousal reactions of sweating and heart pounding. In the context of exercise behavior, reactions to strength and endurance exercise also include sweating and increased heart rate. Feltz and Chase (1998) contended that the interpretation of these exercise-induced arousal reactions will depend on the individual's experience for example, prior physical activity experience, and the environment or context of the situation.

Manipulating the sources of cognitive information has been recognized as potential counseling intervention for health clinicians and educators. Personal

beliefs may either positively or negatively influence the behaviors or activities that a person chooses to engage in and the amount and duration of effort expended on such activities (Dzewaltowski, 1994; Feltz and Chase, 1998). Enhancing personal beliefs in order to promote a behavior despite barriers to that behavior is another important component of behavioral intervention and can be essential to predicting future behavior (Brawley, Martin & Gyurcsik, 1998).

Bandura's constructs of self-efficacy expectations and outcome expectations have been adapted for exercise behavior interventions. For example, various authors (Calfas, Sallis, Oldenburg & French, 1997; McAuley, Courneya, Rudolph & Lox, 1994) suggest that encouragement and feedback by knowledgeable others (e.g., instructors, family physicians); vicarious learning and modeling (e.g., observation of others of one's own age performing exercise); and sensitization to physiological cues (such as being aware of increased heart rate or feeling warm while exercising) have a positive effect on exercise adherence.

Personal Characteristics and Adherence to Exercise

In addition to an individual's personal beliefs influencing exercise behavior, personal characteristics also impact on behaviors. Personal characteristics may be defined as factors that create "the unique demographic makeup of an individual" (Boyette et al., 2002, p.96) and include factors such as biomedical status, past exercise participation, age, gender, ethnicity, occupation, educational level, socioeconomic status, and smoking status. Out of all these characteristics, an individual's biomedical status may be one of the strongest determinants of exercise in that the healthier the individual, the more likely

he/she is to engage in exercise (Boyette et al., 2002; DiPietro, 2001). Past experience and mastery of exercise or physical activity have also been linked with higher levels of exercise behaviors (Boyette et al., 2002; McAuley & Blissmer, 2000; McAuley et al., 1994; Rejeski, Brawley, Ettinger, & Thompson, 1997). In addition to these characteristics, higher education, and higher income have been found to be positively related to higher levels of physical activity in all age groups (DiPietro, 2001; King, 2001; Shepard, 1994).

In terms of gender and its impact on physical activity and/or exercise, the report *Increasing Physical Activity: assessing trends from 1998-2003 report,* (Statistics Canada, 2003) revealed that older men reported a higher level of physical activity in leisure time than did older women. The same survey found that as the age of the older adult increased, reported physical activity for both genders decreased.

Major life events also have been shown to influence exercise behavior. Events such as death of a family member or friend, a change in financial situation, illness or injury may influence exercise behavior (Oman & King, 2000). For instance, exercise adherence during the maintenance phase (after six months after starting exercise) was shown to significantly decline for participants who reported three or more major life events (Oman & King, 2000). Given that there is an increased rate of chronic disease and mortality in older adults, it is likely that older adults are more often affected by negative life events than younger people.

Environment and Adherence to Exercise

In addition to personal beliefs and characteristics influencing exercise behavior, an individual's environment may also influence exercise behaviour. Environmental factors such as the setting in which one performs exercise (alone versus group), the site of exercise (home versus community based), and how advice is channeled to an individual will influence exercise behavior. Atienza (2001) reviewed 39 studies of home-based physical activity exploring these three environmental factors and their influence on exercise behavior. This review found that older adults exercise in a variety of settings: in the home, in community facilities such as gymnasiums and in health care facilities such as geriatric day hospitals or physiotherapy clinics. Home-based exercise programs (HBEP) are defined as physical exercise programs performed in or around the home environment (Atienza, 2001). In contrast, community-based exercise programs (CBEP) are defined as physical exercise programs performed outside of the home environment in "for-profit" or "non-profit" exercise facilities. Most often a HBEP involves an individual exercising alone whereas a CBEP may involve the individual exercising alone or in a group setting.

Atienza (2001) suggested that the site of exercise may influence exercise behavior. Her review found that older adults vary in their preference to exercise at home (alone) or in a community-based program (alone or in a group). Closely associated with the site of exercise programs is the issue of exercising alone or in a group. Findings from studies by Mills, Stewart, Sepsis and King (1997) and

Wilcox, King, Brassington and Ahn (1999) showed that one-third to two-thirds of older adults prefer exercising on their own rather than doing so in a group. Jones and Nies (1996), King (2001), Lee (1993), and Wilcox et al. (1999) found that HBEP's eliminated transportation and financial barriers to exercise and moreover, individuals could exercise at their own pace. Studies comparing adherence to exercise rates in home versus community-based exercise programs (controlling for the type of exercise and intensity) have had inconclusive results. In a study of home-based (individual) exercise in healthy adults 50-65 years old, exercise adherence was found to be greater (75-79%) than that of community-based (class) adherence (53%) after one year (King, Kiernan, et al., 1997). However, King, Oman, Brassington, Bliwise and Haskell (1997) reported that adherence rates were identical (93.6%) in home and community-based exercise programs in sedentary, healthy adults 50-76 years at the end of a 4 month period. Despite the large body of literature on adherence to exercise, research comparing adherence rates for home versus community-based programs controlling for the type of exercise and exercise intensity in older adults with similar chronic conditions is presently lacking.

Exercising in a group may play a role in older adult exercise adherence. For example, Drop outs occur with individual exercise programs and, as noted above, 33-66% of older adults prefer exercising alone. Although extrapolating from these figures, it could be concluded that up to 67% of older adults may prefer exercising with others; "class cohesion" in group exercise programs was found to play a significant role in maintaining exercise behaviors (Martin &

Dubbert, 1985). Estabrooks and Carron (1999) defined "class cohesion" as the social support or reinforcement existing within an exercise class. They studied 33 older adults (mean age 75.1) who were placed in an experimental, placebo or control group. The experimental group underwent intervention strategies to improve class cohesiveness, which included acknowledging role of members and the distinctiveness of the group, establishing goals for the group, facilitating communication and interaction. The placebo group was visited weekly by a research assistants whose responsibility was to ensure that these individuals were aware that they were apart of an ongoing exercise program. The control group received a basic fitness program. Results of this study indicated that the intervention group adherence to exercise rate (90%) was significantly different from that of a placebo and control group ($p<0.05$). This suggests that social cohesion plays a role in exercise adherence in groups. Furthermore, social supports from family, friends and exercise program staff have been found to have a significant positive correlation with physical activity (Wolinsky, Stump & Clark, 1995; Young & King, 1995).

Program Characteristics

Characteristics of exercise programs such as the type (flexibility, muscle strength and endurance, cardiovascular endurance), complexity and intensity, may also influence exercise behavior (Atienza, 2001; King, 2001; and Martin & Sinden, 2001). Research into adherence to exercise in older adults taking part in various exercise programs revealed inconsistent results. For example, exercise programs with moderate intensity and simple exercises may be more appealing

to older adults (Shepard, 1994; Stephens & Craig, 1990). Furthermore, Martin and Sinden (2001) suggested that adherence rates were greater in strength and flexibility exercise programs (87%) than in aerobic exercise training programs (75%); however King et al (2000) found that adherence to flexibility exercise was similar to that of aerobic exercise. Study comparisons are difficult because few studies controlled for the mode of counseling (face-to-face, telephone) and the site of intervention (home-based, community-based). Despite these problems, Atienza (2001) concluded that that home-based aerobic, strength or aerobic, and flexibility exercise programs all improve the health of older adults (Table 4).

Table 4: *Exercise RCT and Exercise Adherence in Older Adults Aged 60 years and older (as extracted from Atienza, 2001)*

STUDY	NUMBER OF PARTICIPANTS	SITE	TYPE AND INTENSITY OF EXERCISE	INTERVENTION	ADHERENCE RATE
King & Brassington (1997)	24	Home (4 months)	Moderate aerobic	Telephone, individual	79% at 4 months
King, Oman et al., (1997)	43	Home (4 months)	Moderate aerobic	Face-to-face and telephone,	93.6% at 4 months
King et al (2000)	103	Home or Class (12months)	Fit & Firm: Moderate aerobic, strengthening in class or home Stretch & Firm: Moderate flexibility in home	Class exercise (face-to-face) Home exercise (telephone)	Home based: F/F 92%, S/F 92%, both at 12 months Class based: F/F 65% S/F 68%, both at 12 months
Campbell, Robertson, Gardner, Norton & Buchner (1999b)	93	Home (44 weeks)	Moderate strengthening and aerobic	Home visit (face-to-face and telephone)	Strength (63%) Aerobic (72%), both at 44 weeks

Channels of Exercise Advice

Bandura (1986) suggested that the person who provides exercise advice is an important influence in adoption of exercise behavior. Sources of exercise advice include the physician, physiotherapist or exercise expert staff in community facilities. Physicians may encourage and influence older adults to exercise; however, lack of physician time and physician confidence in prescribing exercise undermines this intervention (The Writing Group for Activity Counseling Trial Research Group, 2001). Physiotherapists also provide exercise advice within the health care sector (e.g., Geriatric Day Hospital, hospital, private clinic) or in the community (e.g., home). Physiotherapists engage in face-to-face exercise counseling during the course of treatment to assist the client in adopting

and maintaining exercise behavior. However, in a GDH setting, access to exercise advice and monitoring of exercise behavior is generally limited to the duration of physiotherapy treatment in the GDH. Older adults may also access other exercise advisors such as physical education specialists (e.g., kinesiologists, personal trainers). These advisors work in community-based exercise programs such as at the YMCA or for-profit exercise facilities.

However, traditional channels of providing exercise advice and counseling are changing and new, non-traditional channels of exercise advice have been studied. Telephone counseling has been shown to encourage self-regulation of exercise behaviors and provides a method to encourage and support individuals, and help them reduce barriers to exercise via problem solving (King, Baumann, O'Sullivan, Wilcox, & Castro, 1999). Telephone and mail-out exercise behavior interventions with adults 50-65 years old doing home-based exercise have been shown to positively influence exercise maintenance behavior (Castro, King & Brassington, 2001). Exercise research reveals that telephone interventions may influence adherence to exercise rates in healthy older adults (King et al., 2000). Studies exploring the influence of email counseling with older adults were not found.

An alternative to home visits by physiotherapists was presented in a recent study of home-bound older adults with mobility disabilities. Specially trained home care support workers were taught to supervise and encourage exercise on an ongoing basis (Johnson, Myers, Scholey, Cyarto & Ecclestone, 2003). Although interpretation of adherence to exercise rate in this study was

problematic; the participants appeared to have improved his/her mobility following the exercise program.

Summary of the Literature

There is a large body of evidence indicating that physical exercise can decrease or mitigate the negative effects of ageing, chronic disability and sedentary lifestyle. Research also suggests there are many influences on exercise behavior in the older adult – personal beliefs, personal characteristics, the environment, the exercise characteristics themselves, and the channel of exercise advice. Older adults perform exercise in their homes where exercise is inexpensive, convenient and accessible. Home-based exercise program adherence has been shown to be enhanced with either face-to-face home visitations or telephone counseling. Moreover, there appears to be compelling evidence that strategies to enhance self-efficacy of exercise during either telephone or home visitations are effective in improving exercise adherence with older adults.

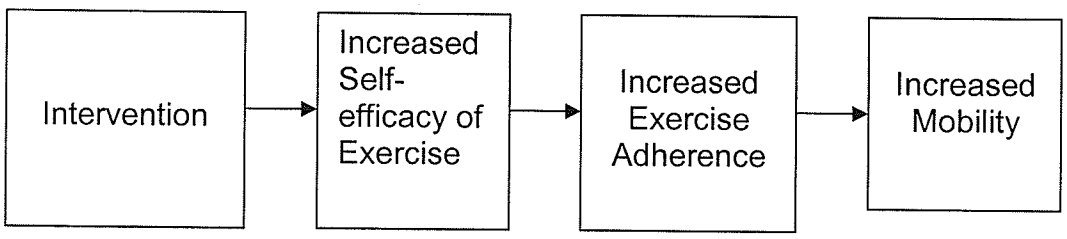
Physiotherapists prescribe exercise programs for older adults who attend Geriatric Day Hospitals and it has been shown that mobility scores improve after this intervention. However, the gain in mobility may not be sustained after discharge from the day hospital and no follow-up supervision at home. Factors contributing to this decline in mobility may be non-adherence to exercise a decline in self-efficacy of exercise and/or a lack of follow-up support for exercise behavior. These factors have not yet been studied in the client population

attending Geriatric Day Hospitals. There may be a role for home visits or telephone counseling to provide ongoing exercise follow-up in the community for older adults with chronic health conditions and disabilities. The ultimate goal would be to encourage exercise to maintain mobility and independent living of these older adults.

Conceptual Model

This pilot study proposes a model of physiotherapy care which incorporates the concepts of older adult's self-efficacy for exercise (Resnick & Jenkins, 2000) and exercise adherence behavior. Traditionally, physiotherapists have not considered clients' self-efficacy of exercise nor have they measured adherence to exercise post-discharge. It is proposed that specific assessment of self-efficacy of exercise and adherence to exercise rates may identify individuals at risk for declining mobility. This could allow triaging of these older adults for a Geriatric Day Hospital post-discharge intervention (Martin & Sinden, 2001). It is further proposed that post-discharge home visits or telephone exercise counseling which incorporate Bandura's self-efficacy enhancing strategies may positively influence exercise adherence, resulting in better mobility of the older adult (Figure 2).

Figure 2: *Conceptual Model of Intervention: Self-Efficacy of Exercise – Exercise Adherence – Mobility Model in Older Adults*



Purpose and Objectives

The overall purpose of this pilot study was to examine the effect of two types of interventions on self-efficacy for exercise, exercise adherence and mobility of community-dwelling older adults following discharge from Geriatric Day Hospital. The specific objectives of this study were to:

1. Determine if demographics and cognition impact on self-efficacy of exercise, adherence to exercise and mobility;
2. Determine if interventions of self-efficacy of exercise (via home visits, or telephone counseling) influence self-efficacy of exercise, adherence to exercise and mobility;
3. Examine the relationship between self-efficacy of exercise and adherence to exercise;
4. Examine the relationship between adherence to exercise and balance and walking in older adults;

5. Identify self-reported outcomes of exercise expected by older adults; and
6. Identify self-reported perceived barriers to exercise in the home-based setting.

Hypotheses

The pilot study was designed to test six hypotheses:

1. There is no difference in the demographics of three study groups: a home visit intervention (HVI), telephone intervention (TI) and control (C);
2. There is no difference in self-efficacy of exercise, mobility, and cognition of the study groups;
3. There is a post-intervention difference among groups (HVI, TI, and C) in self-efficacy of exercise, exercise adherence and mobility;
4. There is a relationship between self-efficacy of exercise and exercise adherence;
5. There is a relationship between exercise adherence and mobility measures; and
6. There is no change in participants' cognition during the study.

Limitations

This study was limited to older adults discharged from a Geriatric Day Hospital with a prescribed home-exercise program. The sample size was small (N=30), therefore, the study's statistical power was low.

Delimitations

This study was not designed to evaluate the effectiveness of physiotherapy-prescribed programs but rather the adherence to the prescribed home exercise program without physiotherapist intervention.

Assumptions

The participants in the study were all given exercise programs prescribed by physiotherapists prior to their discharge from the GDH. It was assumed that these exercise programs were designed to improve or maintain the older adult's walking and balance mobility. It also was assumed that these programs were effective in addressing the individual's walking and balance mobility problems and that individuals put comparable effort into performing their exercise.

CHAPTER THREE

Methods

Study Design

This study used a mixed methods design (qualitative and quantitative) involving one control group and two intervention groups (Portney & Watkins, 2000). A mixed methods approach was used in order to identify participants' personal accounts of their exercise behavior as well as to quantify the behavior itself. The specific quantitative design was a pretest-posttest control group design. The qualitative portion of the study involved an post-intervention interview to examine participants' beliefs and expectations related to exercise outcomes and barriers to exercise that they may have encountered. The Grounded Theory approach (Polit & Beck, 2004) was chosen as the interviews were based on older adult's real experience with exercise.

Table 5: *Summary of Research Design Outline*

GROUP	PHASE 1 (1 week post-GDH discharge) Pretesting	PHASE 2 (4 & 7 weeks post-GDH discharge)	PHASE 3 (10 weeks post-GDH discharge) Post-testing
INTERVENTION – HOME VISIT	TUG, BBS, MMSE, SEE[a]	Home Visit Intervention	TUG, BBS, MMSE, SEE, Exercise Adherence Rates, Qualitative Interview
INTERVENTION – TELEPHONE CALL	TUG, BBS, MMSE, SEE	Telephone call	TUG, BBS, MMSE, SEE, Exercise Adherence Rates, Qualitative Interview
CONTROL	TUG, BBS, MMSE, SEE	No Intervention	TUG, BBS, MMSE, SEE, Exercise Adherence Rates, Qualitative Interview

[a]TUG – Timed up and Go; BBS – Berg Balance Scale; MMSE – Mini-mental Status Examination; and SEE – Self-Efficacy for Exercise Scale.

Participants

Participants were recruited from four Geriatric Day Hospitals (GDH) programs in Winnipeg: Riverview Health Centre, Seven Oaks General Hospital, St. Boniface General Hospital and Deer Lodge Centre.

Inclusion/Exclusion Criteria

Inclusion criteria used to enlist clients who were expected to exercise at home after discharge from GDH were:

1. Age 65 years and older;
2. Prescribed a home exercise program by a physiotherapist for use after discharge;
3. Able to speak, write and read English;
4. Ready for discharge from a day hospital program; and
5. Scoring ≥ 24 on the Mini-Mental State Examination (Folstein, Folstein & McHugh, 1975). Clients who scored less than 24 on the Mini-Mental State Examination were excluded as they were considered to be cognitively impaired.

Recruitment Procedure

All recruitment occurred with the cooperation of the physiotherapists working in the four GDHs. The researcher visited each facility to explain to the physiotherapist the purpose of the study. All physiotherapists agreed to assist in

recruitment by identifying potential participants. The physiotherapists approached potential participants and requested permission for the researcher to meet with them. If the individual gave permission, the physiotherapist contacted the researcher and the researcher arranged to meet the individual at his/her respective day hospital. Details of the recruitment process are set out in Appendix A.

Informed consent

At the initial meeting the researcher explained the study to the potential participant and provided him/her with a copy of the consent form. Where possible, the individual was given one week to review the written description of the study and to make a decision regarding participation. If the individual agreed to participate and signed the consent form, he/she was given a copy of the form as well as an appointment date for the researcher to visit in his/her home for the first phase assessment.

Participant Grouping

This study involved two different interventions - home visits and telephone calls - each employing strategies to enhance an individual's self-efficacy of exercise. The experimental design involved three participant groups: a control group (C), a home visitation intervention group (HVI) and a telephone intervention group (TI). A power calculation showed that 180 participants (60 per group) would be required; however, as this was a pilot project, a sample of 30

was determined to be adequate with 10 participants in each group. Group assignment was done using a preset sequence so that participants were assigned to each of the control group, home visit group and telephone group ensuring equal numbers in each group.

Ethics approval

Ethics approval to carry out this pilot study involved a two-stage process. The study was first approved by the Health Research Ethics Board (HREB), University of Manitoba (Appendix B). Second, each GDH facility had its own research approval process which required application to and approval from these facilities before the study could begin (Appendix C).

Instruments

Quantitative Study

Data were collected on participant demographics, cognitive variables, mobility variables and exercise adherence. The cognitive and mobility performance variables were measured in Phase 1 (pretest) and in Phase 3 (posttest) for all participants. Demographic variables and exercise adherence data were collected from all participants in Phase 3.

Demographic Variables:

Information on age, gender, income and level of education was collected as it is known that these characteristics influence exercise behavior in older adults (Boyette et al., 2002; Statistics Canada, 2003). Because of the personal nature of this information, requiring the researcher to request a participant's age, years of formal education and annual income, it was gathered in the final phase of the study after trust had been established. Ranges rather than absolute numbers were used to facilitate answering these personally sensitive questions (Appendix D).

Cognitive Variables:

Two aspects of thought processes of the older adult were identified as important in exercise behavior in this study: mental status and confidence in ability to exercise. These cognitive variables were measured using the Mini-Mental Status Examination (Folstein, Folstein, & McHugh, 1975) and the Self-Efficacy for Exercise Scale (Resnick & Jenkins, 2000), respectively.

Mini-mental Status Examination:

A participant's ability to follow prescribed exercise instructions is an essential element to successfully exercising at home. Although all GDH clients were screened for cognitive deficits prior to study recruitment, it was possible that a participant's cognitive function might decline during the course of the pilot study

as a result of chronic and/or acute disease processes, therefore confounding adherence to exercise results.

The instrument chosen to measure mental status was the Mini-Mental Status Examination (MMSE) (Folstein, Folstein, & McHugh, 1975). The MMSE was designed to be a simple screening tool of cognitive status for use with older adults who are able to cooperate for only short periods of time (Folstein, 1983). This tool screens a person's orientation to time and place, recall ability, short-term memory, and arithmetic ability (McDowell & Newell, 1996). The MMSE consists of 11 items which are rated using a standardized procedure with a perfect score being 30 (Appendix E).

This tool has undergone testing for reliability and validity. In terms of reliability, the Cronbach's alpha for the MMSE was reported as 0.68 (Kay, Henderson & Scott, 1985). Test-retest reliability has been reported to be no less than 0.89 and inter-rater reliability no less than 0.82 (Folstein, 1983). Concurrent validity testing has been documented using two other mental status instruments: Reisberg's Global Deterioration scale and the WAIS Verbal IQ scale. The correlation with the Reisberg's Global Deterioration scale is reported as -0.92 and 0.78 with the WAIS Verbal IQ scale (McDowell & Newell, 1996).

Self-Efficacy for Exercise

It has been established that an older adult's self-confidence or self-efficacy of exercise has a positive relationship with exercise behavior (Keller et al., 1999). The Self-efficacy for Exercise Scale (SEE) developed by Resnick and

Jenkins, (2000) was chosen as a suitable tool to measure participant's self-confidence in exercise. Resnick and Jenkins (2000) stated that the SEE is a revision of an unpublished measure of self-efficacy barriers to exercise created by McAuley (1990). McAuley's instrument focused on an individual's perceived "self-efficacy expectations" of his/her ability to continue to exercise despite barriers to this behavior. Resnick and Jenkins modified this instrument to better suit an older adult. The SEE consists of nine questions which the participant rates using an eleven-point, Likert-type scale from 0 (not confident at all) to 10 (most confident) (Appendix F). The numerical ratings for each response are summed and the sum is divided by the number of responses to give the score for the test. The scale is administered in an interview format. Although this method can introduce some social response bias (Resnick, 1995), the interview format allows the researcher to explain the context of the questions to the participants.

This tool has undergone reliability testing in older adults. Internal consistency of the SEE scale was evaluated by Nunnally and Bernstein (1994) and by Resnick and Jenkins (2000). They reported alpha coefficients of 0.70 and 0.92, respectively. No published validity testing with the SEE was found.

Mobility Variables

Walking and balance are two of the main mobility issues addressed by physiotherapist-prescribed exercise programs for older adults at the GDH (Malone, Hill & Smith, 2002). Two specific measures of mobility were used: the

Timed "Up and Go" test (TUG) (Podsiadlo & Richardson, 1991) and the Berg Balance Scale (BBS) (Berg, Wood-Dauphinee, Williams, & Maki, 1992).

The Timed "Up and Go" Test (TUG)

The Timed "Up and Go" Test was developed as a modification of the "Get-up and Go" Test, developed by Mathias, Nayak and Isaacs (1986). The TUG measures basic functional mobility and has been used by physiotherapists working with older adults living in the community who attend a GDH (Malone, Hill, & Smith, 2002). This instrument provides an objective measure of basic functional mobility for older adults and insight into the person's ability to get on and off a toilet and walk a few feet (Isaacs, 1985; Rodosky, Andriacchi & Anderson, 1989). The TUG also provides information about balance (Schenkman et al., 1990), upper and lower extremity strength (Hughes, Myers & Schenkman, 1996) and muscle power (Bassey et al., 1992).

The test requires the participant to rise from a chair, walk 3 meters, turn and return to sit back down in the chair. The task is repeated three times, and the shortest time taken to complete the task is recorded as the test score (Appendix G). The test is quick to administer and results are relatively simple to explain to the participant. Participants also may see the immediate application of the results of this test to their own mobility status.

The TUG instrument has undergone extensive testing for validity and reliability. Shumway-Cook, Brauer and Woollacott (2000) found that the TUG correctly identified older adults living in the community who had walking and

rising-to-walking problems and were at risk for falls with a calculated sensitivity of 87%. In addition, the TUG could differentiate those older adults who did not have walking and rising to walking problems, with a calculated specificity of 87%. Convergent validity testing with the Berg Balance Scale (BBS) revealed a -0.81 relationship indicating a strong, reverse proportional relationship between the BBS and TUG (Finch, Brooks, Stafford & Mayo, 2002). This relationship suggests that as BBS scores increase (indicating better balance) the TUG scores decrease (indicating faster walking and inferring better balance). The TUG inter-rater reliability measured through intra-class correlation coefficient (ICC) is reported as 0.98 (Shumway-Cook, Brauer & Woollacott, 2000).

The Berg Balance Scale

The Berg Balance Scale (BBS) measures an older adult's ability to "maintain an upright posture under a variety of conditions" (Berg, Wood-Dauphinee & Williams, 1995, p.27) such as dynamic and static balance adjustments during voluntary movement. The test is intended for use by rehabilitation professionals to quantify balance in older adults, monitor progress, evaluate effectiveness of treatment and serve as a valid measurement tool in research (Berg et al., 1995).

The test consists of 14 Guttman Scale items, rated from 0 (unable to do) to 4 (completely independent and safe) (Appendix H). Scores of the 14 items are summed to give a final test score. This BBS takes 10-20 minutes to administer. The results of the test can be interpreted for the participant and can be used when discussing his/her own balance concerns.

This tool has undergone testing for reliability and validity. Cronbach's alpha, based on scores of clients with varying diagnoses was reported as 0.96 (Berg, Wood-Dauphinee, Williams, & Gayton, 1989) indicating a high level of internal consistency. Inter-rater reliability was found to be high (ICC = .98) as was test-retest reliability (ICC = 0.92 (Berg et al., 1995).

Berg, Wood-Dauphinee, Williams, and Maki (1992) reported that convergent validity testing showed a high degree of correlation with the Tinetti Balance Subscale (0.91) and a lesser degree of correlation with the TUG (-0.76) and the Barthel Mobility Subscale (0.67).

Adherence to Exercise Rate

Exercise behavior was a key element in this study and adherence to exercise was the behavior which was most pertinent. An exercise diary/journal instrument (Weinberg & Szturm, 2005, unpublished) was adapted in order to measure adherence to exercise rates. Exercise adherence measurement involved each participant keeping a daily journal to record how many sessions per week he/she exercised (Appendix I). This self-reported number was then expressed as a proportion of the number of exercise sessions prescribed by the GDH staff per week (Oman & King, 2000). At the final phase of the study, the journals were collected and each week's scores were tallied and then averaged over the ten-week study period to determine an overall exercise adherence rate for the particular participant.

Qualitative Study

The purposes of the semi-structured interviews conducted in this study were twofold: first, to positively influence participant exercise behavior; and second, to gain new information about exercise behavior post-discharge from a GDH. The first interview enabled the researcher to understand each participant's background and perceptions of exercise, and the second interview allowed participants the opportunity to reflect their expectations and barriers to exercise. These interviews allowed the participants to share their real life exercise experience after being discharged from Geriatric Day Hospital. The Grounded Theory approach facilitated identification of participant reflections during interviews and provided a methodology for processing and analysis of this information. Refer to Appendix J for scripts of the interviews.

Procedures

Quantitative Study

There were 3 phases to the study (Appendix A). In Phase 1, all participants received an initial assessment in their home within one week of discharge from the GDH. The initial assessment included administration of the Timed Up and Go Test (TUG), Berg Balance Scale (BBS), Mini-Mental State Examination (MMSE), and the Self-efficacy for Exercise Scale (SEE). All participants were instructed on how to complete an exercise journal.

Phase 2 of the study consisted of intervention strategies and a semi-structured interview with the home visit intervention (HVI) group and the telephone (TI) groups.

The intervention strategies involved the researcher following a standardized intervention/interview script (Appendix J). This script integrated content of the intervention and interview.

Specific Intervention Strategies to Enhance Self-efficacy to Exercise

1. Providing feedback to participants regarding exercise technique and assisting with problem-solving regarding exercise issues (past performance accomplishment)
2. Modeling exercise program (vicarious experience)
3. Discussing the participant's physical cues when exercising (emotional or physiological arousal) and
4. Providing general encouragement (verbal persuasion).

The intervention was designed to enhance participant self-efficacy of exercise. All HVI participants received home visits while the TI participants received telephone calls from the researcher at 4 and 7 weeks after discharge from the day hospital (i.e., 3 and 6 weeks after their initial assessment). Interventions were repeated at three week intervals in order to maximize the increase in treatment effect. This allowed the participant's time between the first and second

intervention to integrate previously discussed strategies designed to support and/or improve exercise adherence without allowing too much time to elapse to forget the discussion. All interventions were audio-recorded.

The intervention and semi-structured interviews were carried out simultaneously using the intervention/interview standardized script (Appendix J). Interviews were repeated at three week intervals with the intention to assess consistency of participant response. The control group received no intervention during this time.

In Phase 3, 10 weeks after discharge from the GDH (i.e., nine weeks after the participant's initial assessment) the post-test assessment was carried out. All three groups (HVI, T, and C) were retested with the TUG, BBS, MMSE and SEE. All participants were asked to submit their exercise journal. An audio-recorded, semi-structured interview was carried out that focused on the expected outcomes of exercise and barriers to exercise.

Qualitative Study

The first interview was carried out in conjunction with the interventions received by both the HVI and TI groups in Phase 2 (at week 4 and 7 post-discharge). The second interview was carried out during Phase 3 (10 weeks post-discharge) involving all three groups. Both Phase 2 and 3 interviews were designed to capture the unique perspectives of the older adults about their exercise behavior.

Phase 2 Interviews

The first semi-structured interview aimed to obtain insights into participants' perceptions about their exercise behavior and expected outcomes of their exercise program. The semi-structured interviews were performed face-to-face with the home visit intervention participants and during the telephone conversations with the telephone intervention participants. A standardized script guided these interviews (Appendix J). The interviews were repeated twice at 4 weeks and 7 week post-GDH discharge intervals as noted previously in Table 5. Repeating the interview allowed review of participant response consistency. All home visit and telephone interviews were audio-recorded.

Phase 3 Interview

The goal of the interview performed with all participants (HVI, TI, and C) in the final phase of the study was to obtain greater information into the positive and negative influences on the older adult exercising in his/her home. This was an audio-recorded, face-to-face interview and consisted of four open-ended questions regarding the outcome expectations of exercise and the barriers/facilitators to exercise (Appendix K).

Data Management

Quantitative Data

Forms were used to capture data during assessment interviews. Each participant was assigned a unique research number. All pretest and posttest quantitative data scores were entered into into an Excel spreadsheet for later manipulation. The scores were organized in pretest data and posttest data columns for each participant. The spreadsheet data were checked three times against the assessment forms in order to confirm accuracy of the data. All assessment forms were filed in a locked cupboard in a locked office.

Qualitative Data

The audio-taped interviews were transcribed verbatim into word processed, participant-specific scripts. Participant scripts were then reviewed and major themes identified. Major themes and supporting information were entered into an Excel spreadsheet. Field notes capturing salient participant observations and procedural problems incurred during evaluations and interventions were documented and later transferred to a word-processed journal.

Data Analysis

Quantitative Analysis

During the planning stages of the study, it was determined that a sample size of 180 participants (60 per group) would be required to achieve a statistical power of .80. However, due to limited resources and difficulties in recruitment, a

compromise in statistical power was made and a target of 30 participants (10 per group) was established for this pilot project. Due to recruitment difficulties, the study fell short of its target of 30 and 19 people were recruited in total. Despite the reduced number of participants inferential statistical procedures were carried out using SigmaStat 3.1, a statistical software package, to test the research hypotheses. The p value was pre-determined at $\leq .05$. The statistical analysis of quantitative data was planned to include the procedures shown in Table 6.

Table 6: *Data Analysis: Statistical Procedures*

RESEARCH HYPOTHESIS	PROPOSED STATISTICAL PROCEDURE (alpha $p \leq 0.05$)	DATA USED
There is no difference in the study groups.	Chi Squared tests (Hassard, 1991).	Gender, education, income, range data for each group
	ANOVA	Age
There is no difference in the study groups regarding pretest mobility, self-efficacy of exercise and cognition	Kruskal-Wallis (Hassard, 1991).	Pretest BBS, SEE, MMSE scores for each group
	ANOVA	Pretest TUG Times for each group
There is a difference between groups as a result of the intervention	Kruskal-Wallis	SEE pretest/posttest score differences Adherence rates BBS pretest/posttest score differences
	ANOVA	TUG pretest/posttest score differences
There is a relationship between SEE and Exercise Adherence Rates	Spearman's Rank Correlation Coefficient (Hassard, 1991).	SEE pretest/posttest score differences, adherence to exercise rates for all participants
There is a relationship between exercise adherence and mobility measures	Spearman's Rank Correlation Coefficient (Hassard, 1991).	Adherence to exercise rates, BBS pretest/posttest score differences for all participants
	Pearson product-moment Correlation Coefficient	Adherence to exercise rates, TUG pretest/posttest score differences for all participants
There is no change in participants' cognition during the study.	Wilcoxon Signed Rank test	Pretest/posttest MMSE scores for all participants

Qualitative Analysis

The qualitative data included a number of sources of information which included the semi-structured interview during participant telephone and home

visit interventions, the interview conducted during the final phase of the study in which included formal discussions guided by the semi-structured interview questions, and researcher observations made during any participant contact. These three sources provided rich information, despite the small sample size.

The qualitative data analysis followed the Grounded Theory Model approach (Polit & Beck, 2004). A participant's response to a question was compared to that of another participant. The analysis of the semi-structured interviews involved reviewing and organizing the participant scripts. Initially, frequency analysis assisted in identifying broad themes or Level 1 codes (Polit & Beck). Level 1 codes were applied to all responses of the same question (Portney & Watkins, 2000; Polit & Beck). Subsequently, the responses were compared to make a fit for a certain theme arising from the responses. Further coding and theme extraction was developed for final interpretations (Creswell, 2003).

In addition to the semi-structured interviews, field notes were kept to document participant statements and observations throughout the course of the study. This information was used to triangulate qualitative information obtained from the semi-structured interviews.

Ethics Considerations

Informed consent and confidentiality are the underpinnings of ethical practice according to the Personal Health Information Act (Government of

Manitoba, 1997). Table 7 summarizes the procedures created and followed to respect both consent and confidentiality. In the unlikely event of an untoward incident occurring during the time spent with the participant, permission was sought to document the participant's physician's name, resuscitation status (Living Will) and the name and phone number of the participant's next of kin. The data were maintained in a secure area for the duration of the study and then destroyed.

Table 7: *Consent and Confidentiality Procedures*

WRITTEN CONSENT	CONFIDENTIALITY PROCEDURES
Approaching GDH clients to discuss the study	No identifying participant information was placed on assessment forms or audio-tapes.
Achieving client consent to participate in the study	All assessment forms and audio-tapes had a unique research study number which corresponded with the participant's name.
Audio-taping participant telephone conversations	Assessment forms/audio-tapes and identifying information were filed in separate locking cabinets.
Audio-taping semi-structured participant interviews	Primary documentation, (e.g., consent forms, demographic information and measurement/question data) and audio-tapes were maintained in secure files in the research office P 469, Riverview Health Centre.

CHAPTER FOUR

Findings and Discussion

Introduction

This chapter presents a parallel presentation of results and discussion to facilitate linkages between quantitative and qualitative data. The quantitative results and qualitative themes are compared and contrasted to existing research.

Supporting information for both the qualitative and quantitative data was referenced in a specific manner. While the name of the participant is withheld, the responses during the pretests and posttests, interviews and interventions are indicated as follows:

1. The particular participant is indicated by P and the randomly assigned participant number, for example P1 and P2; and
2. The session information is indicated by a number or letter: 1 for first intervention in Phase 2, 2 for second intervention in Phase 2, and F for final assessment.

For example: P2.F indicates information obtained during the second participant's final assessment session and P4.1 indicates a response from the fourth participant during the first intervention of phase 2.

Recruiting and retaining participants presented a challenge for a number of reasons:

1. There was a reduced number of day hospital clients being discharged during staff summer vacations;
2. One of the GDH programs did not have clients that met inclusion criteria for the pilot study;

3. There was an abbreviated recruitment process at one GDH due to understaffing. This resulted in a number of clients declining to participate in the study;
4. One day hospital program shut down for a short period due to a health care worker strike.
5. One participant (P15) was injured and unable to comply with mobility testing;
6. Three participants (P3, P16 and P19) declined to answer questions about annual income; and
7. One participant (P5) completed her exercise journal incorrectly and one participant's (P7) journal was lost.

Although there was a delay in retrieving post-test data for two participants (P3 and P7 were hospitalized during the study period) their data were included. Given these problems, once 18 participants were recruited it was agreed that recruitment would stop. Consequently, the smaller-than-projected number of participants affected the power of the statistical analysis. Data were collected over a nine month period

Quantitative Data

Hypothesis 1:

There is no difference in the demographics of the study groups.

It can be seen that the majority of participants (89%) were aged of 75 or over, with 7 of 18 participants being over 85 years of age. The average age of participants in this study was 78.4 years with an age range of 65-88. Using the individual ages calculated from the date of birth data, an analysis of variance test indicated that there was no significant difference in ages between group participants ($p = .332$).

A baseline analysis of the sample gender, education and income through Chi Squared tests was not possible due to the small participant numbers in each group however some observations about this data has been made. The demographic data are summarized in Table 8.

There was a 2 to 1 ratio of females to males in the study. Randomization resulted in both the home visit intervention (HVI) and telephone intervention (TI) groups being predominantly female, while the control (C) group had equal numbers of males and females.

Most participants (89%) had at least grade 9 education. The C and HVI groups appeared to have higher numbers of participants with grades 9-12 years of education than the TI group. More than one third of all participants had education higher than high school.

Although information about annual personal income was requested from all participants, 2 participants refused to answer this question and one participant was unaware of her annual income. The HVI and TI groups had higher annual incomes than the control group, with the HVI group having more than twice the annual income than the control group. Seven participants lived with a spouse; 6 of these individuals reported their combined annual family income.

Table 8: *Demographic Data of Participants*

	CONTROL n = 6 (% of n)*	HOME VISIT n = 7 (% of n)*	TELEPHONE n = 5 (% of n)*	TOTAL N=18 (% of Total)*
AGE				
65-74 years	2 (33)	0 (0)	0 (0)	2 (11)
75-84 years	2 (33)	4 (58)	3 (60)	9 (50)
85+ years	2 (33)	3 (42)	2 (40)	7 (39)
GENDER				
Female	3 (50)	5 (71)	4 (80)	12 (66)
Male	3 (50)	2 (29)	1 (20)	6 (34)
EDUCATION				
0-4 years	0 (0)	0 (0)	0 (0)	0 (0)
5-8 years	1 (17)	0 (0)	1 (20)	2 (11)
9-12 years	5 (83)	3 (43)	1 (20)	9 (50)
13 + years	0 (0)	4 (57)	3 (60)	7 (39)
ANNUAL INCOME ($)				
5,000-9,999	1 (17)	0 (0)	0 (0)	1 (5)
10,000-14,999	2 (33)	0 (0)	2 (40)	4 (22)
15,000-19,999	0 (0)	0 (0)	0 (0)	0 (0)
20,000-24,999	1 (17)	2 (29)	1 (20)	4 (22)
25,000-29,999	0 (0)	0 (0)	0 (0)	0 (0)
30,000-34,999	0 (0)	1 (14)	1 (20)	2 (11)
35,000-39,999	0 (0)	2 (29)	0 (0)	2 (11)
> 40,000	0 (0)	1 (14)	1 (20)	2 (11)
Unknown	2 (33)	1 (14)	0 (0)	3 (16)

* Does not always=100% due to rounding.

Discussion of Results:

The study demographics could not be compared to Geriatric Day Hospital client demographics as the comparator data were not available. Income and education demographic information for city, province or country were also not available and therefore comparisons to the study groups could not be made. The ages of the participants were comparable to those of participants in Malone, Hill, and Smith (2002) study in which the average age was 81 years, with an age range 61-94 years. In comparison to Manitoban population statistics for 2001

(Statistics Canada, 2004) the pilot study participants were older than the distribution of older adults in Manitoba (Table 9). The participant gender was comparable to the older adult gender distribution in Manitoba. In comparison to Manitoba population statistics which reveal a female to male ratio of 1.2 to 1 (Statistics Canada, 2004), the study's female to male ratio was 2 to 1.

Table 9: *Manitoba and Pilot Study Age Distribution*

AGE (Years)	MANITOBA POPULATION (%)	PILOT STUDY (%)
65-74	77,371 (48%)	2 (11%)
75-84	58,402 (37%)	9 (50%)
85 and over	22,368 (14%)	7 (39%)
Total	158,141	18

It is not surprising that the study participants were overly represented in the oldest segment of the population. As age increases, the risk of encountering mobility disabilities is greater (Statistics Canada, 2004.

Hypothesis 2

There is no difference in baseline self-efficacy of exercise, mobility, and cognition of the study groups (Table 10).

Table 10: *Statistical Analysis (means and standard deviations) of Pretest SEE, TUG, BBS, and MMSE*

	HVI (n=7)	TI (n=5)	C (n=6)	STATISTICAL TEST	p VALUE
TUG	15.8±5.5 (n=6)[a]	12.6±2.3	21.2±14.2	ANOVA	0.318
BBS	45.5 (n=6)[a]	46.0	38.5	Kruskal-Wallis	0.176
SEE	7.0	6.6	7.5	Kruskal-Wallis	0.757
MMSE	29.00	29.00	29.50	Kruskal-Wallis	0.955

[a] P15had been recently injured and could not undergo mobility testing.

The findings suggest that there were no differences between the four variables (TUG, BBS, SEE, and MMSE) in the study groups prior to the start of the intervention and therefore the hypothesis was accepted.

Discussion of Results:

Group differences prior to the intervention were not considered an influence on the outcome of intervention.

Hypothesis 3:

There is a post-intervention difference among groups (HVI, TI, and C) in self-efficacy of exercise, exercise adherence and mobility.

Self-efficacy for Exercise Data

Analysis of the SEE data was problematic - not all questions were answered by participants. The SEE instrument asked participants to rate their confidence to exercise in nine different potential barriers to exercise. The preamble to each question read: "How confident are you right now that you could exercise three times per week, when..." and was followed by the specific barrier. During the administration of the instrument, 72% of all participants responded to all questions. The remaining 28% participants did not respond to questions 1, 2, 3, 6 and 9 as these questions were interpreted as being hypothetical. Participants explained their non-responses to the specific questions in the following manner:

Question 1: "The weather was bothering you?"
Reasons for no response: Three participants had difficulty responding because the weather never bothered them and therefore they declined to give a response.

Question 2: "You were bored by the program or activity"?
Reasons for no response: Two participants did not believe that boredom came into play with following an exercise program and therefore they declined to give a response.

Question 3: "You felt pain when exercising?"
Reasons for no response: All participants stated that they had been instructed not to exercise if they felt pain. Many participants wavered on their response, but two participants declined to give a response as they felt the situation just did not apply to them.

Question 6: "You were too busy with other activities?"
Reasons for no response: When discussing the barriers to exercise and problem solving during interventions P18 admitted that she had more priority tasks in her life to complete. During her initial interview, she declined to give a response to this question. At the end of the study she

responded that she had no confidence at all that she would exercise if she was too busy.

Question 9: "You felt depressed?"
Reasons for no response: Three participants declined to answer this question: One participant could not decide how depression would affect her; one participant stated that she never felt depressed therefore she felt the question did not apply to her; and one participant reported that her chronic depression was well controlled and felt that depression was not an issue that affected her exercise behavior.

All participants answered the four remaining questions (4, 5, 7 and 8) and the average scores are found in Table 11.

Table 11: *SEE Questions Fully Responded To*

ITEM	QUESTIONS	INITIAL MEAN SCORE	FINAL MEAN SCORE
4	You had to exercise alone?	6.6	6.6
5	You did not enjoy it?	6.6	6.4
7	You felt tired?	6.6	4.6
8	You felt stressed?	6.8	6.2

.A preliminary review of SEE mean scores over time shows that the control group had twice the drop in SEE mean scores than the HVI group (Table 12). The TI group participants increased their SEE mean scores over the course of the pilot study. Note an increase in SEE scores indicates a greater confidence to exercise.

Table 12: *SEE Prettest and Posttest Mean Scores*

	HOME VISIT [a] n = 7	TELEPHONE[b] n = 5	CONTROL[c] n = 5
PRETEST SCORE	6.97	6.27	6.68
POSTTEST SCORE	6.6	6.48	5.85
SCORE DIFFERENCE	-.37	+.21	-.83

[a] P3 and P15 (HVI) SEE scores were included despite their illness.
[b] P9 (TI) SEE score was included despite illness
[c] P7 (C) excluded from analysis as she had no post-test SEE score due to hospitalization.

A Kruskal Wallis test was carried out comparing each group's SEE pre-test and posttest score differences. This analysis used normalized data, i.e., an individual total SEE score was determined by summing responses of the items answered and then divided by the number of responses. The calculated p =.806 indicated that there was no significant difference in groups' SEE pretest/posttest score differences and the hypothesis was rejected.

Adherence to Exercise Rates Data

The adherence to exercise rate was relative to the physiotherapy prescription rather than the absolute amount of exercise performed by the participant. For example, two participants (A & B) exercised 3 times a week. Participant A was prescribed to exercise 3 times a week while Participant B was prescribed 7 times a week. Although these two participants perhaps were doing the same absolute amount of exercise per week, Participant B's adherence rate (44%) was lower than that of Participant A (100%). Table 13 shows the mean, standard deviation (SD) and median adherence to exercise rates (AER) calculated for each study group and the total number of participants. The results

show that the control group adhered to exercise at a slightly higher rate than the HVI group and the TI group exercised at the lowest rate. Note, because of the size of the standard deviation, the median is likely a more representative statistic.

Table 13: *Adherence to Exercise Rates*

AER	HOME VISIT [a] n=7	TELEPHONE[a, b] n=4	CONTROL[b] n=5	ALL PARTICIPANTS N=16
MEAN	79.4%	84.7%	101.5%	87.9
SD	65.8%	61.5%	46.7%	57.7
MEDIAN	84.4%	76.7%	85.9%	84.5

[a] P3 and P15 (both in HVI) and P9 (TI) experienced illness during the study period however their adherence rate data was included.
[b] P7 (C) and P5 (TI) had no adherence rate data.

A Kruskal Wallis test was carried out comparing each group's adherence to exercise rates. The calculated P=.816 indicated that there was no significant difference in the groups' adherence rates and the hypothesis was rejected.

Goal attainment scaling (Rockwood et al., 2003) of adherence rates was applied as an alternative method of analysis (Table 14). Participants who exercised less than 80% of their prescribed exercise program (PEP) were assigned a goal attainment number of one (1). Those participants who adhered to their PEP 80-100% were assigned a goal attainment number of two (2). Individuals exercising more than a 100% of their prescribed exercise program were assigned a goal attainment number of three (3).

This analysis revealed that 41% of pilot study participants under-exercised. Of the participants who were exercising sub-optimally, almost half

consisted of the HVI participants. As previously mentioned two of these individuals experienced physical illnesses. Slightly less than 60% of all participants were exercising at or above the prescribed rate. The control, HVI and TI groups exercised at or above the prescribed rate (60, 56 and 50% respectively).

Table 14: *Goal Attainment Scale Results of Adherence to Exercise*

GOAL ATTAINMENT SCORE	HOME VISIT n = 7 (Row%)(Column%)	TELEPHONE n = 4 (Row%)(Column%)	CONTROL n = 5 (Row%)(Column%)	TOTAL N = 16 (Row%)(Column%)
1	3 (43%) (43%)	2 (29%) (50%)	2 (29%) (40%)	7 (100%) (41%)
2	2 (40%) (28%)	1 (20%) (25%)	2 (40%) (40%)	5 (100%) (35%)
3	2 (50%) (28%)	1 (25%) (25%)	1 (25%) (20%)	4 (100%) (24%)

Mobility Data

The Timed Up and Go Data

The pretest/posttest mean score differences of "Timed up and Go" (TUG) were calculated (Table 15). The pretest/posttest means score differences were higher (indicating slower walking) in the control group than in either the HVI and TI groups. The HVI group was the only group in which the pretest/posttest means score differences showed an improvement in walking speed. An ANOVA was carried out on the TUG scores and calculated p =0.657 indicating that there was no significant difference in groups' TUG pretest/posttest score differences and the hypothesis was rejected.

Table 15: *TUG Data*

TUG (seconds)	HOME VISIT[a] n = 6	TELEPHONE n = 5	CONTROL n = 6
PRETEST MEAN	16.6 sec.	12.6 sec.	21.2 sec.
POST TEST MEAN	15.2 sec.	14.0 sec.	22.7 sec.
MEAN DIFFERENCE	- .8	+1.4	+1.5

[a] There is no mobility score for P15.

The Berg Balance Scale Data

A number of participants declined to be tested on 1 of 14 test items because they were uncomfortable with performing the stair-stepping-test item. The scores of these participants were therefore normalized, that is, a percentage was calculated from the total scored items and then converted into a score out of 56. A higher BBS score indicated the participant had better balance. BBS medians and pretest/posttest medians score differences were then calculated (Table 16). The telephone group's BBS pretest/posttest median score differences were lower (indicating a loss of balance) than the HVI and TI. The HVI scores improved while the control group scores remained unchanged A Kruskal-Wallis test was carried out comparing each group's BBS pre-test and posttest median score differences. This analysis used normalized data, i.e., an individual total BBS score was determined by summing responses of the items answered and then divided by the number of responses. The calculated $p = 0.123$ indicated that there was no significant difference in groups' BBS pretest/posttest score differences and the hypothesis was rejected.

Table 16: *BBS Data*

	HOME VISIT[a] n = 6	TELEPHONE n = 5	CONTROL n = 6
PRETEST MEDIAN	45.5	46.0	38.5
POSTTEST MEDIAN	47.0	44.0	38.5
MEDIAN DIFFERENCE	+1.5	-2.0	0

[a] There is no mobility score for P15.

In summary, Hypothesis 3 stated that there is a difference between the two intervention groups (HVI and TI) and the control group in measured self-efficacy of exercise, exercise adherence and mobility post-intervention. However, analyses of SEE, adherence to exercise, TUG and BBS scores did not support a significant difference, consequently, the hypothesis was rejected.

Discussion of Results:

The conceptual model used for the pilot study suggested that improving self-efficacy for exercise would improve adherence to exercise thereby improve mobility. The results did not support the model. However, the findings were paradoxical. Both the HVI and TI groups received interventions to increase self-efficacy of exercise and they each had a greater corresponding increase in SEE scores than the control group; however, the exercise adherence rate of the control group was greater than that of the intervention groups. Despite the control group having a greater adherence to exercise rate than that of the intervention groups, this group had the slowest TUG scores (pretest/posttest

mean differences); the HVI group had the lowest adherence to exercise rate while their mobility scores improved. These results of adherence to exercise and mobility analysis do not correspond to the substantial evidence that regular exercise positively affects older adult mobility (Seguin & Nelson, 2003). Furthermore, mobility scores (TUG and BBS) also were uncharacteristic. Convergent validity showed a strong, inverse relationship (r=-0.81) between the BBS and TUG (Finch, Brooks, Stafford, & Mayo, 2002). A similar relationship was not found in the control group as the TUG worsened while BBS scores improved.

Rejeski et al. (2003) used a model of care similar to that proposed by this pilot study (Table 17). Strategies to enhance confidence to exercise were implemented to improve exercise adherence with the intent to improve physical fitness. This study followed the exercise behavior of 147 older adults (mean age of 65 years) with chronic cardiac problems for 12 months. Participants were randomized into two groups: one group received traditional cardiac rehabilitation (CRP) and the other group received mediated, cognitive-behavioral (GMCB) intervention. The post-test evaluation showed that the GMCB group had a higher level of self-efficacy of exercise as well adherence to exercise and physical fitness than did the CRP group.

Table 17: *Comparison of Interventions for Cardiac Rehabilitation Program (CRP) and Group-Mediated Cognitive Behavior (GMCB) (Rejeski, et al., 2003)*

INTERVENTION TIME	CRB	GMCB
MONTHS 1-3	Technical Advice to Exercise and Educational lectures (36 hours)	Technical Advice to Exercise, Group counseling including strategies to improve self-efficacy of exercise, and Educational sessions (28.5 hours)
MONTHS 4-8	Independent Exercise	As above with telephone follow-up (7.5 hours)
MONTHS 9-12	Independent Exercise	Independent Exercise

The contradictory findings in the pilot study prompted a review of field notes, exercise journals and qualitative data from the final interviews to determine possible confounding factors to exercise behavior. The most obvious problem in interpreting the data was the low statistical power of the study which may have influenced the results. Other confounding factors may have been participant illness, previous exercise behavior, and participant overall physical activity, inaccurate self-appraisal of self-efficacy of exercise, and lack of control of exercise programs.

There was strong evidence that participant illness was a major factor negatively affecting exercise behavior in the intervention groups. Two-HVI and one-TI participant reported in their exercise journals that poor health interfered with their exercise behavior. Poor health was not included as an item in the SEE instrument and therefore this barrier was not reflected in SEE results. Shin, Yun,

Pender and Jang (2005) suggested that perceived health status had a moderate relationship ($r=0.69$, $p \geq .01$) with "exercise self-efficacy" in individuals with chronic health conditions. As the pilot sample size was small poor health may have skewed the exercise adherence rates in favour of the control group.

As well as illness, self-efficacy of exercise and adherence to exercise rates may have been influenced by other factors which confounded the results. Previous exercise behavior is considered a powerful determinant in exercise behavior. Shin, Yun, Pender and Jang (2005) found a strong relationship ($r=0.83$, $p \geq .01$) between previous experience with exercise and "exercise self-efficacy". Measurement for previous exercise behavior was not examined in this study and consequently was not factored into the analysis. Furthermore, Brawley, Martin and Gyurcsik (1998) have suggested that novice exercisers, due to their lack of experience, tend to over or under-estimate their confidence in dealing with barriers in order to exercise. Given that the SEE tool used in the study measured "barrier-efficacy", and that many participants were considered novice exercisers, SEE scores may not have been an accurate reflection of the participants' true self-efficacy of exercise.

The effectiveness of the exercise program prescribed by the GDH may also have impacted on the mobility scores. There was no control for the type of exercise, number repetitions and sets and intensity of participant exercise which exist in "real world" conditions. Day Hospital programs varied from a prescription of regular walking to a prescription which involved 15 exercises including strength, flexibility and endurance exercises. Because of low numbers of

participants no analysis was done to determine differences in adherence or mobility between participants who had complex exercise programs and those participants who had relatively simple exercise programs.

Another possible confounding variable considered was the participant's overall physical activity level which may also influence adherence rates and mobility scores. For example, if an older adult is more physically active he/she is likely to experience better quality of life and function (DiPietro, 2001). There was no control for participants' overall physical activity in this study and it is possible that adherence to exercise rates may have dropped with a corresponding increase in physical activity (i.e., leisure or household pursuits).

Although the overall results related to hypothesis 3 were ambiguous, adherence to exercise rates were comparable to those in other studies. For example, Martin and Sinden (2001) reviewed RCT's involving exercise behavior of older adults. In their review, the found that on average older adults performed roughly 80% of their prescribed exercise program. This pilot study defined its exercise adherence rate gold standard (Goal Attainment Rating 2) as 80-100%. Almost 60% of study participants were exercising at or above the prescribed rate. Participant exercise adherence rates were unknown at the onset of the study therefore it cannot be assumed that the mean adherence rates calculated were better or worse than at the time of GDH discharge. Martin and Sinden's review of older adult adherence rates in RCT's revealed a similar adherence rate of exercise when drop outs were included (63.3%). King, Oman, Brassington, Bliwise, and Haskell (1997) reported a higher adherence rate to exercise (93.6%)

during a 4 month RCT using telephone and face to face interviews, involving healthy, sedentary adults.

Although the previously stated analysis did not show strong evidence of a difference between the control, HVI and TI groups in SEE, adherence and mobility scores, another method of testing hypothesis 3 was sought. A comparison of this pilot study and that of Malone, Hill and Smith (2002) shows a difference between post-test mobility measures (Table 18). Malone, Hill and Smith (2002) also studied older adult mobility after discharge from GDH, although no intervention after discharge was described in the methodology.

As previously noted, there were similarities between the Malone, Hill and Smith (2002) and this pilot study regarding the gender. It was assumed that Malone et al.'s sample also reflected individuals with similar chronic conditions. It can be seen that at the time of GDH discharge, the BBS scores of the two studies were similar, while the TUG scores in the current study were slightly better. At the time of reassessment: (12 weeks - Malone, Hill & Smith, 2002); and (10 weeks - this study) there was little change between pretest and posttest mobility scores in this study whereas those in the study by Malone et al mobility scores worsened.

Table 18: *Mobility Measure Comparisons*

STUDIES	PRE-TEST BBS MEAN* SCORE	POSTTEST BBS MEAN* SCORE	BBS CHANGE IN SCORE	PRETEST TUG MEAN SCORE	POSTTEST MEAN TUG SCORE	TUG CHANGE IN SCORE
Malone et al (2002)	46.3	40.7	-5.6	17.2	22.8	(+5.6)
Study Intervention Groups	45.8	46.2	+0.4	14.4	14.5	(+.1)
All Study Groups	43.6	44.6	+1.0	16.8	17.4	(+.6)

*Malone et al used means with BBS analysis, therefore study BBS means were used for a comparison.

In summary, the testing of Hypothesis #3 was problematic as the results were likely confounded by the small sample size and SEE instrument challenges. The comparison mobility pretest and posttest score differences between this study and that of Malone, Hill and Smith (2002) suggests that further testing of the intervention be explored using a larger sample.

Hypothesis 4:

There is a relationship between self-efficacy of exercise and exercise adherence.

The relationship between self-efficacy of exercise and adherence to exercise was explored despite the problems with the SEE and exercise adherence rate data. Preliminary analysis involved calculating the SEE post-test means and adherence to exercise rate means, standard deviations (SD) and medians and then grouping these scores into goal attainment categories 1, 2 and 3 (Table 19). This first step showed a trend in which SEE post-test mean scores

increased with a greater adherence to exercise. It can be seen that those participants who exercised beyond what was expected of them had a higher reported confidence to exercise.

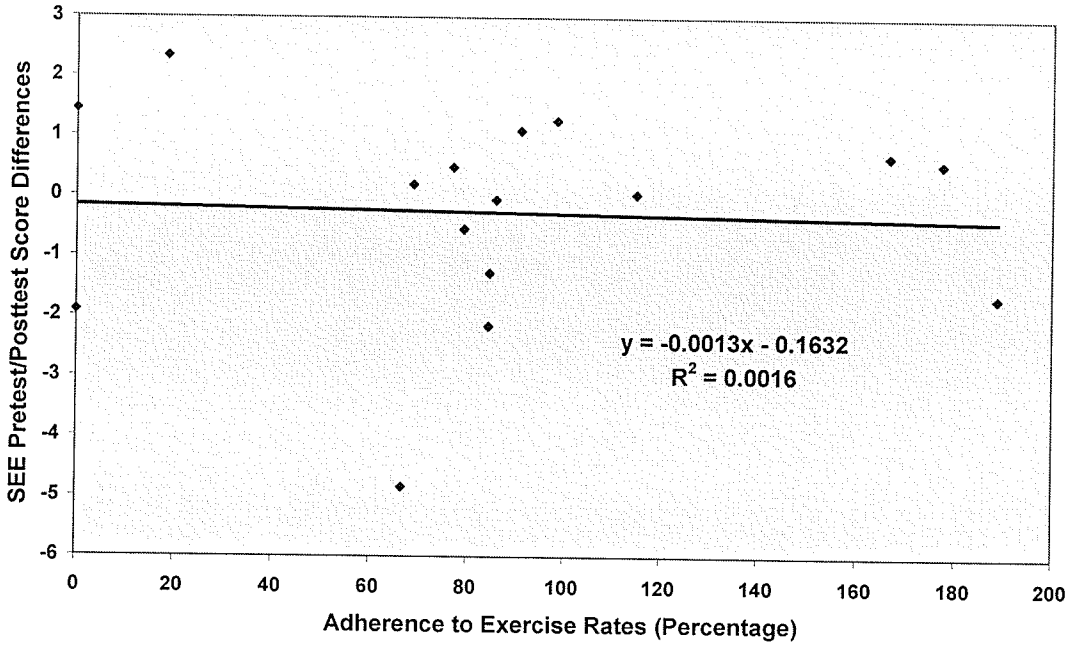
Table 19: *SEE Post-Test Scores and Adherence to Exercise Rates (AER)*[a]

GOAL ATTAINMENT SCORE RATING	1 (n = 7)		2 (n=5)		3 (n=4)	
	SEE	AER	SEE	AER	SEE	AER
Mean	4.96	51.71	6.03	88.82	8.80	161.97
Standard deviation	1.61	22.40	1.92	5.98	.40	18.52
Median	4.60	67.73	5.40	85.86	8.72	172.01

[a]P7 (C) and P5 (TI) had no adherence rate data therefore N = 16.

A more in depth review of this relationship using a correlative analysis of SEE pretest/posttest score differences and adherence to exercise rates found no relationship (r=.0383, p = .882). A scatter plot diagram shows this relationship in Figure 3.

Figure 3: See Pretest/Posttest Score Differences and Adherence to Exercise Rates



Discussion of Results:

The findings were not in keeping with previous research of self-efficacy of exercise in which a low to moderate relationship with exercise behavior was found in older adults (Duncan, McAuley, Stoolmiller & Duncan, 1993; DuCharme & Brawley, 1995; Dzewaltowski, 1989; Kavanagh, Gooley & Wilson, 1993; McAuley, 1993; and Rodgers & Brawley, 1993). A review of field notes, exercise journals and the semi-structured interviews revealed paradoxical results of SEE scores. There was a disparity between SEE scores and exercise behavior in two participants (P16 and P15). P16 had severe Type II diabetes and reported that his mobility was rapidly deteriorating in the last few years. His pretest and posttest SEE scores were the lowest of all participants, yet his exercise

adherence rate was 98%. The participant stated that he was highly motivated to maintain his ability to walk through regular exercise. Perhaps the anxiety of losing his walking ability was the greater influence than his "self-efficacy of exercise". Unlike participant P16 who was "less confident"...but still exercising, participant P15 was quite "confident" to exercise, yet she was not exercising at all. P15 reported feeling remarkably better by the post-test date; her post-test SEE score was 7.00 and yet she had not resumed her exercise program. This particular result suggests that it was the participant's intentions (Muse, 2005) to exercise rather than confidence to exercise that were reflected in the higher SEE score.

Furthermore, caution is necessary in the interpretation of these results as they were likely confounded by pretest group differences and the small sample size. Also, the other determinants of exercise behavior (such as income, gender, education, past exercise experience, and exercise program characteristics) may have had a bearing on the study outcomes of exercise adherence and mobility.

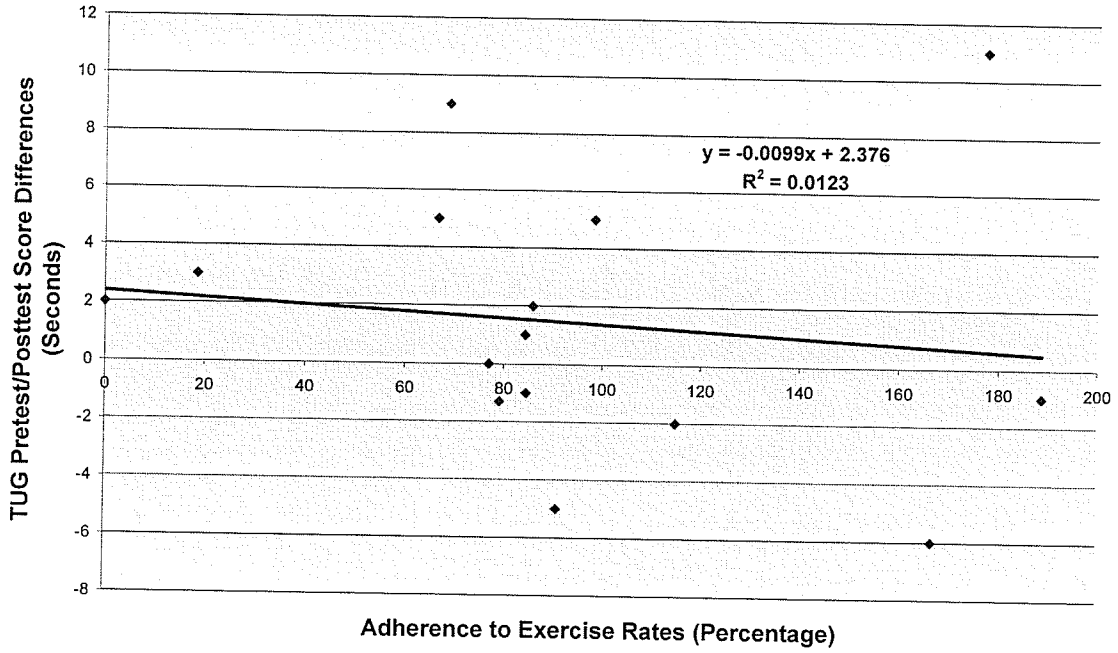
Hypothesis 5:

There is a relationship between exercise adherence and mobility measures.

The Timed Up and Go Data

Correlation analysis of TUG pretest/post-test score differences and adherence to exercise (goal attainment) scores revealed no real relationship ($r = -.111$, $p = 0.694$). A scatter plot diagram shows this relationship in Figure 4.

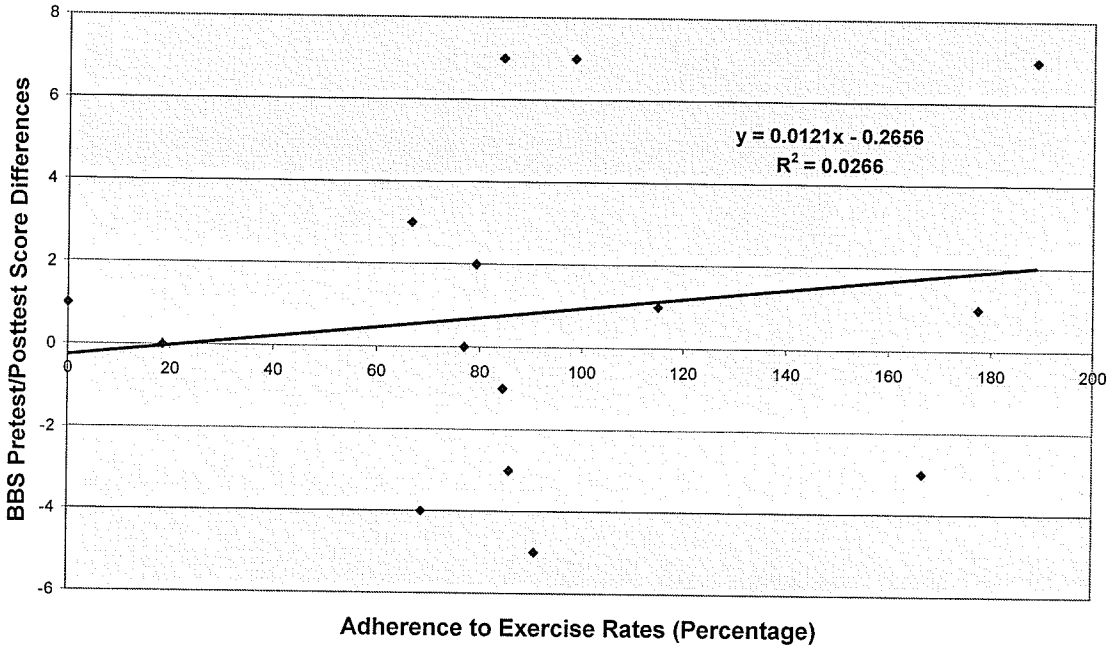
Figure 4: Time Up and Go Pretest/Posttest Score Differences and Adherence to Exercise Rates



The Berg Balance Scale Data

The Berg Balance Scale was the second mobility measure involved in the correlation analysis of adherence to exercise and mobility. This analysis showed no significant relationship ($r = 0.163$, $p = .562$) between BBS pretest/posttest score differences and adherence to exercise rates. A scatter plot diagram shows this relationship in Figure 5.

Figure 5: Berg Balance Scale (BBS) Prestest/posttest Score Differences and Adherence to Exercise



In conclusion no relationship was found between mobility scores and adherence to exercise rates and the hypothesis was rejected.

Discussion of Results:

The lack of relationship between exercise adherence rates and mobility scores in the pilot study was surprising. There has been strong evidence that improving muscle strength, flexibility, and endurance through exercise results in improved mobility including walking, rising from a chair and balance (Campbell, Robertson, Gardner, Norton, & Buchner, 1999a; Carter, Kannus, & Khan, 2001; Hruda, Hicks, & McCartney, 2003; Judge, Lindsey, Underwood, & Wineskins, 1993; Maire, et al., 2003; Mazzeo, et al., 1998).

The most obvious problem with the analysis of hypothesis 5 was the low power of the study which may have influenced the study results. Other

confounding factors contributing to the pilot results were similar to the uncontrolled variables in hypothesis 1: participant illness and variability of effectiveness of exercise programs.

The challenges in answering hypothesis 3 led the researcher to ask an alternative question, "Does exercise adherence influence a change in mobility scores?" To explore this question, a comparison was made of the adherence to exercise (goal attainment scores) and changes in mobility scores (TUG pretest and posttest difference means and medians and BBS pretest and posttest difference means and medians) during the study (Table 20).

This comparison found that the under-exercising participants (group 1) had a positive TUG mean difference score (i.e., the average walking speed decreased by 2.95 seconds between pretest and post-test periods) while the higher-exercising participants (groups 2 and 3) showed a small but positive TUG mean difference score (i.e., the average walking speed is .40 -.50 seconds slower between pretest and posttest periods). When TUG pretest and posttest median difference scores are considered, it can be seen that the higher exercising participants performed even better than the under-exercising participants.

In terms of the BBS mobility measure, the higher exercising participants (groups 2 and 3) improved 1.0 to 1.5 points on average (i.e., there was a small improvement in balance) compared to the under-exercising participants (group 1) whose mean balance scores improved only .33 points. When BBS pretest and posttest difference median scores are examined, it is evident that the higher

exercising participants performed even better than the under-exercising participants. Adherence to exercise rates therefore can be seen as an important factor in improving balance.

Table 20: *Mobility (Pretest/Posttest difference Means and Medians) and Adherence to Exercise Rates (AER) Goal Attainment Rating* [a]

GOAL ATTAINMENT RATING	1 n=6			2 n=5			3 n=4		
MOBILITY	TUG	BBS	AER (%)	TUG	BBS	AER (%)	TUG	BBS	AER (%)
MEAN	3.0	—	—	.4	—	—	.50	—	—
MEDIAN	—	.5	67.7	—	-1.0	85.9	—	1.0	172.1

[a]There was no data for P 5, P7 and P15.

Although these comparisons are not statistically significant, there may be a trend that those who under-exercise do not perform as well in mobility testing as those who exercise at or above the prescribed adherence to exercise rate. This trend strengthens the contention that adherence rates may provide salient information to the physiotherapist.

Hypothesis 6:

There is no change in participants' cognition during the study.

The Wilcoxon Signed Rank Test was applied to pretest and posttest MMSE scores to determine if there was a change in participant cognition over time. Calculated values are as follows: $W = -34$; $n_{s/r} = 18$; $z = 1.428$, $P = 0.204$.

The analysis found no significant difference between participants' MMSE pretest and posttest scores and therefore the hypothesis was accepted.

Discussion of Results:

A change in mental status was not considered to be a confounding variable for self-efficacy of exercise, exercise adherence and mobility measures.

Qualitative Data

There were four sources of qualitative data in the pilot study: informal discussions regarding the participant's exercise behavior and prescribed exercise program (PEP) (N=18) in Phase 1; the semi-structured interviews in Phase 2 carried out during participant telephone and home visit interventions (n=11); the semi-structured interview in Phase 3 (N=18); researcher observations made during any participant contact in Phase 3 (N=18).

The qualitative data are presented using a series of general themes and related categories arising from the themes. Supporting information is referenced in the manner described earlier in this chapter. Discussion follows each of the category topics with reference to published research.

Themes and Categories

1. Exercise Programs and Older Adults
2. I don't have any problems with my exercises or do I?
3. What's out there helping me exercise?
4. Some things get in the way: Barriers to exercise
5. I thought I would get better!
6. Future Adherence to Exercise

1. Exercise Programs and Older Adults
    - 1.1. Prescribed exercise programs (PEP):
        - 1.1.1. My exercise program is interesting and challenging to me;
        - 1.1.2. Home-based exercise programs;
            - 1.1.2.1. Individual pacing and appropriateness of exercise;
            - 1.1.2.2. Privacy;
            - 1.1.2.3. Convenience;
    - 1.2. Community-based exercise programs;
        - 1.2.1. Learning from others;
        - 1.2.2. Transportation;
        - 1.2.3. Group-based exercise programs;
            - 1.2.3.1. Socialization and encouragement;
            - 1.2.3.2. Imposed structure;
            - 1.2.3.3. Individual ability and group exercise; and
    - 1.3. Discussion of results

2. I don't have any problems with my exercises or do I?
    - 2.1. Self-assessed comprehension of PEP:
        - 2.1.1. Understanding the PEP;
        - 2.1.2. Proper technique;
    - 2.2. Researcher-assessed participant comprehension of PEP:
        - 2.2.1. Understanding the PEP;
        - 2.2.2. Proper technique,

2.2.3. Community-based exercise programs; and
2.3. Discussion of results

3. What's out there helping me exercise?

3.1. Environment;
3.2. Physical activity history;
3.3. Caregivers;
3.4. Participant attributes and motivations;
3.4.1. Exercise beliefs;
3.4.2. Self-discipline;
3.4.3. Motivation; and
3.5. Discussion of results

4. Some things get in the way of exercise: Barriers to exercise

4.1. Poor health and discomfort;
4.2. Participant attributes;
4.2.1. Lack of self-discipline;
4.2.2. Lack of motivation to exercise;
4.3. Environment;
4.4. Caregivers; and
4.5. Discussion of results

5. I thought I would get better!

5.1. Positive physical expected outcomes;
5.2. Avoidance of negative physical expected outcomes;
5.3. Psychological expected outcomes; and
5.4. Discussion of results

6. Future Adherence to Exercise

6.1. Good Intentions;
6.2. The Effect of Professional Advice;
6.2.1. Technical advice;
6.2.2. Adherence to exercise counseling;
6.2.3. Contacting other health professionals; and
6.3. Discussion of results

Theme 1: Exercise programs and older adults

1.1 Prescribed Exercise Programs (PEP)

1.1.1. My exercise program is challenging and interesting to me

The HVI and TI groups' participants had very similar response patterns: 64% of the intervention participants who reported regular exercise stated that their program was challenging to them, while the remaining 36% admitted that their program, at least in part, was no longer physically difficult to accomplish. P18 simply refused to do her leg strengthening exercises as she did not believe them to be useful.

Fifty-five per cent of the intervention participants who exercised regularly found that their PEP was interesting to them. Some participants thought that the PEP should maintain their interest. For example, P11 recognized that she needed to be stimulated with her PEP: "I don't know if I would use the word interesting because I am easily bored. I want new things you know", (P11.2, page 5). P12 expressed an opposing view, "I did the exercise because it is good for the body. That is the main concern" (P12.2, page 8).

1.1.2. Home-Based Exercise Programs

Physiotherapy-prescribed exercise programs were carried out in the person's home. All HVI and TI participants reported that they had ample space to carry out their PEP. Seventy-three percent of the intervention participants (8 of 11) stated that they enjoyed exercising alone for reasons of pacing themselves, appropriateness of exercise, convenience and privacy.

1.1.2.1. Individual Pacing and Appropriateness of Exercise

Participants reported that they enjoyed the independence of exercising alone. They enjoyed judging their own bodies' response to exercise and paced their activity suitable to their need in order to obtain the best results. Two participants had specific comments about pacing: "I don't depend on people for exercises – they tone me down", (P2.1, page 7); and

> "I don't like walking with anybody (for exercise)...You can go at your own speed if you walk by yourself. Until you need someone to have to go for a walk with because you are not really walking properly. You are keeping up your pace just to suit them, or else they have to keep speed with you...", (P5.2, page 7)."

Group exercise does not always suit individual needs, and as one participant expressed:

> "...I don't like going to group exercises because they don't do exercises that are peculiar to you. It's for the whole group, and I can't see that it is helping me because they do exercises that I can't do at all. Because I had a hip replacement and therefore you are never supposed to cross your legs after a hip replacement. You are not supposed to cross your ankles. Well, of course this group exercises they don't know what you've had and they say, "Well, cross your legs and do this and that." I just don't do them. But that is what I don't like about the group exercises...A waste of time for me as far as I am concerned....I have these group activities, part of the socializing thing. But I have enough people to socialize with. I don't need to have another group to socialize. "(P5.1, page 6)

1.1.2.2. Privacy

Two participants felt that they would be open to ridicule when others were around them. P14 enjoyed walking in her corridor for exercise, but chose a time when there were fewer people around in her apartment block, "I pick times when people aren't around if I possibly can. I don't like to exercise (in public)...'What's that old coot doing here?'" (P14.1, page 9). P3, who walked outdoors, for

exercise felt that she had to walk a certain route, "...where I don't have neighbours looking at me wondering what the hell I am doing" (P3.1, page 1). Three weeks later, P3 had a change of heart and described walking in public for exercise as: "...at this stage of the game, it doesn't bother me, as long as I can do it", (P3.2, page 8). P17 especially found that exercising was a private matter:

> "...because it is part of my daily activity and it has to be done. It isn't any different than personal grooming. You have to have a shower. You have to brush your hair. You have to brush your teeth, manicure your nails. Exercise falls into this same category. It is part of...an important part of my everyday life", (P17.1, page 11).

As one participant's spouse put it, "We always do them here (in own condominium). I wouldn't go into the lounge...people we know will want to do them too..." (P9.1, page 6).

1.1.2.3. Convenience

Exercising in the home offered a more practical aspect to exercise behavior - convenience. P18 enjoyed exercising in private as she enjoyed the advantage of not having to dress up. Another participant enjoyed exercising in her home because there were no issues related to transportation.

> "When I was going to the Reh-Fit, I was traveling and when I traveled in a cab. So I said to myself, the answer is learn to do some of these things on your own without help and be independent of those organizations that provide these programs. So I had some tapes made and so on and then I discovered I didn't need the tapes, just you know... recite the things or learn the routine", (P11.1, page 10).

1.2. Community-Based Exercise Programs:

Community-based programs were utilized by 39% of all participants in addition to being prescribed an individual exercise program (Table 21). These individuals discussed four issues regarding community-based programs:

learning from others, transportation, their perceived benefits from group exercise and coping with conflicting individual ability versus group members' abilities.

Table 21: *Community-Based Exercise Program Participation*

TYPE OF COMMUNITY-BASED EXERCISE PROGRAM	NUMBER OF PARTICIPANTS
ADULT DAY PROGRAM	4*
YMCA	1
REH-FIT CENTRE	2
SENIORS EXERCISE GROUPS	1

* P14 was waiting to be accepted into an ADP

1.2.1. Learning from others

P2 reported that although she exercises in the YMCA, she tends to exercise by herself to increase her knowledge of exercise:

> "And I do love going to the Y(MCA) because you get out...there is younger people out there and older people but the younger people are so full of energy It's a different atmosphere...I often watch the aerobics and maybe get some ideas of my own from them. I mean learn from what they are doing", (P2.2, page 4).

1.2.2. Transportation

Transportation to the Reh-fit Centre was reported as a problem by two individuals. These two participants were unable to drive or take public transport due to having chronic disabilities. One participant relied on a friend for a ride to Reh-fit, however he expressed his lack of independence as humiliating. "The worst thing (when encountering a physical impairment) was I lost my license -

that feels old," (P12.1, page 2). Another participant relied on Handi-transit for transportation to and from Reh-fit. The schedule for drop-off and pick up meant that P19 was at the venue for 4 hours per visit, which P19 reported as fatiguing and disruptive to her normal weekly routine.

1.2.3. Group-Based Exercise Programs

Although some participants were more enthusiastic about exercising alone, 73% of the intervention participants also reported that they enjoyed exercising in a group. Group exercise was perceived as beneficial to these participants for a number of reasons:

- Group exercise provided opportunities to socialize and participants encouraged each other in their efforts; and
- Group exercise imposed a certain structure on them therefore facilitating their own exercise adherence behavior.

1.2.3.1. Socialization and Encouragement

Twenty-seven per cent of the intervention participants expressed their perceptions that their community based programs provided a physical and psychological supportive environment conducive to exercise:

> "And then they're doing the stand up exercises twice a day and that's...everybody sits in their chair or if they have a wheel chair they have that near them. And those who can't stand up, well they sit and do what they can. But then they are all helping one another...Socializing always is (helpful)", (P14.1, page 11 and 12).

> "It (exercising in a group) gives you more encouragement because some of them (other participants) are as bad off as I am and maybe worse, I don't know. But they are trying like everybody is trying", (P8.1, page 7).

> "People come up to me and encourage me. They help me with my coat if I need it", (P12.1, page 3).

P14 lived alone, did not drive and did not access Handi-transit. She only used taxi service and she reported this service was too costly. P14 described herself as isolated. She reported that she enjoyed the socialization aspect while attending the GDH program and was anticipating attending an ADP although she was frustrated having to wait to attend the program.

1.2.3.2. Imposed Structure

Some participants reported that they relied on the day hospital programs and adult day programs to govern their exercise behavior because it provided an externally imposed structure. Transportation to the program and the scheduling of group and individual exercise sessions was organized by program staff. P16 explicitly expressed a fear that he would not be able to continue his home exercise program after leaving the GDH without having some sort of program structure to support and encourage him. He successfully found a replacement for the GDH program structure with an ADP where again transportation services and exercise sessions were organized for the client and general physical activity was encouraged. P18 also relied upon the GDH to focus her time to exercise:

> "Anyway, one thing when I had to be downstairs and meet that van (to be transported to the GDH)...well that was some structure in my life. Now except for home care and that is very well organized and I am way ahead of where I was with that...without that structure I am not very good (at adhering to PEP), (P18.1, page1)...As soon as I was left on my own and there was nobody prodding me here and there in a serious way about my lifestyle, I just sort of sat back," (P18.2, page7).

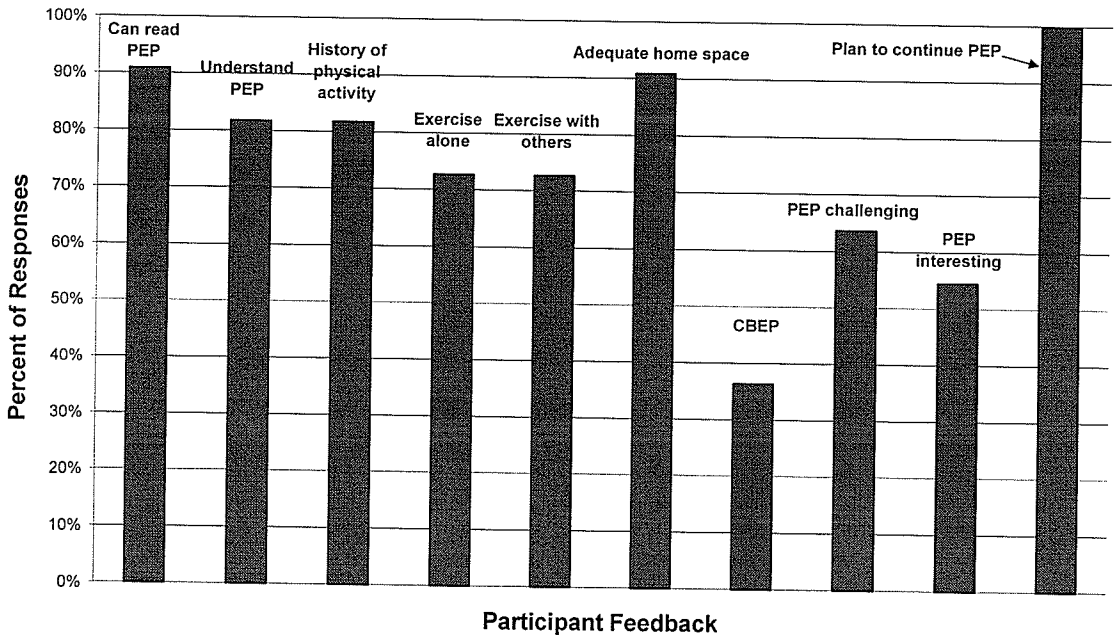
1.2.3.3. Individual Ability and Group Exercise

One participant (P5) described an occasion on which she was not physically capable of performing the exercises planned for a group exercise program. Although P5 found the discrepancy in her ability to participate with the group's program annoying to such a degree that she refused to participate in group exercise, P8, with a similar issue, coped with the discrepancy using her own strategy:

> Well, sometimes like the one (exercise)...it is like you bring your head down, that...I know I get a little dizzy and that. Or I come and do exercise and I do too many that I can feel some pain. So I stop maybe a couple times and if they (the others in the exercise group) are still going I come back in (P8.1, page 5).

This same participant not only recognized that she had to adjust her expectations when exercising in a group but also appreciated that others were in the same situation. "I don't know whether I've got any secret or not (to her positive outlook). I think I am fortunate to some of the cases that I have seen at Deer Lodge Centre", (P8.F, page 3). Overall intervention participants' descriptions of their PEP's were gleaned from field notes and taped interventions and are summarized in Figure 6.

Figure 6: Participant Prescribed Exercise Program (PEP) Feedback



1.3 Discussion of Results:

The purposes of a prescribed exercise program (PEP) have been described as enhancing particular client mobility issues and general health issues or reducing pain (Henry, Rosemond & Eckert, 1998). In this study, GDH physiotherapists provided written instructions and often diagrams describing PEPs to older adults with the intent that the older adult continue to follow his/her PEPs at home after discharge. The PEP therefore was a strategic physiotherapy tool designed to prompt older adult exercise behavior. Intervention participants unanimously reported that their intent was to perform the PEP at home.

The evidence suggested that participants felt that the PEP required revision within 4-7 weeks after GDH discharge. While only 55% of intervention participants found their PEP program interesting, another 36% of the intervention

participants either added new exercises or wanted information on new exercises after GDH discharge. In other words, their PEP was perceived to no longer completely suit their needs. This is not surprising for a number of reasons. First of all, as chronic health conditions persist in older adults, symptoms can change with time. Also, from a practical standpoint, some participants like variety to their behaviors, and exercise is not an exception. Furthermore, by definition progressive resistive training involves regular revision of exercise programs (Whaley, Brubaker, & Otto, 2006). During the study period, there was no GDH physiotherapy follow-up regarding exercise behavior with discharged clients. Common clinical practice included occasional referral to Community Therapy Services (CTS) following GDH discharge for a physiotherapist to follow-up with the older adult's exercise program. CTS is a private, non-profit organization which provides rehabilitation services including physiotherapy in the community. However, CTS involvement is also time-limited. This suggests that the sustainability of PEP-at-discharge treatment effect was jeopardized by an apparent gap in continuity of care focusing on older adult mobility in the community.

Whereas some participants felt their exercise programs should be interesting, other participants indicated that exercises did not need to be interesting. For example, some participants stated that they did not value enjoyment as a crucial component to exercise, but rather acknowledged exercise as an essential component of their activities of daily living.

Exercising alone and in the home appeared to be beneficial for nearly 75% of the intervention participants. Convenience and privacy of exercising at home were particularly highlighted as important factors of the home exercise program for intervention participants. Sin, LoGereo, Belza and Cunningham (2004) in a study of older Korean/American adults and exercise found that older adults often had no means of transportation other than public transit, which was less than optimal for the older user. Exercise in the home averts transportation as an issue. Sin et al., 2004 also suggested that home programs addressed some older adult's needs to exercise in privacy as they could avoid wearing shorts as these clothes are considered inappropriate by the older adults themselves.

Another dimension to exercising in private came to the forefront during the intervention interviews – confidentiality relating to health conditions. A physiotherapy exercise program may be very focused on a particular physical impairment, for example exercise designed to improve chest wall mechanics and ventilation for individuals with chronic obstructive lung disease. These exercises are so unique that exercising in public could invite questions from people in the general exercise area. Exercising to enhance a health need could be perceived as intensely personal and therefore exercise behavior may be hampered in a public environment.

Further to the benefits of home exercise programs, a home exercise program allowed participants to use discretion regarding intensity and pace of their exercise as all participants had chronic conditions such as arthritis. Home

exercise prescription also addressed the older adult's particular needs and consequently was viewed by the older adult as most suitable.

Although many participants stated they appreciated exercising in their homes, 73% of the intervention participants also reported enjoying exercising in a community based exercise program situation. Thirty-nine percent of all participants accessed not-for profit community exercise programs during the study period. Mills, Stewart, Sepsis, & King (1997) also found this seemingly contradictory finding. In their study 28% of the older adult sample preferred exercising with a group leader, 33% preferred exercising on their own (with or without friends), and 39% indicated that both scenarios were appealing to them.

Community-based exercise programs provide other benefits to older adults that exercising alone may not achieve. Almost 30% of intervention participants identified that socialization was an important part of their exercise environment. Ecclestone, Myers, and Paterson (1998) found that community based programs provide socialization opportunities during group exercise, and members gain meaningful encouragement from their peers. The older adult's need for socialization has been aptly described by Hall and Havens (2000), "As people age, many outlive relatives and friends, and social interaction may become limited as people stay closer to home because of mobility difficulties and increased chronic illness" (p. 1).

Socialization and its relationship with exercise can also be explored by analyzing one of the quantitative results of SEE item 4, "How confident are you right now that you could exercise three times per week, when you had to

exercise alone?" The overall participant mean score was 6.6. This result may be interpreted as participants being only moderately confident in exercising alone. A mean score for the SEE item-4 in the control group was not calculated in the group; however, the control group overall SEE scores dropped more than those of the two interventions groups. Although the specific interventions involved strategies to improve self-efficacy of exercise, it is also possible to interpret the study interventions as opportunities for participants to socialize with the researcher thus also influencing SEE.

Some participants took advantage of community based exercise programs (CBEP) to "fill the gap" in supporting exercise behavior post-discharge from the GDH. The YMCA, Kinsmen Reh-fit Centre, Adult Day Programs (ADP) and seniors exercise groups were examples of community-based exercise programs which may offer opportunities for both group exercise and individual exercise in a public environment. The CBEPs offered individuals various exercise classes and equipment which enhanced their exercise experience outside the home.

Not all CBEPs are alike. Adult day programs are free and transportation to the program is arranged by program staff. Seniors' exercise groups held in apartment blocks were free and peer-led. Individuals who were interested in attending the YMCA or the Reh-Fit Centre required adequate financial resources for a membership and had to be independent in organizing transportation.

In summary, older adults used both home- and community-based exercise programs. New strategies for physiotherapy follow-up are needed to maintain the individual's interest in the exercise program and, more importantly, to

address the individual's evolving chronic health conditions. These strategies may include physiotherapists establishing a on-going relationship with the older adult living in the community. This relationship could be through a modified assessment/intervention with the physiotherapist in GDH programs, or a longstanding relationship with physiotherapists in community agencies such as Community Therapy Services.

Theme 2: I don't have any problems with my exercises, or do I?

The purposes of the telephone and home visit interventions were twofold: first, to positively influence participant exercise behavior; and second, to gain new information about exercise behavior post-discharge from a GDH. These intervention discussions and observations revealed new insights into participant perceptions of their exercise performance and researcher-assessed participant exercise performance.

2.1 Self-assessed Comprehension of PEP

Upon commencement of the first interventions, all participants of HVI and TI groups reported that they understood their PEP. However, during the course of the telephone or home visit discussions, 55% of participants raised questions about their exercises. These questions included understanding the purpose of an exercise and confusion over proper exercise technique.

2.1.1. Understanding the PEP

P8 recognized that she did not completely understand how or why she was to do a particular breathing exercise; however, with a brief demonstration and explanation she reported to have greater understanding of what was required to execute the exercise. Sometimes the frequency of exercise per week was not included on the written instructions of the PEP. This gap in information led participants to misunderstand the frequency of exercise per week e.g., some participants perceived the frequency of to be greater than that which had been prescribed by the physiotherapist.

2.1.2. Proper technique

Just over one quarter (27%) of intervention participants recognized that they had problems with exercise technique. For example, P2 had some difficulty with a hip exercise; P17 found an ankle exercise awkward; and P8 found one shoulder exercise caused her pain. The intervention there included technique instruction with each of these participants improving their technique to their satisfaction.

2.2. Researcher-assessed participant comprehension of PEP

Although 55% of intervention participants recognized they had some problems with their PEPs the researcher observed that 91% of these individuals experienced problems. The participant problems were similar to the participant-reported issues: understanding their exercise program, technique difficulties, changing the PEP, and where to access community-based programs (Table 22)

2.2.1. Understanding the PEP

Although all participants reported that they could read their PEP, not all participants were effective readers. Due to vision and hearing impairments P9 required help from his spouse to read and demonstrate the exercises to him each exercise session. Although P9 stated during a telephone intervention that he understood the purpose of his exercise program, his verbal description of his breathing exercise techniques made the researcher query whether the exercises were done properly.

P17 expressed confidence in her technique to execute her PEP; however, during the home visit observation she performed a completely different exercise than what was indicated in the text and accompanying diagram. The participant was unable to distinguish between her own body movement and the exercise instructions. P17 was able to correct her technique when the exercise was demonstrated in front of her.

There were instances in which the exercise prescription was changed by the physiotherapist prior to discharge. Two intervention participants had initially learned particular exercises and then were advised to stop them as the exercise aggravated symptoms. P11 decided to carry on with particular exercises which caused her pain, against the advice of the physiotherapist. P11 used her personal judgment by weighing the information gained from the physiotherapist and her own body's reaction to the particular movement.

> "I hate those (particular exercises)...and I don't know why I still do them...but I feel maybe why I do them because if I don't, I know I am in trouble (with her shoulder flexibility) and it's the damn ones you lift you arms up and circle around", (P11.1, page 2)" ...I think that when it is a bad

> hurt I really do stop, I don't push past that. I say to myself, this is not right and so, you know that arm lift will be sort of a half-assed lift. It's not what I would really like to do...I say to myself let it go at that....You can only push yourself so far anyway and after that forget it. You are crazy if...what is the point to hurt yourself so I try not to hurt myself", (P11.1, page 3).

P17 also did not follow the advice of her therapist and continued performing a particular exercise. P17 judged that her body was healing, and that the exercises only occasionally gave her discomfort. Although she was advised to consult with the prescribing physiotherapist, she either forgot or decided not to.

2.2.2. Proper Technique

During home visit interventions, 67% of the participants were observed to experience technical problems with exercise which the participant did not recognize. During telephone intervention conversations 40% of participants were suspected of having technical problems with their PEP. Just over one-third of intervention participants reported that they did not know how to change their exercise program. Simple problems with technique were corrected during the intervention.

2.2.3. Community-Based Exercise Programs

Eighteen per cent of participants were considering joining community-based exercise programs and requested information about them. The participants were advised to contact their prescribing physiotherapist to address the more involved exercise issues.

Table 22: *Problems with Exercise*

PROBLEMS WITH PEP	INTERVENTION PARTICIPANTS (%)
Wrong exercise technique	45%
Lack of knowledge to progress exercise	36%
Lack of knowledge to add new exercise	36%
Lack of knowledge to maintain or attain adherence to exercise	36%
Lack of knowledge about community-based exercise programs	18%

2.3 Discussion of Results:

Although intervention participants reported that they understood their exercise programs, this understanding was not reflected in the their performance of exercises. Furthermore, participants evaluated their exercise performance as being better than the researcher's evaluation of their performance. This difference in evaluation was especially evident during the home visit interventions. Home visitations allowed the researcher to observe technique problems, re-teach exercise technique and re-evaluate participants' improved technique. In contrast, during the telephone interventions the researcher relied upon the participant to identify the exercise problem. Teaching proper exercise technique over the phone proved to be problematic for both the researcher and the participant. Although for the most part exercise technique improvements were

initiated by the researcher, three individuals were able to self-evaluate and problem solve leading them to adapt their own exercises.

There may be many factors which influence retention of learning of a motor skill. Physiological monitoring of the neuromuscular system was beyond this study, however cognitive screening suggested that memory did not confound exercise performance. However, other confounding factors may have come into play: familiarity with exercise and number of exercises.

Familiarity with exercises may have influenced exercise performance. Although the majority of the prescribed exercise programs included fitness parameters of strength and flexibility for the trunk, upper and/or lower extremities, two PEPs included respiratory or breathing exercises. Breathing exercises focus on improving chest wall mechanics and pulmonary ventilation and are relatively unknown to the general public. Retaining technique for unfamiliar motor skills such as breathing exercises appeared to be more difficult for two of the intervention participants. Finkin and Babcock (1996) found older adults had greater difficulty learning an unfamiliar task than younger adults. Furthermore, older adults may not retain functional motor skills (e.g., learning to use a walker) as well as younger adults (Tunney et al., 2003).

Number of exercises may also have influenced performance and adherence to exercise. Henry, Rosemond, and Eckert (1998) studied the effect of the number of home exercises on compliance and performance in older adults. They found that exercise technique was better in individuals who had fewer exercises compared to individuals who had a greater number of exercises. In

that study, there was no difference between self-reported compliance to exercise between the participant groups who had 2, 5 and 8 exercises. In the present study no correlation analysis of the number of exercises and adherence to exercise was performed due to the small number of participants.

Henry, Rosemond, and Eckert's (1998) findings suggested that limiting the number of exercises resulted in better technical performance of exercise. In clinical practice a novice exerciser is often given a few exercises to begin with; as the older adult's confidence (self-efficacy) to exercise improves, the physiotherapist often increases the number and intensity of the exercises. Physiotherapists practicing in GDH setting have a predicament in that older adults may perform a smaller number of exercises better and thus exercise effectively. However, many older adults in the GDH have such complex mobility issues, that a small number of exercises may also not meet the overall goals and effectiveness of the prescription.

Comment can be made regarding the large variation in the number of exercises prescribed for participants. Some intervention participants had multiple home exercise programs which had been prescribed by other physiotherapists prior to the GDH or in previous treatments. Unfortunately, not all exercise programs were dated which caused some confusion during the study intervention for two participants who had to sift through their information to find the current exercise program. A previously prescribed exercise program may be inappropriate if an older adult's biomedical status changes due to the nature of a

chronic condition. Therefore, undated, multiple-exercise program instructions may be detrimental to older adults.

In summary, the qualitative results emphasize that older adults do have difficulties continuing to exercise after discharge from the GDH programs. A cursory review of the content of PEPs suggested that there was a wide variation in number of exercises and gaps in fitness parameter prescription. This suggested that physiotherapists working in GDH may not be prescribing exercise to improve overall fitness. Additionally, interviews revealed that a printed PEP was not adequate to maintaining effective exercise technique of older adults on a long term basis. The PEP may be an effective tool if physiotherapists adopt standardized guidelines (i.e., inclusion of warning signs and symptoms while exercising, contact information, frequency to exercise, number of sets, resistances etc.) for prescribed exercise programs. Furthermore, although the PEP may be the right tool, the prescription requires ongoing revision in collaboration with the older adult and a physiotherapist.

Theme 3: What's out there helping me exercise?

During interventions and final interviews, participants recognized that their environment, previous physical activity, caregivers, and personal attributes positively influenced their exercise behavior.

3.1. Environment:

A number of factors in participants' physical environments were reported to support their exercise behavior (Table 23). The PEP's were most frequently cited as supporting exercise behavior. Not only was the presence of the program important, but also the quality of the PEP was reported as a positive factor. "If you have a program that is easy to accomplish, you are more liable to do it. If you have a program that is too much...you give up" (P11.2, page 5).

In addition to the exercise program many participants were advised to walk indoors or outdoors. Participants considered that outdoor walking in the winter was dangerous due to the slippery conditions and therefore used corridors in their apartments, indoor tracks or treadmills to accomplish their walking. Furthermore, exercise equipment within the participant's own home, or within the living complex proved invaluable to individuals carrying out their exercise program.

Walking was not necessarily perceived as an important health issue for a particular participant but it was perceived important for the participant's pet. P4 acknowledged that walking his dog regularly contributed to his exercise behavior. "I like to go out for a little walk, but the dog probably helps that", (P4.F, page 4). P4 planned to use his indoor treadmill in the winter months for walking.

Table 23: *Environmental Supports for Exercise Behavior*

SUPPORTS FOR EXERCISE BEHAVIOR	STUDY PARTICIPANTS (%)
PEP Sheets	61%
Home Exercise Equipment	28%
Community Based Exercise Program	22%
Exercise Journal	17%
Corridors in Building for Walking	17%
Exercise Facilities in Apartment	11%
Walking the Dog	6%
Nice Physical Atmosphere	6%

3.2. Physical Activity History

> "(Exercise) is an integral part of my life. That's what makes life beautiful. That is what is keeping me alive. Life is too precious and too short", (P17.1, page 15).

Participants were asked if they were physically active prior to developing health concerns. Eighty-two percent of interventions participants felt that they had strong histories of being physically active. They expressed pride and enjoyment in recounting their triumphs in various physical endeavours: walking for pleasure, walking for transportation, golfing and gardening. P2 started exercising when she was 50 to ward off arthritis. When P13 no longer was able to golf due to arthritis she joined an ADP; she explained that she "...had to do

something. I can't sit all the time" (P13.F, page 3). The remaining participants expressed no strong identification with physical activity prior to the study.

3.3. Caregivers

The presence of caregiver support such as home care services, family and friend support was not probed in the study; however, during discussions with participants it became evident that 50% of participants had live-in-home caregivers who in some manner influenced participant exercise behavior. Of the 9 participants who had live-in caregivers, 6 male participants had 7 female caregivers. Of these 7 female caregivers, 5 were spouses, and 2 were siblings. Of the 3 female participants with caregivers, 2 were spouses, and 1 was a female, privately paid helper. In comparing the control, HVI and TI groups, the HVI participants had a greater number of live-in caregivers than did the other participants (Table 24).

Table 24: *Participants and Live-In Caregivers*

TYPE OF SUPPORT	GROUPS		
	CONTROL (n=3)	HVI (n=5)	TI (n=1)
Live-in Sibling	1	1	
Live-in Spouse	2	4*	1
Live-in Paid	0	1*	

* P3 had both a spouse and a live-in paid caregiver therefore appears twice in the table.

All participants reported that someone in their lives supported them in pursuing their exercise behavior. Fifty percent of the participants lived with

another individual, predominantly the spouse. Thirty-nine percent of the participants stated that their family in general encouraged them to exercise for their health while 33% of participants focused on how their spouse helped them. Siblings and private live-in caregivers were reported to be supportive for 12% of the total participants.

Help for and support of exercise behavior came in many forms: the helper encouraged the participant emotionally, reminded the participant to exercise, physically helped the participant to exercise and/or assisted the participant in completing his/her exercise journal.

> "A lot of times she (the paid caregiver) will say to me, "Come on, let's go (for a walk)"...Sometimes I don't much feel like it but she says, "Come on"...She's very good you know", (P3.2, page 9).

These reports were substantiated by observations made during participants' interventions. One particular visit saw a spouse advocate for the participant, asking questions about the exercise program. P8 reported that her spouse did the home exercise program with her while they were sitting in their living room watching television together.

Spousal support of the participant's exercise behavior was reported as somewhat costly to some of the husband-wife relationships. P12 acknowledged that his spouse helped him a great deal, however there was a perceived low level of tension between him and his spouse when discussing this topic: "Sometimes she says, 'Do the exercises....', and P12's spouse responded: "Yeah, I have to keep reminding him. If I don't remind him, they (the exercises) won't get done", (P12.2, page 8). P4's spouse expressed dismay that the participant did not

seem to want to exercise as much as she wanted him to, and P4 agreed that this was the case. P4 referred to his wife as the "sergeant major" with respect to reminding him to do his exercises, "She wants me to keep trying to get a lot better with the leg and I don't give a darn really from that respect", (P4.F, page 2). P9's spouse voiced frustration when she felt she had to remind her partner: "I have to (remind P9 to do his exercises)...he says, 'Oh, I'm tired'...he says, 'A little bit later', and when it is a little bit later on he says, 'I don't feel like it'", (P9.2, page 4). P12's spouse expressed similar sentiments regarding her husband's lack of initiative. "It's like he doesn't have to remember...it doesn't bother him...and if I forget, if he misses a day, he thinks that that is fine," (P12.2, page 9).

Apart from the social network supports, 17% of participants reported that they were inspired by their GDH physiotherapist to exercise, and that the teaching of the exercise program helped sustain their exercise behavior.

> "(The physiotherapist) used to keep her eye on me and straighten me out on them (exercises). She was so busy and you know attending to a lot of people at one time but she always managed to see me if I wasn't doing them right", (P2.2, page 6).

> "(The physiotherapist) really inspired me. She made me realize that it was up to me and that she made me realize the importance of it (exercise)", (P5.F, page2).

> "...they (physiotherapists) pointed out which ones (exercises) so maybe it was more helpful that I am saying because they pointed out which ones I should do and that is what I am doing, but nothing that I didn't know before (P11.F, page 2)...Since the day hospital, yeah, I have been paying far more attention to how my body responds to the exercising", (P11.F, page 3).

> "I have to admit that when I was in the Day Hospital it was nice. You know, you had a social thing", (P18.1, page 10).

3.4. Participant Attributes and Motivations

Participants reported that certain personal attributes supported exercise behavior such as: beliefs about exercise, self-discipline, and perceived motivators (positive reinforcement and avoidance of negative reinforcements).

3.4.1. Exercise Beliefs

> "I watch what other people have done. Some that have exercised are better off", (P14.2, page 10).

Many participants believed that there were positive outcomes of exercise and these outcomes encouraged their exercise behavior. These outcomes were described as improved general health, functional mobility and psychological well being. P2 expressed her personal impression of exercise, "Exercises are good, healthy things to do. It makes stronger muscles...stronger body and I really think it drives away arthritis. I really think if more people do exercises when they get older they wouldn't have so much arthritis", (P2.2, page 4). P11 also felt that exercise was necessary for her and thus she found the will power to struggle to do her exercises. P2 stated that her source of motivation was, "...what ever is good for my health", (P2.1, page 7). P12 expressed a more pragmatic view of exercise: "It's important that I do exercises. The easier thing is to go for a walk and watch TV but that's not the purpose of the body", (P12.1, page 1).

3.4.2. Self-Discipline

Participants also reported that self-discipline and will power supported their exercise behavior. As P17 stated, "One has to (be self-disciplined)...there isn't anyone else to. We have to focus, set an objective and in order to obtain

that objective we have to work at it...there are no short cuts", (P17.F, page 2). P8, despite experiencing progressively deteriorating conditions, described herself as possessing adequate will power to keep active in order to maintain her ability to help out in her home. P12 also experienced a deteriorating condition and subsequently had difficulties with his activities of daily living. He saw exercise as delaying his mobility problems, and felt that being disciplined to adhere to his exercise was a given. "All your life you have been planning and be motivated", (P12.F, page 3).

One participant with particular insight into her exercise behavior inferred that adhering to exercise through self-discipline was a constant struggle. "When I do the exercises according to how my body feels and responds to it (exercise) then it is far more meaningful than someone saying you've got to do 7 of these, 8 of those and 9 of these...you just do it and get it over with", (P11.F , page 2).

Closely related to self-discipline was the confidence to rely upon oneself to behave in a certain manner. P18 was quite thoughtful in her responses; she recognized that human resources were important in maintaining her health, however she thought that self-reliance was much more crucial to her pursuing her passions in her life:

> "I know people who have human resources in the way of family and friends sort of that I don't have. There are a couple people in my life but I don't have them (referring to them as being deceased). And you know the first thing is said you have to have friends. You cannot make it if you don't have friends, which I do, but I do have these two people, but I learned a long time ago under the best of circumstances they can die, get killed, all sorts of things. You've got to have...you have got to have faith in yourself, anyhow", (P18.2, page 2).

Of note, although P18 expressed a strong desire to rely on herself to guide her behaviors, she admitted that imposed structures such as supervised exercise programs were effective in improving her exercise adherence.

3.4.3. Motivation

Participants expressed their hope that exercise would have positive and meaningful outcomes. These exercise outcomes were seen as social and biological motivators: improved mobility, improved recovery from injury or condition, feeling good about oneself and living a longer life.

Maintaining or improving mobility was the strongest motivating factor reported by participants. Some individuals set tangible mobility goals. For example: P6 established a goal to walk independently with a standard cane so he could go on a trip with his spouse. The better he walked, the more he felt he could exercise and the more he adhered to his extensive exercise program. Another participant hoped to walk without a cane and be able to take a city transit bus. She felt that her walking was improving with exercise and she again adhered to her comprehensive exercise program. P3 was motivated by, "just being normal and being able to do it (walk)", (P3.2, page 6). P11 and P6 reported that improving physical appearance through physical exercise was another perceived motivating factor

P14 and P3 saw exercise as prolonging their lives so they could enjoy their families. "I want to see them (her grandchildren) married and have children…I have to keep alive", (P14.1, page 10). P3, who also expressed

enjoyment in her children's activities, saw her motivation to exercise fueled by, "the desire to be alive", (P3.F, page 2).

Participants also perceived less tangible consequences to exercise also to be motivating. Individuals were motivated to exercise because it made them feel better.

> "I feel like I am alive...more, how would you describe it...not as tense or not as tightened up...more flexible", (P11.1, page 4).

> "Even at the Y some days at first I say I don't want to go but I get up and I get going and I am always glad that I went because I feel so...you get more energy as you do those things", (P2.2, page 7).

Avoidance of negative consequences was also identified as a motivating factor. Participants perceived that negative consequences such as disability and dependency on others would occur if they did not exercise. P14 and P3 expressed their fears that if they did not continue walking for exercise, they would likely lose their ability to walk and become wheelchair dependent.

> "I don't want to be all cripple up and sitting in a wheelchair. I have to do something (meaning walk for exercise) because I don't want to end up in a wheelchair", (P3.1, page 5). "If I stop, as my son says, 'If you stop you will be in a wheelchair'", (P3.1, page 8).

Along with fearing dependence on assistive devices, participants found that preventing dependence on others was also a powerful motivator: "I don't like to be handicapped", (P14.F, page 1) and another individual stated "I know I am kind of an independent person. I don't like bothering people more than I have to", (P2.F, page1). Exercise was seen as a means of preventing this undesirable dependence and promoting independent living.

3.5 Discussion of Results:

The study revealed that participant beliefs, attributes, caregivers and environment influenced exercise behavior in a positive manner. These findings were similar to those of Boyette, et al's (2002) descriptive research study which involved asking 18 experts to rate each of 9 personal characteristics (age, gender, ethnicity, occupation, educational level, socioeconomic status, biomedical status, smoking status, and past exercise participation) as they related to the exercise initiation phase and the adherence phase. They identified 5 categories of distinct determinants: (1) personal characteristics; (2) knowledge, attitudes, and beliefs; (3) psychological/behavioral attributes; (4) activity characteristics; and (5) environment.

Biomedical status and past physical history were rated as the most influential determinants impacting on initiation and adherence to exercise behavior in older adults (Boyette, et al., 2002). Past-exercise behavior has also been shown to be a greater predictor of exercise behavior than self-efficacy (McAuley, 1993). Furthermore, self-efficacy of exercise as a determinant of exercise was also been found to be influenced by exercise experience (McAuley & Mihalko, 1998). Past physical activity/exercise was not well documented in this study thus its influence on participant's adherence to exercise was not measured.

Knowledge, attitudes and beliefs also influence exercise behavior (Boyette, et al., 2002). In this study a number of participants valued physical activity highly, but for different reasons. Generally, social and biological motivators were identified as promoting exercise. The desire to be independently

mobile, improved recovery from injury or condition, feeling good about themselves and living a longer life prompted participants to exercise. McAuley, Marquez, Jerome, Blissmer, & Katula (2002) studied a similar belief: social physique anxiety (SPA), defined as an older adult's fear of being seen as being physically dependent on others. McAuley et al. found that physical exercise was one strategy to improve "self-presentation", i.e., the more an individual exercised the more the individual was mobile and therefore seen as a valuable member of society. In their 12 month study, they found that increased self-efficacy and fitness predicted a decrease in SPA.

In this study participants recognized that some aspects of their physical environment also supported their exercise behavior. Walking in apartment corridors, especially during winter months, was seen as a safe alternative to walking outdoors. Participants largely agreed that a prescribed exercise program was necessary for their exercise behavior, however how long participants would consider their exercise program appropriate while remaining interesting or challenging to them is unclear.

Caregivers were often identified by participants as being helpful to them when exercising. Some caregivers provided hands-on assistance, while other participants found that the encouragement from a spouse, child or friend was enough to spur them on to exercise. Oka, King and Young (1995) suggested that social support specific to exercise was a better predictor to exercise adherence than general social support. Coincidentally, when participants responded to questions in the interviews, often-time spouses would provide

feedback regarding the participant's exercise behavior. Although most often the participants saw the spousal help as beneficial, spouses also reported that this help could be emotionally taxing on them. Physiotherapists often ask spouses to help the clients with their exercises. This practice may not necessarily be healthy for the spouse and other routes for older adult exercise support may be more effective for the longer term.

In summary, present clinical practice includes problem solving with older adults to determine their supports for exercise, however this practice is not based on cognitive theory research involving older adult beliefs and attitudes that influence exercise.

Theme 4: Some things get in the way of exercise: Barriers to exercise

GDH physiotherapists commonly discuss the barriers to exercise and participate in joint problem solving with the older adult prior to discharge. Semi-structured interviews revealed that 83% of participants experienced challenges to their exercise behavior once they were on their own. These reported barriers were poor health and discomfort, personal attributes (such as lack of self-discipline and motivation, and lack of value of exercise), problems with caregivers and the environment, all of which negatively influenced their exercise behavior.

4.1. Poor health and discomfort:

Poor health was reported as a barrier to exercise by 22% of participants. During their 10 week participation in the study a number of participants suffered physical health setbacks: P3 had medical problems and was twice admitted to hospital; P7 had a hip prosthesis infection for which she was hospitalized; P9, who had a significant chronic lung condition, experienced diarrhea and later influenza, both of which interfered with his exercise adherence; and P15 fractured a rib and had respiratory complications.

Mental health issues may also have influenced participant behavior. P4 admitted that he was apathetic about his normal responsibilities around the home and this attitude also related to doing his exercise. He disclosed, "I guess I should say that I really don't care", (P4.F, page 5). P18 also acknowledged that she had chronic depression and she admitted that during the study period she felt overwhelmed with her responsibilities. She found her mind unable to organize itself to carry out her intentions. P18 denied that she lacked motivation to exercise but rather she believed that her exercise behavior was dependent on her, "getting her head together," (P18.2, page 10). She was frustrated with health care professionals in their inability to address this need:

> "Physical, mental, emotional and spiritual health...and believe this, physical one is the one that people either do it or they don't. They deal with it better if this one (the mental) is working better. The faith that gives you confidence – I know I go on about this because health professionals never, ever get into that (stated with great emphasis)", (P18.2, page 1).

P12 also expressed sentiments that he was struggling with his progressively disabling condition. During discussions about his physical activity in the past he

became teary eyed. His insight into maintaining his independence and identity was summed up in this way, "When I was young I used to say nothing was too difficult. I've now left that behind", (P12.1, page 3).

In addition to poor health affecting exercise adherence, pain was also reported as dampening efforts to exercise. Almost one quarter of participants (22%) reported that pain would stop them from doing a particular exercise or the exercise session. Most often the participants adjusted their exercise to avoid pain. All participants reported that their physiotherapists had advised against doing any exercise that caused discomfort or pain.

> "She (the physiotherapist) says,' Well, don't do it (the exercise)...don't bother if it hurts it...don't do it', (P14.1, page 3)....I don't do the one with the elastic where you put it around the knees and pull it in and out because that one hurts", (P14.1, page 4).

Despite the physiotherapists' warnings, two participants endured pain while exercising because they perceived some sort of benefit from the exercise which outweighed their pain. It is unclear if these participants understood that pain may indicate a more serious problem. P11 explained:

> "I hate those (a specific exercise)...well, they (the physiotherapist) told me not to do that...but I still do them and I don't know why I still do them...but I feel maybe why I do them because if I don't I know I am in trouble and it's is the damn ones you lift your arms up and then circle around. ...it helps me from kind of freezing up you know. It helps and so I suffer it because I know it helps. I feel certain it helps", (P11.1, page 2).

4.2. Participant Attributes:

> "I am overwhelmed with things...not necessarily with the things that I want to do but have to do...I am way down on self-esteem. Well, self-esteem I can get back if I can just get back this mountain of stuff (paper work) out of the way", (P18.2, page 1).

Personal attributes acted as barriers to individuals carrying out their exercise program. Participants categorized these attributes as: lack of self-discipline and diminished motivation, the latter related to a reduced value of exercise.

4.2.1. Lack of Self-Discipline

Lack of will, "laziness" or fatigue was reported by 22% of participants as negatively affecting their exercise behavior. P11 acknowledged, "Sometimes your body and mind works against you and at other times it helps you", (P11.1, page 5). P9 and P15 acknowledged their own lack of motivation to exercise as evidenced by their poor rates of adherence to exercise at 19% and 0% respectively. During the research trial, P6's adherence rate was 100%; however, he expressed a fear that his will-power might wane once the research was completed.

4.2.2. Lack of Motivation to Exercise

Participants' responses describing they lacked motivation to exercise fell into three themes: lacking understanding of an exercise, competing interests and perceiving mobility as sufficient.

P12 reported that he sometimes omitted a certain prescribed exercise (isometric hip extension) from his exercise session. When he was asked if he had a problem with the exercise he responded that he did not understand this exercise had any positive effect on his mobility problem. Therefore if he could

not understand how the exercise would be of benefit to him, he decided that it was acceptable to not do it.

Twenty-two percent of all study participants indicated that the pursuit of social activities, other personal goals and day to day living competed with their prescribed exercise program for their time and energy. For example, P5 did not do as many repetitions in her exercise program as were prescribed by her physiotherapist because she was not convinced there were benefits to do so, "…I think I do as many as I can quite frankly (annoyed tone), as many (exercises) as I feel I have time and the patience to do", (P5.2, page 5). Likewise, P9 did not voice any particular goal/activity that was interfering with his exercise however it appeared that his everyday activities just "got in the way" and they "didn't have the time".

Other participants spoke of specific activities which they had to contend with. P11 was frank in her explanation that she would not exercise as frequently as prescribed:

> "It's Christmas and I have been shopping my butt off and I have been just running around like crazy and then because I have to do everything at once – trying to get the Christmas letter done, trying to get shopping done, trying to get the decorations out and in the middle of it all in just a hell of a mess. And just cannot do a lot of exercises", (P11.2, page 1).

P15 agreed that she was ready to resume her exercise after being ill, however she admitted her energy was focused on writing a book thus she did not exercise. Similarly P18 explained that she did not have time to exercise:

> "Another thing too with all of these crises things that are coming along and the things that I need to do – they are not optional (referring to doing her income tax return). They should be first if anything", (P18.1, page1).

Two participants were skeptical about exercise. P4 did not expect any benefits from exercising and he could not make a connection between doing his exercises and his walking. It was difficult to ascertain whether he did not value the potential positive outcome of exercise or that he perceived exercise as ineffective. P18 suffered from chronic depression and believed that maintaining good mental health was much more important to her than physical exercise. She stated:

> "Health is, in the minds of most people, is physical. You are not...if you are not healthy emotionally, mentally and if you don't have that confidence that you get about faith, and I am not talking about religion. The goals and all those things if you ...that last one (mental) if those are not going for you then the other three (physical, emotional and spiritual) won't be (P18.1, page 9)...I am always moving but not in that way that would be practically good" (18.1, p.9)

Although P18 believed that physical exercise was not the most important aspect of her life to address during the study period, she expressed her thoughts about the consequences of not exercising: "I am going to slip into trouble and I am going to be back a year ago (referring to a time when she was sedentary and less physically mobile).

4.3. Environment

In addition to the participants' internal attributes or internal environment, the external environment also presented obstacles to carrying out the exercise program. Winter weather, fear of criminal activity, lack of an exercise mat and lack of access to community programs were reported as environmental barriers to exercise.

All participants who enjoyed walking outdoors expressed their discouragement when winter set in. P18, who had always enjoyed walking outdoors until recently, now found that she could not do so for fear of falling. "Walking conditions have been horrible, but I can do hall walking, but that is not good. You have got to have that cold air...at least I do", (P18.1, page1). In addition to P14 reporting that she disliked the treacherous winter walking conditions, she was also fearful that individuals might harm her when she was out walking on the sidewalk.

Not only did winter force individuals to change their walking habits, it also altered their mode of transportation to community based exercise programs. P2 planned to take a taxi to the YMCA instead of a bus to avoid walking in the snow. P19 took Handi-transit, a public transport for individuals who are disabled, instead of driving to the Reh-fit centre; she found that the Handi-transit schedule was inconvenient. P18 also found traveling to her preferred community-based exercise program inconvenient because transit buses and the Tai Chi facility had poor accessibility for persons using walkers. P18 considered taxi fare too expensive and did not wish to take Handi-transit.

One final environmental barrier to exercise behavior was the lack of a proper surface to exercise on. P12 and P18 disliked doing exercises on their beds as they were not as firm as the exercise plinths at the GDH facilities; their exercise technique did not feel the same and thus was perceived as unsatisfactory.

4.4. Caregivers

Although care givers were most often reported as a positive support for participants, there were reports that a spouse and home care attendants were detrimental to participants' general self-esteem. P3 reported that her spouse discouraged her and created stress in her life, "He looks for things to put me down in everything I do - he really does," (P3.2, page 2). P18 saw additional home care services as an intrusion on her privacy. She felt that she would be judged rather than be encouraged if a home care attendant helped her with her exercises.

4.5 Discussion of Results:

> "Personal change would be trivially easy if there were no impediments or barriers to surmount" (Bandura, 1997, p. 3).

Brawley, Martin, and Gyurcsik (1998) suggested that questionnaires about exercise barriers rely on a person's recall thus responses may produce results that reflect barriers to exercise only at the time of response. This study used three strategies to capture barriers to exercise (a semi-structured interview based on a standard questionnaire, the exercise adherence journals and discussions during exercise interventions) in an effort to determine consistency of participant responses. There was only one participant whose description varied as to why she did not exercise - P18 reported that she was busy with other things and she could not get herself organized enough to manage her time. It was difficult to determine if her lack of organization contributed to her "busyness".

Exercise behavior research indicates that both adherence to exercise and SEE have a similar curvilinear pattern over 12 month periods (McAuley et al., 1999; Litt, Kleppinger, & Judge, 2002). This implies that some factor(s) influence exercise behavior in both a positive and a negative manner. The study participants reported that there were a number of barriers influencing their exercise behavior: personal (health-related and personal attributes); situational (negative influence from spouse); and physical (poor weather, poor exercises surfaces, transportation costs and inaccessible facility). Lees, Clark, Nigg, and Newman (2005) conducted a focus-group study to determine barriers to the exercise behavior of older adults and the results of this study support their findings. Participants who exercised reported that inertia, time constraints and physical ailments were barriers; however, these barriers differed from those identified by non-exercisers. Non-exercisers reported fear of falling, inertia and negative affect as obstacles to exercise. Sin, LoGereo, Belza and Cunningham (2004) added to the list of barriers in their study of barriers to exercise in older Korean/American adults. These participants preferred home-based exercise programs as there were no transportation issues. Given that participants in the present study all had chronic disease, it is not surprising that both the qualitative and quantitative data suggested that poor health was a barrier to exercise. This finding is in keeping with previous studies (Boyette, et al., 2002; DiPietro, 2001) where an older adult's biomedical status was found to be the most important determinant in exercise behavior. Furthermore, Ecclestone, Myers, and

Paterson (1998) et al found that health problems were the most common reason for dropping out of a community exercise program during a 3 year study.

Pain, also related to poor health, was identified as a barrier to exercise in 89% of respondents. It was unclear if pain influenced exercise behavior as no correlation analysis of the SEE pain-related item and adherence was carried out. A study focused on "self-efficacy of exercise" in older adults with pain from arthritis (Leveille, Cohen-Mansfield & Guralnik, 2003) found that older adults who had two or more pain sites from arthritis had lower self-efficacy scores than did older adults with no pain. If pain is so prevalent in the older adult exercisers, it is important for older adults to understand how to manage their pain. Pain management strategies are therefore a critical component of an action plan. One participant was asked how she tried to manage her pain, and she reported that she was very unsure how to do this. After careful thought, she replied that she would take analgesics. She was unaware of other methods of reducing her pain, and did not think that she would contact her physiotherapists for this information. This small scenario highlights that pain management is an area of care for which older adults require action plans as well to support their mobility.

Bandura (1977) suggested that the intensity and duration of effort made in pursuing an activity were related to the person's perceived outcome of the activity. Some participants reported that they did not understand why they were doing particular exercises because their particular exercises were relatively obscure (e.g., unfamiliar isometric exercises and breathing exercises) to the general public. Although participant adherence to these particular exercises was

not compared to their other exercises, the fact that participants needed explanation regarding the purpose suggests that lack of understanding may have negatively influenced exercise adherence.

Related to lack of understanding about their exercises and its influence on exercise adherence, Meichenbaum and Fong (1993) suggested that reasons or excuses to exercise (or not) may originate from ingrained beliefs based on observations, personal reasons (self-relevant reasons) and emotional responses (affective-schema related). For example, an individual may not exercise because of the evidence of observations, "I know lots of people who walk fine and they don't exercise". Others include self-relevant reasons, "Exercise makes me uncomfortable", or affective-schema related reasons, "I'm too old to exercise – what's the use". For obvious reasons, clinicians and researchers face great challenges in evaluating and changing these beliefs.

Some participants were particularly insightful and open in sharing their perceptions about the reliance of the body on the willing or able mind. They identified personal attributes and values which negatively influenced their exercise behavior: personal lack of discipline to exercise and a lack of motivation. Nearly 25% of all participants suggested that they suffered from a lack of will-power or discipline which made exercising a struggle. The lack of motivation suggested that the participants were not adhering to exercise or would stop exercising in the near future. No analysis of SEE scores and participant's reporting lack of motivation was carried out.

Participant responses such as "I don't have the time" have also been interpreted as stereotypic reflecting a generalized excuse rather than one based on the current situation for the respondent (Mannel & Zuzanek, 1991). Brawley, Martin, and Gyurcsik (1998) dissected stereotypic responses such as "lack of time":

> "This response may represent a legitimate lack of time for an individual who desires to exercise (i.e., a barrier), an admitted unwillingness to sacrifice time spent doing something else (relaxing or participating in other leisure activities) in order to exercise (i.e., a reason;)... or a socially acceptable excuse that masks the true reason for nonparticipation (I'm too lazy, "I don't want to make the effort") which allows the individual's private and social esteem to be upheld. We contend that when "lack of time" is used as an excuse for not exercising, the individual may have little or no intention or desire to exercise. Because excuses may intimate that one does indeed have an intention to exercise, they may be misconstrued as perceived barriers. Conversely, when an individual actually wants or intends to exercise, but is prevented by time constraints (i.e., poor time-management skills...), "lack of time" becomes a barrier to participation", (p. 345).

Whether the barrier is perceived or real, the barrier's influence on exercise behavior is most important to understand. Kendzierski and Johnson (1993) explored perceived versus actual barriers to exercise in younger adults using a questionnaire about reasons/excuses for not exercising. The most common responses were lack of time and fatigue; however, these responses did not reflect the behavior, i.e., fatigue and lack of time did not stop the younger adults from exercising. Likewise, Brawley, Martin and Gyurcsik et al. (1998) suggested that it is important to determine are individuals' intentions to exercise and how often this intention is blocked before labeling this block as an actual barrier.

In summary, older adults experienced poor health, pain, lack of motivation to exercise and environmental barriers which interfered with their exercise

behavior. These results support the contention that physiotherapists require a long-term relationship with this patient population in order to help maintain older adult mobility.

Theme 5: I thought I would get better!

> "My idea of (a) successful life is to live all four of my lives (physical, emotional, mental and spiritual) in my sense in good health and happiness at work, socially and in solitude", (P18.2, page 12).

The final interview involved asking all participants to describe their expected outcome from engaging in exercise. There were diverse responses to this question, however three main themes emerged. Participants reported that there were positive physical and psychological outcomes of exercise and that exercise helped minimize some of the negative consequences of their health conditions.

5.1. Positive Physical Expected Outcomes

Improved functional ability or components of mobility were the most frequently reported expected outcomes from performing exercise (Table 25). Participants responded by describing that they could do very specific physical tasks or that their bodies felt well because of engaging in exercise. Some of the participants' testimonials about their personal expectations from exercise were as follows:

> "I can do things like put dishes away and do up jewelry and be independent"…"(maintaining independence is) very important", (P11.1, page 11).

> "I feel more up to doing my regular daily chores and I sleep better", (P13.F, page 1).
>
> "(Improving my) steadiness on my feet ...and get rid of this thing (indicating her walker)", (P18.1, page 11) "and to use buses", (P18.F, page 1).
>
> "I will return to normal (referring to his walking pattern and balance)", (P6.F, page1).
>
> "To be able to do the things I could do before like walking distances, showering, cleaning the house and cooking", (P19.F, page 1).
>
> "It (exercise) will help to use up the energy that...and get my stomach working and get rid of this gas that builds up. So there is an incentive there to keep going and get in...I'll be able to get into my clothes right. And I will feel better and look better", (P11.1, page 5).
>
> "Strengthen my back so that I can sit and use the computer...isn't that awful", (P15. F, page 6).
>
> "I have to (exercise). I mean I want to get back to the normalcy of my life prior to my trip (euphemism for her CVA) where I can do things and feel comfortable in doing them. The exercises are bringing me to that goal and I am going to achieve it", (P17.1, page 8).

Aside from increased independence, participants reported that their bodies felt better because of exercise. P14, P16 and P11 had arthritic conditions and claimed that exercise provided pain relief to their joints and muscles. P9 and P12 also hoped their exercise would positively influence their deteriorating health conditions by mitigating the need for oxygen therapy or "getting rid" of Parkinson's disease, respectively.

Table 25: *Expected Physical Outcomes of Exercise.*

EXPECTED OUTCOME	PARTICIPANTS (%)
Improvement in walking	50%
Increased strength	39%
Improved breathing	22%
"Loosened up" limbs	17%
Improved balance	17%
Improved coordination	11%
Continue to do chores	11%

5.2. Avoidance of Negative Physical Expected Outcomes

Twenty-two percent of all study participants recognized that although exercise might not improve their functional mobility, it was still of value as it could delay deterioration of mobility or the negative effects of an impairment. P14 exercised to improve the circulation to her extremities which were vulnerable due to diabetes. P9 was hopeful that exercise would promote, "Living life a little longer with handicaps", (P12.1, page 3). P2 agreed that exercise positively affected her health and independence; she saw exercise as a means to avoid burdening her family or the health care system.

5.3 Psychological Expected Outcomes

> "...it is a feeling of well being and accomplishment. Being able to do it (exercise)"...it gives me more self-confidence where I am not more apt to think, what am I doing this for, you know, that type of thing?" (17.1, page 12).

Along with the beneficial positive outcomes of exercise, participants also expected and reported positive psychological outcomes from exercise (Table 26). Improved self-confidence in being physically active and improved self-satisfaction in accomplishing a task which reinforced participant independence were perceived as positive psychological outcomes. P11 felt that the psychological result of exercise was just as important as maintaining her upper extremity function:

> "Well they (the exercises) mean relaxing. Yeah...it means feeling better.. Yeah...I do this to satisfy myself, really. It's me that I satisfy and it is only me that can do it", (P11.2, page 4).

P17 encountered a temporary physical disability and found that exercise had a role to play in recovery. She interpreted her exercise experience as extremely beneficial:

> "The whole, the body...the goodness to the wellbeing of my entire body because there are so many different muscles that are involved in these exercises that benefit to the entire body and to the brain too", (P17.1, page 12). "It (exercise) gives me peace of mind - peace of mind to be able to think that I am able to do it and I am able to go to bed with a sort of a smug look on my face saying you smarty, you can do it", (P17.1, page 13).

Furthermore, P1, who had a permanent physical disability, spent many months re-learning to walk. He recognized that exercise helped in his physical recovery of walking and this helped re-establish his own physical identity. "Well, if your body is strong, your mind is strong...you are mobile and you want to do things, I

feel good about myself', (P1.F, page 1). Additionally, P16 who had diabetes and arthritis was frank: "I...hell...I would get worse. I would crack up (break down mentally) and tighten up all over", (P16.F, page 1) if he didn't exercise.

Table 26: *Expected Psychological Outcomes of Exercise*

EXPECTED OUTCOME	PARTICIPANTS (%)
Feeling good about himself/herself	17%
Feeling of well-being	11%
Increased confidence	6%

5.4 Discussion of Results:

Participant knowledge and beliefs about the beneficial effects of exercise on risk factors and chronic health conditions played a part in participants engaging in exercise. Participants expressed the predominant view that exercise was a means to maintain their independent mobility. This belief is categorically supported by evidence that exercise improves strength, flexibility and endurance necessary for walking, rising from a chair and balance (Campbell, Robertson, Gardner, Norton, & Buchner, 1999a; Carter, Kannus & Khan, 2001; Hruda, Hicks, & McCartney, 2003; Judge, Lindsey, Underwood, & Wineskins, 1993; Maire et al., 2003; and Mazzeo, et al., 1998). Increased physical mobility in older adult translates to physical independence (Shepard, 1994) and improved the quality of

life of the older adult (Blair, Wells, Weathers & Paffenbarger, 1994; and Evans & Pollock, 1999).

In addition to the physical benefits of exercise, participants reported psychological improvements in well-being and confidence. This supports the findings of Singh, Stavrinos, Scarbek, Galambos, Liber, and Fiatarone-Singh, (2005) in their RCT of community-dwelling adults 60 years or older who were diagnosed with minor depression, dysthymia or major depression. Participants were randomly assigned to one of two intervention groups which received high or low intensity progressive resistance exercise training, or a control group which received standard general practitioner treatment. After an 8-week period, the high intensity exercise group participants' self-ratings of depression and therapist ratings of depression were significantly less ($p > 0.001$ and $p > 0.013$ respectively) than the control group self-ratings and therapist ratings of depression.

In summary, many of the participants recognized the benefits of exercise and this knowledge appeared to be a motivating factor to exercise for them. This finding suggests that there is a place for information sessions to educate older adults regarding the benefits of exercise. Such information sessions can be carried out in groups or on an individual basis and could be led by knowledgeable others such as health care professionals or specially trained peers.

Theme 6: Future Adherence to Exercise

6.1. Good Intentions

All participants reported that they were confident that they would either continue with or commence their PEP. The researcher was not confident with at least two of these responses. P18 believed that she did not need confidence to exercise. "You use that word confident (to exercise)...with me it is intention. I have the intention to do (exercise)", (P18.1, page 11). It is questionable that her intentions would be realized after the study completion as the same intentions had not led her to exercise during the 10 week research period. P5 was blunt about her intention to continue with her exercise, "Well, if I feel that I don't need them any more then I won't do them", (P5.1, page 7)...I am really not interested in making it (exercising) more of a habit. (P5.1, page 8).

6.2. The Effect of Professional Advice

The intervention phase involved helping participants to problem solve as well as encouraging and advising participants about their exercise programs. As previously noted, 91% of participants had some sort of problem with their PEP, varying from very small technical issues to more complex health issues. The PEP problems were either dealt with directly by giving technical advice or the participants were advised to contact their prescribing physiotherapist to resolve their issues.

6.2.1. Technical Advice

Problems with the technical execution of the exercises and adherence to PEP were addressed immediately during the intervention phase. Sixty-four percent of participants required retraining technique of particular exercises. Retraining involved reviewing the PEP text and picture with the participants and then asking them to perform the exercise as described. This review was done either face to face during the home visit or on the telephone. Tactile and verbal cues were provided when possible during home visit retraining. Thirty-five percent of participants were observed or reported to have improved their technique during the home visit intervention phase. It is unknown if the telephone intervention participants improved their execution of the exercise due to lack of participant feedback and observation.

6.2.2. Adherence to Exercise Counseling

Thirty-six percent of participants experienced some sort of adherence to exercise issue in addition to the effects of poor health. These adherence issues were discussed during the intervention phase. Most often discussion involved identifying the individual's barrier to adherence to exercise then jointly problem solving to remedy the problem. Three types of barriers to exercise adherence were identified:

1. The lack of value of exercise
2. Lack of knowledge regarding the minimum dosage of effective exercise; and

3. Lack of strategies to schedule their PEP within their daily routine.

In the first intervention session (4 weeks post GCH discharge) three participants were identified as having adherence problems and the following are examples of exercise adherence counseling provided. After reviewing his daily schedule it was suggested to P9 that he match the time he had the most energy with the time to exercise which coincided with watching television. It was suggested that he exercise while watching television. In addition, P5 stated that she valued her time to do other activities such as reading and getting out of her apartment more than spending time exercising. Following a joint problem-solving session, it was suggested that to do some of her exercises throughout the day instead of spending one concentrated time exercising. P18's self-evaluation pointed out her lack of organization and activities competing with her time to exercise. A number of practical suggestions were discussed; however, she adopted only the idea of setting priorities with an accompanying schedule. She agreed:

> "...after you leave I am going to sit down and say hey, this is getting to you kid. Sit down and stop and think. If you are responding to everything that crops up, you never do get around what you would do if you had sat down and said, oh, maybe figuring out what I wanted to do", (P18.2, page 7).

Despite engaging in discussions regarding improving adherence to exercise, none of the three participants improved their adherence from the first intervention to the final study phase (10 weeks post discharge). Moreover, P11 acknowledged that she was having problems with adhering to exercise during the second intervention (7 weeks post discharge) because she was tired from

overdoing other activities. It was suggested that she do her specific exercises here and there during the day but focus on obtaining adequate rest. She also did not change her behavior by the 10th week of the study and admitted that she was never going to change.

6.2.3. Contacting Other Health Professionals

The majority of intervention participants (82%) were advised to seek counsel from their prescribing physiotherapist at the GDH to address more complex PEP issues. This advice was met with a general hesitancy by participants and only one participant contacted her physiotherapist.

One reason expressed by participants for not contacting their physiotherapist was a lack of understanding of the role of the physiotherapist as a primary health care provider. Some participants thought that when they were discharged from the GDH, the physiotherapist had no future role in providing care. P3 expressed her confusion over what to do: "I didn't know...after I left there (the GDH), whether I had the right to call her (physiotherapist)", (P3.1, page 6). P11 also lacked knowledge about what to do if she had a problem with her PEP, "I don't really have anyone to go to, to really enquire about that (exercise program problems). That is a problem. The only one I can rely on is me and I don't know that much about it", (P11.1, page 9).

Another reason for not contacting the physiotherapist after discharge was expressed by P14, "I just figured that there are so many people who need to be there (at the GDH) and if I don't need to be there I shouldn't be there", (P14.2,

page 12). P14 was unclear about the legitimate reasons for attending and/or re-attending GDH or using their services.

An additional 36% of intervention participants were advised to contact other health care providers such as family physicians, GDH nursing staff, social worker, speech-language pathologist or home care coordinator regarding health issues such as diabetes management, pain control, additional home care or dysphagia. Again, there was no evidence that these participants followed up on these suggestions.

6.3 Discussion of Results:

Bandura's Social Cognitive Theory was useful in explaining exercise behavior but only up to a point as other influences may have come into play. Strategies to enhance "self-efficacy of exercise" proved ineffective with two HVI participants who reportedly planned or intended to exercise using their PEP after the study but had not actually adhered to their program. Exercise counseling focused on helping individuals to develop positive beliefs about exercise are based on other psychological theories such as the Theory of Planned Behavior (Ajzen, 1985) and Transtheoretical Model of Health Behavior Change (Prochaska & DiClemente, 1983).

The Theory of Planned Behavior was designed to understand and predict social behaviors (Ajzen, 1985; Godin, 1994). It proposes that behaviors, such as exercise, can be determined by intentions. Intentions may be formed by an individual's attitude toward exercise, subjective norms of exercise (what my

doctor and spouse think) and perceived behavior control (I can exercise even though I am tired). Intention to exercise has been suggested as the immediate precursor to exercise behavior (Brenes, Strube & Storandt, 1998) and therefore may be the focus of exercise counseling.

The Transtheoretical Model (TM) of Health Behavior Change (Petersen, 2003) suggests that behavior change follows a sequence:

1. Pre-contemplation – e.g., the individual lacks awareness that exercise may improve his/her mobility);
2. Contemplation - e.g., the individual recognizes that mobility is becoming a problem and may seek information about how to become stronger;
3. Preparation - e.g., the individual ponders the decision, seeks the opinion of peers or significant others for the need to change behavior;
4. Action - e.g., the individual starts to exercise;
5. Maintenance - e.g., the exercise becomes routine for the individual; and
6. Termination/Relapse - e.g., something happens that the individual stops exercise, however he/she is disappointed.

The stages of behavior encompass temporal changes in intentions and exercise behavior. A systematic review of health behavior interventions based on the trans-theoretical model found little evidence that stages-based interventions influenced behavior (Bridle et al., 2005). In contrast to this review, Muse (2005) found that counseling strategies using the "Stages of Change" model may be more appropriate to address "intention to exercise" and are effective in creating behavior change in individuals who are in pre-contemplative and contemplative stages.

Schulz and Heckhausen (1996) suggested that "successful ageing is equated with the development and maintenance of primary control throughout the life course, which is achieved through control-related processes" (p. 702). For this reason exercise counseling focuses on teaching older adults self-regulating behaviors (Rejeski et al., 2003), and self-management behaviors (Barlow, Turner & Wright, 2000) show promise in supporting older adult exercise behavior.

Self-regulating skills may include using an action plan to deal with new barriers to exercise (e.g., a new health problem or an exacerbation of an old health problem). It was obvious that participants in this study did not have an action plan to deal with new or old barriers. One of the most logical actions to take in the face of new barriers was to contact the prescribing physiotherapist. However, most participants were hesitant to contact the GDH physiotherapist about their health or exercise concerns. It is unclear why these individuals would not see the prescribing therapist as a source of information. Public perception of physiotherapists and their role as primary care providers requires further investigation.

In summary, it appears that once discharged from the Geriatric Day Hospital, participants lacked the knowledge to problem solve when they ran into difficulties with their exercise programs. The apparent gap in knowledge appeared to be the lack of an action plan for the participants. Recent exercise behavior research suggests that teaching self-regulating behaviors may help older adults address problems themselves, however this model may not be

appropriate for all older adults who may need some ongoing support by knowledgeable others.

Limitations

Performing this pilot study allowed the researcher to identify further limitations to the study methodology. These limitations were found in the measurements, analysis of data, treatment effect and unexpected biases.

Measurements

There were a number of limitations related to the instruments. The SEE instrument did not include poor health as a barrier item. Also, an instrument to measure mobility/function of the upper extremity was missing. The latter limitation became relevant when one individual met the inclusion criteria for the study however her exercise program focused on upper limb function; the mobility measures of the TUG and BBS would not necessarily have changed despite the individual pursuing her exercise program. In addition to these problems, the adherence to exercise journal and the "Expected outcomes from exercise and barriers to exercise" semi-structured questionnaire was not tested for validity.

In addition, the study protocol excluded the control group from being asked in-depth questions about exercise behavior. Information from the control

group could have proven valuable, especially given that statistical analysis indicated that the three groups were different at the beginning of the study. Furthermore, there was no measure for overall physical activity and this could not be analyzed as a confounding factor influencing mobility. Other confounding factors that may have influenced mobility were not taken into consideration such as the type and number of exercises. Additionally, learning was not directly measured but rather was inferred through exercise behavior, mobility and SEE scores.

Data Analysis

In addition to the small sample size which reduced the power of the study, there were other challenges to data analysis. Additionally, normalizing BBS data for those who did not perform the stair climbing item might have artificially inflated their balance score because the step-climbing item was one of the more difficult balance items.

Treatment Effect

The treatment effect of the intervention was unknown as no previous intervention of this kind has been tested on older adults who had attended a Geriatric Day Hospital. Furthermore, telephone interventions were sub-optimal for individuals who were severely hearing impaired. This problem was not identified in King, et al's (2000) project which used telephone interventions to

influence older adult exercise behavior; however, it appears that King et al's participants were younger and healthier than those in this study.

Unexpectedly, participants did not contact their physiotherapists about PEP problems even when advised to do so by the researcher. This lack of taking the researcher's advice may have been affected by confusion regarding the role of the researcher and the role of the GDH physiotherapist. On the other hand, participants may not have contacted their physiotherapists because they did not find the researcher's advice credible; it could also be that the researcher addressed all their questions and therefore they found no need to contact the GDH physiotherapist.

Bias

The limitations of bias were evident. The dosage effect (time spent during phone calls or visits) was variable between the HVI and TI groups where a disproportionate amount of time was spent with HVI participants. On average home visit interventions required 75 minutes and telephone interventions required only 30-45 minutes. This disparity occurred because modeling (one of the four methods used to improve self-efficacy of exercise) could not be used with telephone interviews due to lack of visual contact. Furthermore, there was a greater opportunity during home visits to detect technical problems with the participant's exercise than with the telephone intervention participants. Balancing this time with home visitations, verification of exercises took longer during the telephone versus the home visit. Some participants had multiple

exercise programs from various therapists and it took some time to ensure they had their GDH PEP before commencing discussion.

The lack of blind assessment and re-assessment exposed the study to investigator bias. Spouse or caregiver bias occurred during the home intervention semi-structured interviews and the final semi-structured interviews. Often the spouse/caregiver sat in on the interview and often provided feedback about some aspect of the participant's exercise behavior. Although this input was unexpected and valuable, their presence may have influenced participants' responses. The interview responses with the participant who was hearing impaired also introduced his spouse's bias. And finally, as in all research of human behavior, volunteer bias limits the generalization of findings to all adults of similar age.

CHAPTER FIVE

Summary

The study was unable to determine whether or not participant demographics affect beliefs of "self-efficacy of exercise", adherence to prescribed exercise and mobility. Moreover, the results were inconclusive regarding treatment effects on the two interventions groups due to the small sample size. However, participants in this study had better mobility scores than those in Malone et al's (2002) study where there were no interventions.

The qualitative evidence suggested that the older adults exercised for a multitude of reasons and experienced a number of valuable outcomes. The participants faced ongoing barriers to exercise post-discharge from the GDH – poor retention of exercise technique, inability to independently problem solve new or unresolved barriers to exercise, and the continuance of health/mobility problems. Therefore, these older adults fell into a gap of service with respect to maintaining or improving mobility in the community. The results of this study gave rise to recommendations to decrease disparity in care directed to maintaining mobility in older adults the community.

Recommendations for Physiotherapy Clinicians

This study was useful in identifying gaps in delivery of physiotherapy clinical practice. The following are recommended strategies to improve physiotherapy clinical care for older adults attending a Geriatric Day Hospital:

1. Prior to exercise prescription evaluate the older adult's self-efficacy and intention to exercise using a valid/reliable tool.
2. Assess the older adult's perceptions of outcomes of exercise and physical activity and integrate these findings into exercise counseling during physiotherapy treatments. While exercise counseling techniques based on exercise behavior research are relatively new to physiotherapy, continuing education courses are available to upgrade counseling knowledge and skills.
3. Consider using established self-management strategies in group settings to support exercise behavior (e.g., Arthritis Self-Management Program) as well as incorporating self-management strategies into counseling lifestyle change as an inter-disciplinary team responsibility.
4. Include a formal evaluation of exercise adherence throughout treatment.
5. Offer the option of home-based exercise programs or community-based exercise programs.
6. If prescribing a home exercise program, it should include all the parameters of fitness in exercise programs (i.e., aerobic training, muscular strength and endurance, flexibility, and balance).
7. A PEP document should have special written instructions:
    - The date of prescription,
    - Contact information should questions or problems occur

- The frequency, duration, resistances, and number of sets of the prescribed exercise,
- The possible warning signs and symptoms of adverse reactions to exercise,
- An exercise journal which includes the expected frequency of the exercise routine, the goals of each exercise and the overall expected outcome.

8. Encourage the older adult to dispose of old exercise programs as the old program may no longer be helpful to them.
9. When revising exercise programs eliminate inappropriate exercises from the older adults' program.
10. Expect relapses in exercise behavior as relapse is a normal phenomenon. Include relapse counseling and assist the older adult in preparing his/her own action plan in which the older adult understands that if certain signs or symptoms arise, he/she is to take specific steps (e.g., if I have pain, then I will...). This action plan would include instructions on when to contact therapists again regarding mobility and their problems arise with the physiotherapy exercise program (PEP).
11. Consider the long term utility of the paper-format exercise program. GDH clients receive a great deal of information from GDH staff. A means to organize information (such as a binder) may be necessary to facilitate client access to the information. Also, other formats such

as video-tapes may be alternatives for older adults to use when performing their exercise routines.

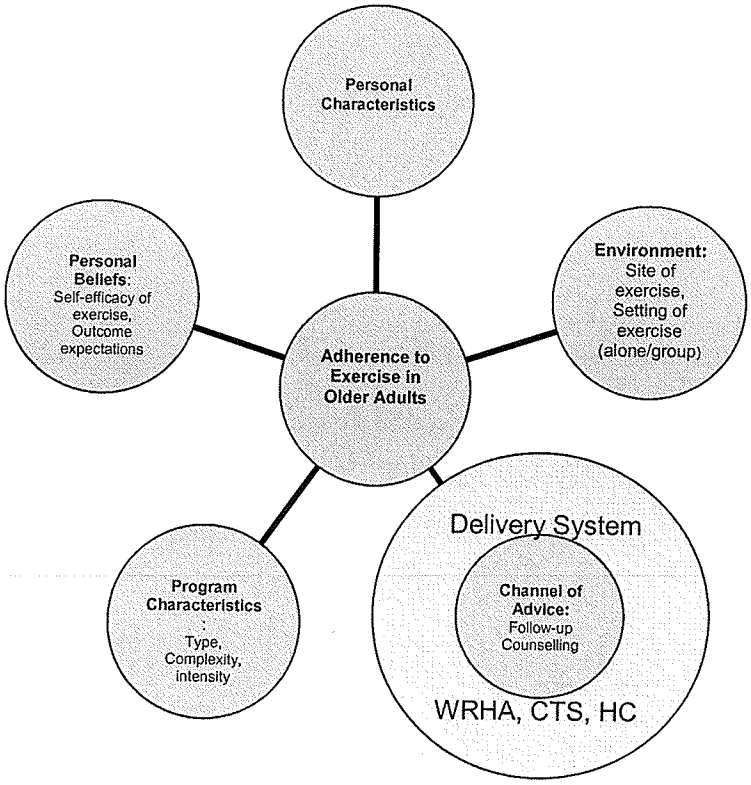
12. When determining long term goals with the older adult that focus on mobility, consider alternatives to the short/finite relationship between the physiotherapist and the individual. This is recommended due to evidence suggesting that a short-term relationship with older adults is inadequate because:
    - Relapse to exercise is expected.
    - A withdrawal of the GDH supportive and structured environment is a further challenge to exercise behavior.
    - The present practice of continued use of PEP for long term is inappropriate due to the changing nature of biomedical status in the older adult
    - Older adults may forget proper exercise technique (older adults do not retain motor skills as well as younger adults).
    - Socialization is important to older adults.
13. Be cautious when asking spouses to assist with exercise programs. This additional responsibility may place additional burden to the spouse and be detrimental to the relationship.

Recommendations for Delivery of Care Systems

The research study not only made recommendations for clinicians, but also found that the delivery of care system also requires change. A longer-term relationship between the older adult and physiotherapy should be established. This can carried out through discussion and negotiation with other stake holders such as the Winnipeg Regional Health Authority (WRHA), Community Therapy Services (CTS), Home Care (HC) and GDH team.

These recommendations may be summed up for physiotherapists in a model which recognizes the influences on exercise adherence in older adults seen in Figure 7.

Figure 7: Influences on Exercise Adherence in Older Adult



Recommendations for Future Research

There were a number of issues in physiotherapy clinical care that were identified for further research. These areas of recommended future enquiry are:

1. Develop guidelines for identifying older adults at risk for non-adherence to exercise.
2. Determine the best-practice physiotherapy exercise prescription guidelines for specific health conditions.
3. Physiotherapists' perceptions of their role in primary care
4. Physiotherapist exercise prescription practice:
    - Do exercise prescriptions for older adults include the four parameters of fitness including balance?
    - Are there accompanying explanations with the prescriptions?
    - What type of follow-up is provided?
5. Identify best-practice methods of counseling exercise behavior for older adults (identifying intention, self-efficacy and self-regulating behaviors)
6. Identify best-practice methods to provide client PEP instructions

Recommendations for Revising the Pilot Study Methodology

1. Develop a new measurement tool which incorporates the constructs of both self-efficacy and intention to exercise,
2. Include a mobility outcome measurement for the upper limb
3. Include a measurement of overall physical activity

4. Perform semi-structured interviews only in Phase 3 and include all participants.
5. Expand counseling strategies to address lack of intention to exercise as well as self-efficacy
6. Encourage participants to complete all of BBS items

In conclusion, the pilot study identified methodological issues that need to be addressed prior to conducting a larger study because of the low power of the study. A larger study to determine effectiveness of follow-up care to support older adult exercise behavior and mobility should be carried out.

APPENDIX A

STUDY PROTOCOL

Appendix A: Study Protocol

Consent and Randomization of Participants

1. Educating the Geriatric Day Hospital Physiotherapists
   I provided a formal audio-visual presentation outlining the details of the study and the role that physiotherapists play in recruitment of participants. The physiotherapists were given a one page summary of the pilot study and their role within this study, including an address, email address and telephone number of the investigator.

2. The physiotherapists identified potential candidates for the study
   - 2.1 Three weeks prior to the client being discharged from the study, the PT approached the client asking the client to consider having me meet with them to explain the study. The PT gave a letter requesting permission for me to approach them about the study (Appendix L).
   - 2.2 If the client gave permission in writing the therapist contacted me to arrange a meeting with the client and myself at the day hospital to explain the study

3. Meeting with the potential candidate
   - 3.1 Two weeks prior to the client being discharged from the GDH, I met with the day hospital client to describe the study. This discussion included an explanation of what participating in the study meant in terms of time and effort and the potential risks and benefits. A copy of the consent form was provided to the client for review in private.
   - 3.2 One week prior to the client being discharged, I met with the individual to request consent.

4. When consent is given, the investigator:
   - 4.1 Requested and documented the following Confidential Demographic Information (Appendix N):
     - 4.1.1 Address, phone number and postal code
     - 4.1.2 Name of Physician and phone number;
     - 4.1.3 Presence of Living Will; and
     - 4.1.4 Name and phone number of next of kin.
   - 4.2 Requested a copy of the physiotherapy prescribed exercise program and reviewed this program with the physiotherapist.

4.3. Set a home visit date with the client approximately one week from the day hospital discharge date. I provided a photocopy of the Study Information and Consent Form, including a sheet of paper with my phone number and the date of home visit to the participant.

5. The four geriatric day hospitals operate independently from each other, and thus the discharge of patients from these programs occurs on a continuous and independent nature as clients fulfill discharge criteria within their programs. The notification of a potential participant to the study occurred at random between Deer Lodge Centre, Riverview Health Centre, St. Boniface General Hospital and Seven Oaks General Hospital. As a day hospital client consented to participation in the study, I assigned the participant into the control (C) group, the home visit-intervention (HVI) group or the telephone-intervention (TI) group, in this order of assignment. That is to say, when a participant was assigned to the C group, then the next participant was assigned to the HVI group. When a participant was assigned to the HVI group, the next new participant was assigned to the TI group. The next new participant was assigned to the C group, and the assignment continued until there were adequate numbers of participants in each of the C, HVI and TI groups.

6. Once the participant was assigned into the C, HVI or TI groups I assigned a study number to participant. All assessment and questionnaire documents were henceforth identified only by this particular number pertaining to this particular individual. The file containing the participant's name, address (Confidential Demographic Information Form) and participant number was kept in a separate filing cabinet from the testing result files.

7. I requested a copy of the participant's home exercise program with the instructions attached from the participant's physiotherapist. The physiotherapist reviewed the program with me to ensure continuity of the instructions between the therapist and me.

8. I requested consent for participant's telephone conversations and interviews to be audio-taped (Appendices O and P).

The Initial Phase: Assessment

All participants received a telephone call three days before the scheduled first assessment to confirm the home visit. The day of the meeting, I brought the participant's home exercise program; a stop watch; assessment forms (TUG, BBS, MMSE, and SEE); a blank exercise journal; and a copy of contact names and numbers (next of kin, and physician).The participants underwent approximately 60-75 minutes of assessment.

After the assessment was completed, the participant and I determined the next appointment date. The participants in the **control group** received an appointment nine weeks into the future which is ten weeks post-day hospital discharge for final assessment. The participants in the **HVI** and **TI groups** received appointments for their interventions scheduled three weeks in the future. Every effort was made to maintain a similar time of day, and day of the week for all home visit assessments, or home visit interventions or telephone interventions.

Two days prior to the final phase, I telephoned **control group participants** to confirm the final assessment.

The Second Phase: Intervention

The Home Visit-Intervention Group

After the assessment was complete, the participant and I agreed upon a specific date 4 and 7 weeks after discharge from the GDH (or 3 and 6 weeks into the future) and time during the day which I would visit the participant at home. The days, times and dates will be written down for the participant, as well as the contact phone number of the investigator.

Three days before the scheduled first home visit intervention, I contacted the participant by phone to confirm the home visit. I brought the participants physiotherapy prescribed exercise program; a tape recorder and a standardized intervention script (Appendix J). The visit consisted of reviewing the participant's home exercise program and applying self-efficacy of exercise enhancing strategies. The latter was be done by the investigator providing feedback on how the participants are doing their exercise program, assisting the participant in problem-solving regarding the barriers to exercise, discussing the participant's physical cues when exercising and providing general encouragement about the progress and effort being made. General questions were also asked regarding their exercise behavior. This intervention was planned to be approximately in 45 minutes in duration. The participant and I determined the next appointment dates (three and six weeks into the future which are four and seven weeks, post-day hospital discharge). Every effort was be made to maintain a similar time of day and day of the week for these appointments.

Two days prior to visit, I telephoned the participant to confirm the visit. During the second visit, the investigator reviewed the exercises with the participant, and used self-efficacy of exercise enhancing strategies as described in the above paragraph. Again general questions were also asked regarding their exercise behavior. This intervention was planned to be approximately in 45 minutes in duration. The participant and I determined the final assessment date (one week later which will be 10 weeks post-day hospital discharge).

The Telephone-Intervention Group

After the assessment was complete, the participant and I agreed upon a specific date, 4 and 7 weeks after GDH discharge (or 3 and 6 weeks into the future) and time during the day which I would telephone the participant. The day,

time and dates was written down for the participant, as well as the contact phone number of the investigator.

Three days before the scheduled first telephone-intervention, I contacted the participant by phone to confirm the planned intervention. The telephone intervention was carried out using a standardized script and was audio-recorded using a phone/tape-recorder (Appendix J). This intervention consisted of using self-efficacy of exercise-enhancing strategies. These strategies included: providing personal feedback to participants, answering questions regarding the participant's program, assisting in problem solving regarding the exercises, discussing the participant's physical cues when exercising and providing general encouragement about the effort made. General questions were also asked regarding their exercise behavior. During the second intervention the final home visit-assessment date and time was also be agreed upon by the participant and investigator (9 weeks after the initial assessment, 10 weeks from discharge from the day hospital).

The Control Group

The control group did not receive any intervention.

The Final Phase: Reassessment

Each participant received a final reassessment approximately ten weeks after his/her discharge from the GDH (or 9 weeks after the initial study assessment). The day of the meeting, again I brought the participant's home exercise program; a stop watch; assessment forms (TUG, BBS, MMSE, SEE, and Barriers/Outcomes to Exercise Questionnaire); a tape recorder; and a copy of contact names and numbers (next of kin, and physician).

The participant underwent approximately a 90-minute assessment. During the final assessment I also requested demographic information (Appendix D).

After the assessment was completed, I informed the participant that his/her involvement in the study is complete, and was thanked. One week after this final assessment, a letter of appreciation was sent to the participant for his/her involvement and cooperation in the study.

APPENDIX B:

LETTER OF APPROVAL: HEALTH RESEARCH ETHICS BOARD, UNIVERSITY OF MANITOBA

UNIVERSITY OF MANITOBA

BANNATYNE CAMPUS
Research Ethics Boards

P126-770 Bannatyne Avenue
Winnipeg, Manitoba
Canada R3E 0W3
Tel: (204) 789-3255
Fax: (204) 789-3414

APPROVAL FORM

Principal Investigator: Ms. Nancy Ryan-Arbez
(Supervisor: Dr. J. Cooper)

Protocol Reference Number: H2004:007
Approval Date: June 10, 2004

Protocol Title: **"Older Adults Post-Geriatric Day Hospital Discharge Exercise Adherence: A Pilot Study Research Proposal"**

The following is/are approved for use:

- **Informed Consent Form (dated June 2, 2004)**
- **Appendix F: Exercise Journal (dated June 2, 2004)**
- **Appendix G: Expected Outcomes from Exercise and Barriers to Exercise Assessment Form (dated June 2, 2004)**
- **Appendix N: Script for Home Visit and Telephone Interventions (dated June 2, 2004)**
- **Appendix H: Study Protocol (dated June 2, 2004)**

The above was approved by Dr. Ken Brown, Chair, Health Research Ethics Board, Bannatyne Campus, University of Manitoba on behalf of the committee per your letter dated June 2, 2004. The Research Ethics Board is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement, and the applicable laws and regulations of Manitoba. The membership of this Research Ethics Board complies with the membership requirements for Research Ethics Boards defined in Division 5 of the *Food and Drug Regulations.*

A study status report must be submitted annually and must accompany your request for re-approval. Any significant changes of the protocol and informed consent form should be reported to the Chair for consideration in advance of implementation of such changes. The REB must be notified regarding discontinuation or study closure.

This approval is for the ethics of human use only. For the logistics of performing the study, approval should be sought from the relevant institution, if required.

Sincerely/yours,

Ken Brown, MD, BA
Chair, Health Research Ethics Board
Bannatyne Campus

Please quote the above protocol reference number on all correspondence.
Inquiries should be directed to the REB Secretary
Telephone: (204) 789-3255/ **Fax:** (204) 789-3414

APPENDIX C:

LETTERS OF APPROVAL, DEER LODGE CENTRE, RIVERVIEW HEALTH CENTRE, SEVEN OAKS GENERAL HOSPITAL AND ST. BONIFACE GENERAL HOSPITAL

Hôpital général St-Boniface General Hospital

Room N1004 - 409 Tache Ave.
Winnipeg, Manitoba
Canada R2H 2A6
Tel: (204) 235-3623
Fax: (204) 237-9860

Research Review Committee

Approval Form

Principal Investigator: **Ms. Nancy Ryan-Arbez**

RRC Reference Number: **RRC/2004/0562**

Date: **July 14, 2004**

Protocol Title: **The Effects of Interventions on Exercise Adherence of Older Adults Discharged from a Geriatric Day Hospital (previously Older Adults Post-Geriatric Day Hospital Discharge Exercise Adherence: A Pilot Study Research Proposal)**

The following is/are approved for use:

- **Protocol Synopsis dated January 9, 2004**
- **Amendment as per April 1, 2004 and April 6, 2004 letters**
- **Appendix A: Demographic and Quantitative Assessment Results Form dated January 9, 2004**
- **Appendix B: Timed Up and Go Assessment Form dated January 9, 2004**
- **Appendix C: Berg Balance Scale dated January 9, 2004**
- **Appendix D: Mini-mental State Examination Form dated January 9, 2004**
- **Appendix E: Self-efficacy for Exercise Assessment Form dated January 9, 2004**
- **Appendix F: Home Exercise Journal dated June 2, 2004**
- **Appendix G: Expected Outcomes from Exercise and Barriers to Exercise Assessment Form dated June 2, 2004**
- **Appendix H: Study Protocol dated June 2, 2004**
- **Appendix I: Letter Requesting Permission to Approach Client dated January 9, 2004**
- **Informed Consent Form dated June 2, 2004**
- **Appendix K: Confidential Demographic Information Form dated January 9, 2004**
- **Appendix L: Permission to Audio-tape Telephone Conversations or Telephone Messages dated January 9, 2004**

- **Appendix M: Permission to Audio-tape Interviews (undated)**
- **Appendix N: Script for Home Visit and Telephone Interventions dated June 2, 2004**

The above was approved by Dr. M. Tétreault, Chairperson, Research Review Committee, St. Boniface General Hospital, on behalf of the Committee. As the recommendations by the Research Review Committee have been met, final approval is now granted.

Sincerely yours,

Dr. M. Tetreault
Chairperson, Research Review Committee
St. Boniface General Hospital

Please quote the above reference number on all correspondence.
Inquiries should be directed to the RRC Secretary
Telephone: (204) 235-3623 **Fax**: (204) 237-9860

cc: Dr. Juliette Cooper, Supervisor
Ms. L. Sturtevant, Program Director - Rehabilitation Services
Ms. K. Neufeld, Director - Chief Nursing Officer
Dr. P. Hall, President of the Medical Staff
Mr. D. Mestdagh, Pharmacy Department
Ms. D. Halhead, Financial Services
Ms. S. Guinn, Health Records

RIVERVIEW
HEALTH CENTRE

April 19, 2004

Dear Ms. Ryan-Arbez:

RE: The Effects of Interventions on Exercise Adherence of Older Adults Discharged from a Geriatric Day Hospital

The Riverview Health Centre Research Committee reviewed your proposal at our meeting on April 16, 2004. Based on an examination of the documents you submitted, the Committee has approved your request for access to the Centre.

Please note that a condition of access to RHC is that you provide us with a summary of the findings of the study when available. Once you are ready to begin data collection, please contact me at or Best wishes for the successful completion of your study.

Sincerely,

Marie Edwards
Chair, Research Committee
Telephone Number:
Fax Number:

1 Morley Avenue ◆ Winnipeg, Manitoba, Canada ◆ R3L 2P4
Telephone (204) 452-3411 ◆ Fax (204) 287-8718

DEER LODGE CENTRE
Making lives better

2109 PORTAGE AVENUE
WINNIPEG, MANITOBA R3J 0L3
www.deerlodge.mb.ca

May 28, 2004

Nancy Ryan-Arbez

Dear Nancy:

Re: Request for Research Access " The Effects of Interventions on Exercise Adherence of Older Patients Discharged from Geriatric Day Hospital"

Please find enclosed the approved Request for Research Access form for the project " **The Effects of Interventions on Exercise Adherence of Older Patients Discharged from Geriatric Day Hospital** ". This project promises to be of significant benefit to the Centre as we look for ways of enhancing and improving discharge planning and promoting exercise adherence once clients have left the Day Hospital. We very much look forward to the results of this project.

Pat Barkowski, Physiotherapist, Day Hospital, will be the site facilitator for this project. Please contact her at for any information or assistance you may require. When you have finished this study, please forward a copy of the project results to Judy Inglis in the Centre's Crane Library. Once completed it would also be helpful to provide a follow-up session to share your work with both study participants and Centre staff in general.

We are happy to support this project and wish you every success in completing your studies.

Sincerely,

Réal Cloutier
Chief Operating Officer

SEVEN OAKS
General Hospital

June 17, 2004

Ms. Nancy Ryan-Arbez

Dear Ms. Ryan-Arbez:

Your research project entitled "The effects of interventions on exercise adherence of older adults discharged from a Geriatric Day Hospital" has been approved.

Please find enclosed a copy of your 'Request to Proceed with Research Project' which has been signed by B. Laurila, Rehab/Geriatrics Program Director, C. Rippin-Sisler, Chief Nursing Officer and M. Neskar, Chief Executive Officer.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Neil Swirsky, MD, FRCPC
Chief Medical Officer
Chair, Ethics Committee

:ljrt

F:\DATA\ADMIN\WP\LINDA\COMMITTE\ETHICS\approvals\

2300 McPhillips Street • Winnipeg MB R2V 3M3 • Phone: 204.632.7133 • Fax: 204.694.9469

APPENDIX D

DEMOGRAPHIC AND QUANTITATIVE ASSESSMENT RESULTS FORM

Appendix D: Demographic and Quantitative Assessment Results Form

Participant Number: _____

Demographic Data:

Date of Birth: _____

Gender: Male ___ Female___

Age: 65-74_____ 75-84 _____ 84 + _____

Years of Formal Education:

0 ____ 1-4 ____ 5-8 ____ 9-12 ____ 13 + ____

Income: $0-4900 ___ 5-9900 ___ 10,000-14,900 ___15,000-19,900 ___
20,000-24,900 ___ 25,000-29,900 ___30,000-34,900 ___
35,000-35,900 ___ 40,000 + ____

Quantitative Data:

Test Name	Initial Assessment	Final Assessment
TUG		
BBS		
MMSE		
SEE		
Adherence		

APPENDIX E

MINI-MENTAL STATE EXAMINATION FORM

Appendix E: Mini-mental State Examination Form

Participant Number: _____

Date of Assessment: _____

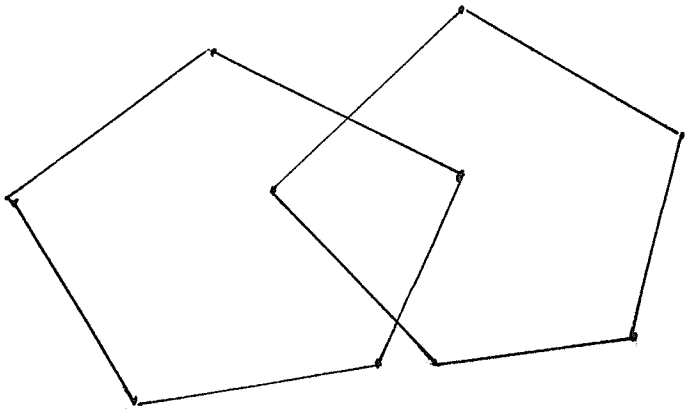
Initial Assessment: _____ **Final Assessment:** ____

Score	Questions
/5	**Orientation to Time** Month _____ date _____ year _____ day of week ____season ____
/5	**Orientation to Place** Home/unit _____street _____ city _____ prov. _____ country _____
/3	**Registration** Name 3 objects (apple, penny, table); 1 second to say each. Ask the client to repeat all 3 after you have said them. Give 1 point for each correct answer. Than repeat them (up to 3 times) until client learns all 3. Count trials. **Trials:** ____
/5	**Attention and Calculation** Spell "WORLD" backwards: __ __ __ __ __. Spell forward and correct errors first __ __ __ __ __ Alternatively ask client to count backwards from 100 by 7's. 1 point for each correct. Stop after 5 answers. 93 __ 86 __ 79 __ 72 __ 65 __ Record best score.
/3	**Recall** Ask for the 3 objects repeated above. Give one point for each correct. _____ _____ _____
/2	**Language** Name a pencil _____. Name a watch _____.
/1	Repeat the following: "no ifs, ands or buts" _____
/3	Follow a 3 stage command: "take this paper in you right hand _____, fold it in half _____, and put it on the floor/bed/table". (3 points). [Use blank piece of paper].
/1	Do what this says to do: "CLOSE YOUR EYES' [show bottom of this page]. **CLOSE YOUR EYES**

/1 Write a sentence.

_____

/1 **Visual construction**
Copy the design. [The picture here will be of two overlapping pentagons]



APPENDIX F

SELF-EFFICACY FOR EXERCISE ASSESSMENT FORM

Appendix F: Self-efficacy for Exercise Assessment Form

Participant Number: _____

Date of Assessment: _____ Initial ____ Final ____

How confident are you right now that you could exercise three times per week, when…

1. The weather was bothering you? 0 1 2 3 4 5 6 7 8 9 10

2. You were bored by the program or activity? 0 1 2 3 4 5 6 7 8 9 10

3. You felt pain when exercising? 0 1 2 3 4 5 6 7 8 9 10

4. You had to exercise alone? 0 1 2 3 4 5 6 7 8 9 10

5. You did not enjoy it? 0 1 2 3 4 5 6 7 8 9 10

6. You were too busy with other activities? 0 1 2 3 4 5 6 7 8 9 10

7. You felt tired? 0 1 2 3 4 5 6 7 8 9 10

8. You felt stressed? 0 1 2 3 4 5 6 7 8 9 10

9. You felt depressed? 0 1 2 3 4 5 6 7 8 9 10

Not confident Very confident

1 2 3 4 5 6 7 8 9 10

APPENDIX G

TIMED UP AND GO ASSESSMENT FORM

Appendix G: Timed Up and Go Assessment Form

Participant Number: _____

Date of Initial Assessment: _____

Date of Final Assessment: _____

Note: The best and final score is used for the data analysis.

Trial Number	**Initial Assessment**	**Final Assessment**
1.	(seconds)	(seconds)
2.	(seconds)	(seconds)
3.	(seconds)	(seconds)
Best and Final Score	(seconds)	(seconds)

APPENDIX H

BERG BALANCE SCALE FORM

Appendix H: Berg Balance Scale

Participant Number: _____

Date of Initial Assessment: _____

Date of Final Assessment: _____

Item	Description	Initial Assessment	Final Assessment
1.	Sit to standing		
2.	Standing unsupported		
3.	Sitting unsupported		
4.	Standing to sit		
5.	Transfers		
6.	Stand, eyes closed		
7.	Stand, feet together		
8.	Forward reach		
9.	Retrieve object from floor		
10.	Turn to look behind		
11.	Turn 360 degrees		
12.	Stool stepping		
13.	Tandem standing		
14.	Standing on one foot		
	Total Score:		

APPENDIX I

HOME EXERCISE JOURNAL

Appendix I: Home Exercise Journal

(Adapted from Weinberg and Stzurn, 2004)

Script for introducing the home journal to the participant: I would like to ask you to fill out this record of your exercise each day of the week. This journal will help you and me to know how much exercise you will do in the next ten weeks. I have an example of how to fill this journal out. Each day you exercise please mark an "X" in the box. Also put a little note as to how you felt. If you had planned to exercise one day and you couldn't exercise for what ever reason, please just jot down why you didn't exercise, but do not put an "X" in the box. I will go over the journal with you the next time I see you. You also can call me at my research office and leave a message if you have any other questions about the journal. At the end of the study I will need to take the journal to my office to review the results.

The above script will not be included on the participant's journal.

1. Please make an "X" under the proper day when you have completed ALL the exercises.

2. Mark down any notes about problems or concerns if there are any (e.g., pain, fatigue, chest pain, shortness of breath or feeling unwell).

Example of filling the journal out:

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 5: NOTES:	X	Felt too tired to exercise	X	X	Day of rest	X Felt really good	Day of rest

Participant Number_____

Date starting journal: _____

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 1: NOTES:							

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 2: NOTES:							

Participant Number: _____

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 3: NOTES:							

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 4: NOTES:							

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 5: NOTES:							

Participant Number: _____

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 6: NOTES:							

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 7: NOTES:							

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 8: NOTES:							

Participant Number: _____

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 9: NOTES:							

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 10: NOTES:							

DAY	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Week 11: NOTES:							

Participant Number: _____

APPENDIX J

SCRIPT FOR HOME VISIT AND TELEPHONE INTERVENTIONS

Appendix J: Script for Home Visit and Telephone Interventions and Semi-Structured Interviews

Instructions for use of the script:

1. The participant's exercise list including pertinent instructions will be attached to the script.
2. The strategies to enhance self-efficacy numbered 1-3 are used with each individual exercise. The fourth strategy consists of a series of questions and is applied once all exercises are completed.
3. The bolded text indicates when I respond to what the participant has said.

Telephone Intervention Strategy:

Introduction to the session:
Hello Mr./Mrs./Miss _____. It is Nancy Ryan-Arbez calling. I am the person who you met at the Day hospital, and talked about your participation in my research study. As we talked before this phone call shall take us about 30 minutes.

1. Review of the Home Program to improve mastery of the task:

The first thing I would like to discuss is your exercise program. I see you have (blank) number of exercises. How is it going with each one?

I wonder which one you enjoy the most. Which one do you enjoy the least?

Is there any exercise that you cannot do?

2. Modeling of the Exercise Program:

I know when I exercise or my mother exercises, we can feel it in our muscles and joints or we can feel like we are breathing more deeply.

In exercise number… (the exercise that is the most enjoyable) you should feel "X" **(I will describe what muscle/joint the participant will encounter symptoms given the particular exercise).** Is that what you feel?

In exercise number… (the exercise that the person least enjoys), you should feel "X" **(I will again describe what just/joint the participant will encounter symptoms given the particular exercise).** Is that what you feel?

3. Encourage and provide feedback:

After the discussion about the particular exercises I will point out one positive aspect of the technique which the participant described to me.

4. Persuade to adhere to exercise program:

I recognize that you are making an effort to exercise and I must congratulate you.

I notice that your therapist prescribed you to exercise __ times a week. Have you been able to do this?

I wonder why you can do this.

Things sometimes happen that influence a person's routine to exercise. Since you have been discharged from the Day Hospital have you experienced a change in health?

If yes, what have you experience?

Have you exercised in the past?

Do you need the advice from the physiotherapist?

Do you exercise with someone? Who?

Where do you exercise?

Is there enough space?

Is there enough privacy?

Is exercising in privacy something important to you?

Do you understand your exercise program?

Are you able to read the exercise program?

Are you confident that you will continue exercise?

Is the exercise program interesting and challenging?

Is the exercise too hard?

Does the exercise cause pain?

Does the exercise help you?

I notice in our discussion that there are some things that hinder you following your exercise program such as **(I will review the problem areas identified by the participant).** Is there any way that we can work together to overcome these problems? **(I then will endeavor to problem solve with the participant to overcome the barrier(s).**

What do feel you are gaining from the exercise?

In what way is this important to you? **(If the reason is not important to her/him, then I will endeavor to help the participant find a valid reason for her/him to continue on with the exercise program).**

It is not always easy to keep going with an exercise program. What are the kinds of things that help you keep exercising?

How do you think this support will continue in the next few months? (If the participant thinks the support is beyond his/her control, we will talk about alternative options to providing support that are within the participant's control).

If the participant has questions about the appropriateness of his/her exercise (for example, the participant finds the exercise boring, painful, unhelpful, and ineffective):

I see from our talk today that you have some questions about your exercise program. These questions can only be answered by your physiotherapist at the Day Hospital. Why don't you contact her and she will be able to answer your question. Her telephone number is **(I will have all the therapists' telephone numbers with me)**

Your therapist will appreciate your call to straighten out any problem.

Home Visit Strategy

Instructions for use of the script:

1. The participant's exercise list including pertinent instructions will be attached to the script.
2. The strategies to enhance self-efficacy numbered 1-3 are used with each individual exercise. The fourth strategy consists of a series of questions and is applied once all exercises are completed.
3. The bolded text indicates when I respond to what the participant has said.

Introduction to the session:

Hello Mr./Mrs./Miss _____, I am Nancy Ryan-Arbez the person who you met at the Day hospital. We talked about your participation in my research study. May I come in? I mentioned before that this will take us about 45-60 minutes.

1. Review of the Home Program to improve mastery of the task:

Can you and I sit down to go over your exercise program? I see you have (blank) number of exercises. How is it going with each one?

I wonder which one you enjoy the most.

Which one do you enjoy the least?

Is there any exercise that you cannot do?

2. Modeling of the Exercise Program:

I know when I exercise or my mother exercises, we can feel it in our muscles and joints or we can feel like we are breathing more deeply. Can you show me how you do exercise number… (the exercises least and most liked).

In exercise number… (the exercise that is the most enjoyable) you should feel "X" **(I will describe what muscle/joint the participant will encounter symptoms given the particular exercise)**.

Is that what you feel**? (I will provide visual feedback through demonstrating the exercise and then ask the participant to repeat using the same technique).**

In exercise number… (the exercise that the person least enjoys), you should feel "X" (I will again describe what just/joint the participant will encounter symptoms given the particular exercise). Is that what you feel? **(I will provide visual**

feedback through demonstrating the exercise and then ask the participant to repeat using the same technique).

3. Encourage and provide feedback:

After the discussion about the particular exercises I will point out one positive aspect of the technique which the participant described to me.

4. Persuade to adhere to exercise program:

I recognize that you are making an effort to exercise and I must congratulate you.

I notice that your therapist prescribed you to exercise __ times a week. Have you been able to do this?

I wonder why you can do this.

Things sometimes happen that influence a person's routine to exercise. Since you have been discharged from the Day Hospital have you experienced a change in health? If yes, what have you experience?

Have you exercised in the past?

Do you need the advice from the physiotherapist?

Do you exercise with someone?
Who?

Where do you exercise?

Is there enough space?

Is there enough privacy?

Is exercising in privacy something important to you?

Do you understand your exercise program?

Are you able to read the exercise program?

Are you confident that you will continue exercise?

Is the exercise program interesting and challenging?

Is the exercise too hard?

Does the exercise cause pain?

Does the exercise help you?

I notice in our discussion that there are some things that hinder you following your exercise program **(I will review the problem areas identified by the participant)**. Is there any way that we can work together to overcome these problems? **(I then will endeavor to problem solve with the participant to overcome the barrier(s).**

What do feel you are gaining from the exercise?

In what way is this important to you? **(If the reason is not important to her/him, then I will endeavor to help the participant find a valid reason for her/him to continue on with the exercise program).**

It is not always easy to keep going with an exercise program. What are the kinds of things that help you keep exercising?

How do you think this support will continue in the next few months? (If the participant thinks the support is beyond his/her control, we will talk about alternative options to providing support that are within the participant's control).

If the participant has questions about the Appropriateness of his/her exercise (for example, the participant finds the exercise boring, painful, unhelpful, and ineffective):

I see that you have some questions about your exercise program. These questions can only be answered by your physiotherapist at the Day Hospital. Why don't you contact her and she will be able to answer your question. Her telephone number is (I will have all the therapists' telephone numbers with me)

Your therapist will appreciate your call to straighten out any problem.

APPENDIX K

EXPECTED OUTCOMES FROM EXERCISE AND BARRIERS TO EXERCISE ASSESSMENT FORM

Appendix K: Expected Outcomes from Exercise and Barriers to Exercise Assessment Form

Participant Number: _____

Date of Final Assessment: _____

1. What did you expect to happen when you exercised (what are the expected outcomes of exercise)?

2. Is there anything that may have stopped you from exercising at home exercised (what are the barriers to exercising in your home)?

3. **Has anyone helped you to continue to exercise at home?**

1. **Has anything helped you to continue to exercise at home?**

APPENDIX L

LETTER REQUESTING PERMISSION TO APPROACH CLIENT

Appendix L: Letter Requesting Permission to Approach Client (University of Manitoba Letterhead)

Dear (Name of Client), Date:

My name is Nancy Ryan-Arbez, and I am a licensed physiotherapist. I am studying how well people exercise at home after they have finished attending a Day Hospital program. My study involves visiting individuals in their home to see how clearly they think, how well they walk, keep their balance, and how confident they are in doing their exercise,

I would like to explain my study and ask you if you would like to participate in it. Would you consider talking with me one day at the Day Hospital? If you would agree to speak with me, please sign the form below and return it to the person who gave you this letter.

Thank you for considering my request.

Sincerely,

Nancy Ryan-Arbez, BMR (PT)
Physiotherapist

_____ Yes, **I would be interested in speaking with Nancy Ryan-Arbez.**

_____ **No, I do not wish to speak with her.**

Signature of Client: _____ Date: _____

APPENDIX M

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

Appendix M: Research Participant Information and Consent Form (University of Manitoba Letterhead)

Title of Study: "The Effects of Interventions on Exercise Adherence of Older Adults Discharged from a Geriatric Day Hospital"

Principal Investigator: Nancy Ryan-Arbez
Student,
Masters of Science (Rehabilitation)
School of Medical Rehabilitation
University of Manitoba
771 McDermot Avenue
Winnipeg, Manitoba
R3E 0T6

You are being asked to participate in a research study. Please take your time to review this consent form and discuss any questions you may have with Ms. Nancy Ryan-Arbez. You may take your time to make your decision about participating in this study and may discuss it with your friends or family before you make your decision. This consent form may contain words that you do not understand. Please ask Ms. Ryan-Arbez to explain any words or information that you do not clearly understand.

Purpose of Study

This research study is being conducted as part of the Nancy Ryan-Arbez's requirement to complete a Masters of Science (Rehabilitation) program. The main purpose of the study is to find out what happens to older adults' exercise habits after they are discharged from a geriatric day hospital. A total of 30 individuals will participate in the study.

Participant Selection

There are three groups of participants. You will be randomly selected to one of these three groups:

1. A control group. The control group participants receive no type of treatment;
2. A telephone intervention group. This group's participants receive telephone calls as a treatment; or
3. A home visit intervention group. This group's participants receive home visits as a treatment.

"The Effects of Interventions on Exercise Adherence of Older Adults Discharged from a Geriatric Day Hospital"

Study Procedures

If you take part in this study Ms. Ryan-Arbez will visit you in your home 1 week after you have stopped attending the day hospital program. She will ask you questions about how you are exercising. You will be asked to complete an exercise journal for the next 10 weeks. She will also assess your walking, balance and memory. This visit will take 1.5 hours of your time.

During the next 8 weeks, some people in the study will receive telephone calls to help them with their exercise, while other people will receive visits in their home to help them with their exercise. Some people in the study will not receive any of these treatments during those 8 weeks. After 10 weeks from the time you were discharged from the day hospital program, Ms. Ryan-Arbez will visit you in your home again to assess your walking, balance and memory, as well as ask you questions about your exercise. This visit will take 1.5 hours of your time.

You can stop participating any time in the event you feel uncomfortable about answering the questions. However, if you decide to stop participating in the study, we encourage you to talk to Ms. Ryan-Arbez first.

Risk and Benefits

There are minimal risks associated with participating in this study. Ms. Ryan-Arbez will assess your balance and walking in the same manner as the physiotherapists did in the geriatric day hospital. There may be benefits to participating in this study where you may exercise more and maintain your walking and moving ability.

Payment for Participation

You will receive no payment for participating in this study.

Confidentiality

Information gathered in this research study will be presented to professors and students in the School of Medical Rehabilitation, University of Manitoba. Medical records that contain your identity will be treated as confidential in accordance with the Personal Health Information Act of Manitoba. Your name and other identifying information will not be used or revealed. Questionnaires will be identified by a number only and will be stored in Ms. Ryan-Arbez's office, in Riverview Health Centre. The signed consent forms and results of the assessments will be destroyed one year after the completion of the study. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed.

Participant Initials: _____

"The Effects of Interventions on Exercise Adherence of Older Adults Discharged from a Geriatric Day Hospital"

The University of Manitoba Health Research Ethics Board may review research-records related records for quality assurance purposes.

Voluntary Participation/Withdrawal from this Study

Your decision to take part in this study is voluntary. You may refuse to participate or answer specific questions, or you may withdraw from the study at any time.

Questions

You are free to ask any questions that you may have about your rights as a research participant. If any questions come up during or after the study, contact Ms. Ryan-Arbez at . For questions about your rights as a research participant, you may contact The University of Manitoba, Bannatyne Campus Research Ethics Board Office at (204 798-3389). Do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

Statement of Consent

I have read this consent form. I have had the opportunity to discuss this research study with Ms. Ryan-Arbez. I have had my questions answered by them in language I understand. The risks and benefits have been explained to me. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.

I understand that information regarding my personal identity will be kept confidential, but that confidentiality is not guaranteed. I authorize the inspection of any of my records that relate to this study by The University of Manitoba Research Ethics Board, for quality assurance purposes. By signing this consent form, I have not waived any of the legal rights that I have as a participant in a research study.

Participant Signature: _____ **Date:** _____

Participant printed name: _____

Participant Initials: _____

"The Effects of Interventions on Exercise Adherence of Older Adults Discharged from a Geriatric Day Hospital"

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has knowingly given their consent.

Printed Name: _____ Date_____

Signature: _____Role in Study: _____

Participant Initials: _____

APPENDIX N
CONFIDENTIAL DEMOGRAPHIC INFORMATION FORM

Appendix N: Confidential Demographic Information Form

Name: _____

Address: _____

Postal Code: _____ **Phone No:** _____

Physician: _____ **Phone No:** _____

Living Will: _____ **Next of Kin:** _____

Phone No. of Next of Kin: (Residence) _____ **(Work)**

_____

Participant Number: _____

APPENDIX O

PERMISSION TO AUDIO-TAPE TELEPHONE CONVERSATIONS OR TELEPHONE MESSAGES

Appendix O: Permission to Audio-tape Telephone Conversations or Telephone Messages

I grant permission for any telephone conversations that I may have with the investigator or messages left for the investigator, to be recorded on a tape recorder. I understand that these tape recordings will be kept confidential and will be put in a secure location.

Participant signature: _____

Date: _____

Participant's name (printed):_____

I, the undersigned, have fully explained the relevant details of recording telephone messages or conversations to the participant named above and believe that the participant has understood and has knowingly given their consent.

Printed Name: _____ **Date:** _____

Signature: _____

Role in Study: _____

APPENDIX P

PERMISSION TO AUDIO-TAPE INTERVIEWS

Appendix P: Permission to Audio-tape Interviews

I grant permission for any interviews that I may have with the investigator to be recorded on a tape recorder. I understand that these tape recordings will be kept confidential and will be put in a secure location.

Participant signature: _____

Date: _____

Participant's name (printed):_____

I, the undersigned, have fully explained the relevant details of recording telephone messages or conversations to the participant named above and believe that the participant has understood and has knowingly given their consent.

Printed Name: _____ **Date:** _____

Signature: _____

Role in Study: _____

REFERENCES

American College of Sports Medicine (ACSM). (1998). Exercise and Physical Activity for Older Adults, *Journal of the American College of Sports Medicine, 30(6),* 992-1008.

Atienza, A. (2001). Home-based physical activity programs for middle-aged and older adults: summary of empirical research. *Journal of Ageing and Physical Activity*, 9(Suppl.), S38-S58.

Ajzen, I (1985). From intention to actions; a theory of planned behavior. In J. Kuhl, & J. Bechmann,. (Eds.). *Action-control From Cognition to Behavior.* (pp. 11-39) Heidelberg: Springer.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processing, 50,* 179-211.

Bamman, M.M., Hill, V.J., Adams, G.R., Haddad, F., Wetzstein, C.J., Gower, B.A., et al. (2003). Gender differences in resistance-training-induced myofiber hypertrophy among older adults. *Journal of Gerontology, A., Biological Science Medicine, Science, 58*, 108-116.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review, 84(2),* 191-215.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: the exercise of control.* New York: Freeman.

Barlow, J.H., Turner, A.P. & Wright, C.C. (2000). A randomized controlled study of the Arthritis Self-Management Programme in the UK. *Health Education Research, 15(6),* 665-680.

Bassey, E. J., Fiatarone, M.A., O'Neill, E.F., Kelly, M., Evans, W.J., & Lipsitz, L.A. (1992). Leg extensor power and functional performance in very old men and women. *Clinical Science, 82,* 321-327.

Berg, K.O., Wood-Dauphinee, S.L., Williams, J.I., & Gayton, D. (1989). Measuring balance in the older adult: preliminary development of an instrument. *Physiotherapy Canada, 41,* 304-311.

Berg, K.O., Wood-Dauphinee, S., & Williams J.I., (1995). The balance scale. Reliability assessment for elderly residents and patients with an acute stroke. *Scandinavian Journal of Rehabilitation Medicine, 27,* 27-36.

Berg, K.O., Wood-Dauphinee, S.L., Williams, J.I., & Maki, B. (1992). Measuring balance in the older adult: validation of an instrument. *Canadian Journal of Public Health, 83(Suppl. 2),* S7-11.

Bianchi, M.L., Orsini, M.R., Savaifoger, S., Orolani, S., Radaelli, G. & Betti, S. (2005). Quality of life in post-menopausal osteoporosis. *Health and Quality of Life Outcomes, 3(78),* 1-7.

Blair, S.N., Wells, C.L., Weathers, R.C., & Paffenbarger, R.S. (1994). Chronic disease: the physical activity dose-response controversy. In R.K Dishman (Ed.). *Advances in Adherence to Exercise.* (pp.31-54). Windsor: Human Kinetics.

Blumenthal, J.A., Emery, D.F., Madden, D.J., George, L.K., Coleman, R.E., Riddle, M.W., et al. (1989). Cardiovascular and behavioral effects of aerobic exercise training in healthy older men and women. *Journal of Gerontology; Medical Sciences, 4,* M147-M157.

Boyette, L.W., Lloyd, A., Boyette, J.E., Watkins, E., Furbush, L., Dunbar, S.B., et al. (2002). Personal characteristics that influence exercise behavior of older adults. *Journal of Rehabilitation Research and Development, 39(1),* 95-103.

Brassington, G.S., Atienza, A. A., Perczek, R.E., DiLorenzo, T.M., King, A.C. (2002). Intervention-related cognitive versus social mediators of exercise adherence in the elderly. *American Journal of Preventive Medicine, 23(2), (Suppl. 1),* 80-86.

Brawley, R.B., Martin, K.A., & Gyurcsik, N.C. (1998). Problems in assessing perceived barriers to exercise: confusing obstacles with attributions and excuses. In J.L. Duda (Ed.). *Advances in Sport and Exercise Psychology Measurement.* (pp.337-349). Morgantown: Fitness Information Technologies.

Brenes, G.A., Strube, J.J., & Storandt, M. (1998). An application of the theory of planned behavior to exercise among older adults. *Journal of Applied Social Psychology, 28(24),* 2274-2290.

Bridle, C., Riemsma, R.P., Pattenden, J., Sowden, A., Mather, L., Watt, I.S., et al. (2005). Systematic review of the effectiveness of health behavior interventions based on the transtheoretical model. *Psychology and Health, 20(3),* 283-301.

Brosseau, L. Wells, G.A., Tugwell, P., Egan, M., Dubouloz, D.J., Casimiro, L, et al. (2005). Ottawa panel evidenced-based clinical practice guidelines for therapeutic exercise and manual therapy in the management of osteoarthritis. *Physical Therapy, 85(9),* 907-973.

Buckelew, S.Pl, Murray, S.E., Hewett, J.E., Johnson, J., & Huyser, B. (1995). Self-efficacy, pain, and physical activity among figromyalgia. *American Journal of Epidemiology, 134,* 220-231.

Calfas, K.J., Sallis, J.F., Oldenberg, B., & French, M. (1997). Mediators of change in physical activity following an intervention in primary care: PACE. *Preventive Medicine, 26(3),* 297-304.

Campbell, A.J., Robertson, M.C., Gardner, M.M., Norton, R.N., & Buchner, D.M. (1997). Randomized controlled trail of a general practice programme of home based exercise to prevent falls in elderly women. *British Medical Journal, 315 (7115),* 1065-9.

Campbell, A.J., Robertson, M.C., Gardner, M.M., Norton, R.N., & Buchner, D.M. (1999a). Falls prevention over 2 years: a randomized controlled trial in women 80 years and older. *Age and Ageing, 28,* 513–18.

Campbell, A.J., Robertson, M.C., Gardner, M.M., Norton, R.N., & Buchner, D.M. (1999b). Psychotropoic medication withdrawal and a home-based exercise program to prevent falls: a randomized, controlled trial. *Journal of the American Geriatric Society, 47,* 850-853.

Canadian Physiotherapy Association (2005). *Types of Physiotherapy Help.* Retrieved June 20, 2006, from Web site: http://www.physiotherapy.ca/helptype.htm.

Carter, N.D., Kannus, P., & Khan, K.M. (2001). Exercise in prevention of falls in older people. *Sports Medicine, 31(6),* 427-38.

Castro, C.M, King, A.C., & Brassington, G.S. (2001). Telephone versus mail interventions for maintenance of physical activity in older adults. *Health-Psychology, 20(6),* 438-444.

Centres for Disease Control and Prevention (1996). *Physical activity and health: A report of the Surgeon General.* Atlanta GA: U. S. Department of Health and Human Services, Centres for Disease Control and Prevention, National Centre for Chronic Disease Prevention, and Health Promotion.

Courneya, K.S., & McAuley, E. (1994). Are there different determinants of the frequency, intensity and duration of physical activity; *Behavioral Medicine, 20,* 84-90.

Creswell, J.W. (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches,* (2nd Ed.) Thousand Oaks, CA: Safe Publications.

Dehn, M.M., & Bruce, R.M. (1972). Longitudinal variations in maximal oxygen intake with age and activity. *Journal of Applied Physiology, 33(6),* 805-7.

Deschenes, M.R. (2004). Effects of ageing on muscle fibre type and size. *Sports Medicine , 34(12),* 809-824.

DiPietro, L. (2001). Physical activity in ageing: changes in patterns and their relationship to health and function. *Journals of Gerontology: SERIES A, 56A, Special Issue,* 13-22.

Dishman, R.K. (1994). The measurement conundrum in exercise adherence research. *Medicine and Science in Sports and Exercise,* 1382-1390.

Dishman, R.K., & Sallis, J.F. (1994). Determinants and interventions for physical activity and exercise. In Bouchard, C. (Ed.), *Exercise, fitness and health: A consensus of current knowledge* (pp.75-102). Champaign, IL: Human Kinetics.

Duncan, Y., McAuley, E., Stoolmiller, M., & Duncan, S (1993). Serial fluctuations in exercise behavior as a function of social support and efficacy cognitions. *Journal of Applied Social Psychology, 23,* 1498-1522.

DuCharme, K.A., & Brawley, L.R. (1995). Predicting the intentions and behavior of exercise initiates using two forms of self-efficacy. *Journal of Behavioral Medicine, 18(5),* 479-97.

Dzewaltowski, D.A. (1989). Toward a model of exercise motivation. *Journal of Sport and & Exercise Psychology, 11*, 251-269.

Dzewaltowski, D.A. (1994). Physical activity determinants: a social cognitive approach. *Medicine and Science in Sports and Exercise,* 1395-1399.

Ecclestone, N.A., Myers, A.M., & Paterson, D.H. (1998, January). Tracking older participants of twelve physical activity classes over a three-year period. *Journal of Ageing and Physical Activity, 6(1),* 70-82.

Emery, C. F. Schein, R.L. Hauck, E.R., & MacIntyre, N.R. (1998). Psychological and cognitive outcomes of a randomized trial of exercise among patients with chronic obstructive pulmonary disease. *Health Psychology 17(3),* 232-240.

Estabrooks, P.A., & Carron, A.V. (1999). Group cohesion in older adult exercisers: prediction and intervention effects. *Journal of Behavioral Medicine, 22(6),* 575-588.

Ettinger, W.H., Burns, R., Messier, S.P., Applegate, W., Rejeski, W.J., Morgan, T., et al. (1997). A randomized trial comparing aerobic exercise and resistance exercise with a health education program in older adults with knee osteoarthritis: The fitness arthritis and seniors trial (FAST). *Journal of the American Medical Association, 277,* 25-31.

Evans, W. J. &. Pollock, M. L. (1999). Exercise training guidelines for the older adult. *Clinical Sciences: Symposium: Resistance Training For Health And Disease, 31(1),* 12-17.

Evcik, D., & Sonel, B. (2002). Effectiveness of home-based exercise therapy and walking program on osteoarthritis of the knee. *Rheumatology International, 22*, 103-106.

Feltz, D.L., & Chase, M.A. (1998). The measurement of self-efficacy and confidence in sport. In J.L. Duda (Ed.), *Advances in sport and exercise psychology measurement.* (pp. 65-80). Morgantown, WV: Fitness Information Technologies.

Ferretti, G., Antonutto, G., Denis, C., Hoppeler, H., Minetti, A.E., Marici, M.V., Desplanches, D. (1997). The interplay of central and peripheral factors in limiting maximal oxygen consumption in man after prolonged bed rest. *Journal of Physiology (London), 501*, 677-686.

Finch, E., Brooks, D., Stafford, P.W., & Mayo, N.C. (2002). *Physical rehabilitation outcome measures: a guide to enhanced clinical decision making* (2nd Ed.). Hamilton: Canadian Physiotherapy Association, BC Decker.

Finkin, L.L., & Babcock, R.L. (1996). Age differences and learning and the question of pre-experimental interference. *Educational Gerontology, 22,* 683-692.

Folstein, M.F. (1983). The Mini-Mental State Examination. In T. Crook, S. Ferris, & R. Bartus (Eds.), *Assessment in geriatric psychopharmacology.* (pp. 47-51). New Canaan, CN: Mark Pawley.

Folstein, M.F., Folstein, S.E., & McHugh, P.R. (1975). "Mini-Mental State": a practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research, 12,* 189-198.

Forster, A., Young, J., & Langhorne, P. (1999). Systematic review of day hospital care for older adult people. *British Medical Journal, 318,* 837-841.

Fried, L.P., & Guralnik, J.M. (1997). Disability in the older adults: evidence regarding significance, etiology and risk. *Journal of American Geriatric Society, 45(1),* 92-100.

Frontera, W.R., Hughes, V.A., Fielding, R.A., Fiatarone, M.A., Evans, W.J., & Roubenoff, R. (2000). Ageing of skeletal muscle: a 12-yr. longitudinal study. *Journal of Applied Physiology, 88,* 1321-1326.

Godin, G. (1994). Theories of reasoned action and planned behavior: usefulness for exercise promotion. *Medicine and Science in Sports and Exercise. 26(11),* 1391-1394.

Government of Canada (1999). *Canada's Participation in the International Year of Older Persons (IYOP).* Retrieved November 21, 2003 from http://www.hc-sc.ca/seniors-aines/iyop_wrapup/english/raising.htm.

Government of Manitoba (1997) Personal Health Information Act. Retrieved October 3, 2006 from http://web2.gov.mb.ca/laws/statutes/ccsm/p033-5e.php.

Hall, M., & Havens, B. (2000). *The effect of social isolation and loneliness on the health of older women.* Retrieved November 16, 2005 from http://www.pwhce.ca/effectSocialIsolation.htm#top.

Harridge, S.D., Kryger, A. & Stensgaard, A. (1999). Knee extensor strength, activation, and size in very elderly people following strength training. Muscle Nerve, 22 (7), 831-9.

Hassard, T.H. (1991). *Understanding Biostatistics.* St. Louis: Mosby –Year Book, Inc.

Haykowsky, M., McGavock, J., Vonder Muhll, I., Koller, M., Mandic., Welsh, R., et al. (2005). Effect of exercise training on peak aerobic power, left ventricular morphology, and muscle strength in healthy older women. *Journal of Gerontological A Biological Science Medical Science, 60(3),* 307-11.

Haq, I., Murphy, E., & Dacre, J. (2003). Review: osteoarthritis. *Postgraduate Medicine Journal, 79,* 377-383.

Health Canada. (2002). *Economic burden of illness in Canada, 1998.* (Cat. N. H321-136/1998E). Ottawa: Publications Health Canada.

Health Canada/The Arthritis Society (2003). *Arthritis in Canada: an ongoing challenge.* Retrieved December 30, 2003 from http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/ac/ac_3e.html.

Heart and Stroke Foundation. (2003).*The growing burden of heart disease and stroke in Canada.* Retrieved May 30, from http://www.cvdinfobase.ca/cvdbook/CVD_En03.pdf.

Henry, K.D., Rosemond, C., & Eckert, T. (1998). Effect of number of home exercises on compliance and performance in adults over 65 years of age. *Physical Therapy; 78,* 270-7.

Helbostad, J.L., Sletvold, O. & Moe-Nilssen, R. (2004). Home training with and without additional group training in physically frail old people living at home: effect on health-related quality of life and ambulation. *Clinical Rehabilitation, 18*, 498-508.

Hruda, K.V., Hicks, A.L., & McCartney, N. (2003) Training for muscle power in older adults: effects on functional abilities. Canadian Journal of Applied Physiology, 28(2), 178-189.

Huang, G., Shi, X., Davis-Brezette, J.A., & Osness, W.H. (2005). Resting heart rate changes after endurance training in older adults: a meta-analysis. Medicine and Science in Sports and Exercise, 37(8), 1381-6

Hughes, M.A., Myers, B.S., & Schenkman, M.L. (1996). The role of strength in rising from a chair in the functionally impaired elderly. *Journal of Biomechanics, 29(12)*, 1509-1513.

Hunter, G.R., McCarthy, J.P., & Bamman, M.M. (2004). Effects of resistance training on older adults. *Sports Medicine, 34(5),* 329-348.

Isaacs B. (1985). Clinical and laboratory studies of falls in old people. *Clinical Geriatric Medicine, 1,* 513.

Janssen, I, Heymsfield, S.B. & Ross, R. (2002). Low relative skeletal muscle mass (sarcopenia) in older persons is associated with functional impairment and physical disability. *Journal of American Geriatric Society, 50,* 889-896.

Isaacs B. (1985). Clinical and laboratory studies of falls in old people. *Clinical Geriatric Medicine, 1,* 513.

Jette, A.M. Lachman, M., Giorgetti, M.M., Assman, S.F., Harris, B.A., Levenson, C., et al (1999). Exercise – it's never too late: the strong for life program. *American Journal of Public Health; 89*, 66-72.

Johnell, O., & Kanis, J.A. (2004). An estimate of world-wide prevalence, mortality and disability associated with of hip fractures. *Osteoporosis International, 15*, 897-902.

Johnson, C.S.J., Myers, A.M., Scholey, L.M., Cyarto, E.V., & Ecclestone, N.A. (2003). Outcome evaluation of the Canadian centre for activity and ageing's home support exercise program for frail older adults. *Journal of Ageing and Physical Activity, 11,* 408-424.

Jones, M. & Nies, M. A. (1996). The relationship of perceived benefits of and barriers to reported exercise in older African American women. *Public Health Nursing, 13,* 151-158.

Judge, J.O., Lindsey, C., Underwood, M. & Wineskins, D. (1993). Balance improvements in older women: effects of exercise training. *Physical Therapy, 73(4),* 254–65.

Kane, R.L., Ouslander, J.G. & Abrass, I.B. (2004). Essentials of Clinical Geriatrics (5th Ed.). New Jersey: The McGraw-Hill Companies Inc.

Katzmarzyk, P.T., Glenhill, N., & Shepard, R.J. (2000). The economic burden of physical inactivity in Canada. *Canadian Medical Association Journal 163(11),* 1435-40.

Kavanagh, D.J., Gooley, S., & Wilson, P.H. (1993). Prediction of adherence and control in diabetes. *Journal of Behavioral Medicine, 16(5),* 509-522.

Kay, D.W.K., Henderson, A.S., & Scott, R. (1985). Dementia and depression among the older adult living in the Hobart community: the effect of the diagnostic criteria on the prevalence rates. *Psychology Medicine, 15,* 771-788.

Keller, C., Fleury, J., Gregor-Holt, N., & Thompson, T. (1999). Predictive ability of social cognitive theory in exercise research: an integrated literature review. *The Online Journal of Knowledge Synthesis for Nursing, 6(2), 1-13.*

Kendzierski, D., & Johnson, W. (1993) Excuses, excuses, excuses: a cognitive behavioral approach to exercise implementation. *Journal of Sport and Exercise Psychology, 15,* 207-219.

Khaw, K.T. (1997). Epidemiological aspects of ageing. *Phil. Trans. Royal Society of London, 352,* 1929-1935.

King, A. (1994). Clinical and Community Interventions to Promote and Support Physical Activity Participation. In R.K. Dishman (Ed.). Advances in Exercise Adherence. Georgia: Human Kinetics, 183-212.

King, A. (2001). Interventions to promote physical activity by older adults. *Journals of Gerontology: SERIES A, 56 A (Special Issue II),* 36-46.

King, A.C., Baumann, K., O'Sullivan, P., Wilcox, S., & Castro, C. (1999). Improving dietary patterns in older family caregivers via the telephone: 1-year results of a clinical trial. *The Gerontologist, 39,* 261-262.

King, A.C., & Brassington, G. (1997). Enhancing physical and psychological functioning in older family caregivers: The role of regular physical activity. *Annals of Behavioral Medicine, 19,* 91-100.

King, A.C., Kiernan, M., Oman, R.F., Kraemer, H.C., Hull, M., & Ahn, D. (1997). Can we identify who will adhere to long-term physical activity? Signal detection methodology as a potential aid to clinical decision making. *Health Psychology, 16,* 380-389.

King, A.C., Oman, R.F., Brassington, G.S., Bliwise, D.L., & Haskell, W.L. (1997). Moderate-intensity exercise and self-rated quality of sleep in older adults. A randomized controlled trial. *Journal of the American Medical Association, 277,* 32-37.

King, A.C., Pruitt, L.C., Phillips, W.T., Oka, R., Rodenburg, A., & Haskell, W.L. (2000). Comparative effects of two physical activity programs on measured and perceived physical functioning and other health-related quality of life outcomes in older adult. *Journal of Gerontology Medicine Science, 55,* M74-M83.

Kubo, K., Kanehisa, H., Miyatani, M., Tachi, M., & Fukunaga, T. (2003). Effect of low-load resistance training on tendon properties in middle-aged and elderly woman. *Acta. Physiol. Scand., 178,* 25-32.

Lai, S-M., Studenski, S., Duncan, P.W. & Perera, S. (2002). Persisting consequences of stroke measured by Stroke Impact Scale. *Stroke, 33,* 1840-44.

Lakka, T.A., Laaksonen, D.E., Lakka, H.M., Mannikko, N., Niskanen, L.K., Rauramaa, R., et al. (2003). Sedentary lifestyle, poor cardiorespiratory fitness and metabolic syndrome. *Medicine & Science in Sports & Exercise*, 35(8):1279-86.

Larsson, L., Li, X. & Frontera, W.R. (1997). Effects of ageing on shortening velocity and myosin isoform composition in single human skeletal muscle cells. *American Journal of Physiology, 27(2)*, 638-49.

Last, J.M. (Ed.) (2001). A Dictionary of Epidemiology. New York: Oxford University Press.

Lee, C. (1993). Attitudes, knowledge and stage of change: a survey of exercise patterns in older Australian woman. *Health Psychology, 12,* 476-480.

Lees, F.D., Clark, P.G. Nigg, C.R., & Newman, P. (2005). Barriers to exercise behavior among older adults: a focus-group study. *Journal of Ageing and Physical Activity,* 13(1), 23-33.

Leveille, S.G., Cohen-Mansfield, J.C., & Guralnik, J.M. (2003). The impact of Chronic Musculoskeletal Pain on Exercise Attitudes, Self-Efficacy, and Physical Activity. *Journal of Ageing and Physical Activity, 11*, 275-283.

Lexell, L. (1995). Human ageing, muscle mass, and fiber type composition. Journal of Gerontology 50A, (Spec.No.), 11-16.

Lipsitz, L.A., Nakajima, I., Gagnon M., Hirayama, T., Connelly, C.M., Izumo, H., et al, (1994) Muscle strength and fall rates among residents of Japanese and American nursing homes: and international cross-cultural study. *Journal of American Geriatric Society, 42,* 953-959.

Litt, M.D., Kleppinger, A & Judge, J.O. (2002). Initiation and maintenance of exercise behavior in older women: predictors from the social learning model. *Journal of Behavioral Medicine, 25(1),* 83-97.

Macaluso, A., & De Vito, G. (2004). Muscle strength, power and adaptations to resistance training in older people. *European Journal of Applied Physiology, 91,* 450-472.

Macaluso, A., Nimmo, M.A., Foster, J.E., Cockburn, M., McMillan, N.C. & DeVito, G. (2002). Contractile muscle volume and agonist-antagonist coactivation account for differences in torque between young and older women. *Muscle Nerve, 25(6),* 858-63.

Maddox, J.E., Norton, L.W., & Stoltenberg, C.D. (1986). Self-efficacy expectancy, outcome expectancy, and outcome value: Relative effects on behavior intensions. *Journal of Personality and Social Psychology, 51 (4),* 783-789.

Maire, J., Dugue, B., Faillenet-Maire, A.F., Tordi, N., Parratte, B., Smolander, J., et al. (2003). Recovery after total hip joint arthroplasty in older adult patients with osteoarthritis: positive effect of upper limb interval-training. *Journal of Rehabilitation Medicine, 35(4*), 174-179.

Malone, M., Hill, A., & Smith, G. (2002). Three month follow-up of patients discharged from a geriatric day hospital. *Age and Ageing, 31(6),* 471-475.

Mannel, R.C., & Zuzanek, J. (1991). The nature and variability of leisure constrains in daily life: The case of the physically active leisure of older adults. *Leisure Sciences, 13,* 337-351.

Marcus, B.H., Eaton, C.A., Rossi, J.S., & Harlow, L.L. (1994). Self-efficacy, decision making and stages of change: An integrative model of physical exercise. *Journal of Applied Social Psychology, 24,* 489-508.

Marks, J.S. (2003). The burden of chronic disease and future public health. (Centers for Disease Control and Prevention). Retrieved May 30, 2006 from http://www.cdc.gov/publications/Burden.

Martin, J.E., & Dubbert, P.M. (1985). Adherence to Exercise. *Exercise Sport Science Review, 13,* 137-167.

Martin, K.A., & Sinden, A.R. (2001). Who will stay and who will go? A review of older adults' adherence to randomized controlled trials of exercise. *Journal of Ageing and Physical Activity, 9(91),* 91-114.

Martin, P.E., Rothstein, D.E. & Larish, D.D. (1992). Effects of age and physical activity status on the speed-aerobic demand relationship of walking. *Journal of Applied Physiology, 73,* 200-206.

Mathias, S., Nayak, U.S.L., & Isaacs, B. (1986). Balance in the elderly patient: The "Get-up and Go" test. *Archive of Physical Medicine in Rehabilitation, 67,* 387.

Mazzeo, R.S., Cavanagh, P., Evans, W.J., Fiatarone, M., Hagberg, J., McAuley, E., et al. (1998). American College of Sports Medicine Position Statement: Exercise and Physical Activity for Older Adults. *Medicine and Science in Sports and Exercise, 31(1),* 12-17.

McAuley, E. (1993). Self-efficacy and the maintenance of exercise participation in older adults. *Journal of Behavioral Medicine, 16(1)* 103-113.

McAuley, E., & Blissmer, B. (2000). Self-efficacy determinants and consequences of physical activity. *Exercise and Sport Sciences Reviews.* 85-88.

McAuley, E., Courneya, K.S., Rudolph, D.L., & Lox, C.L. (1994). Enhancing exercise adherence in middle-aged males and females. *Preventative Medicine, 23,* 498-506.

McAuley, E., Katula, J., Mihalko, S.L., Blissmer, B., Duncan, T.E., Pena, M., & Dunn, E. (1999). Model of physical activity and self-efficacy in older adults: A latent growth curve analysis. *Journal of Gerontology Psychology Science 54B,* P283-P292.

McAuley, E., Marquez, D.X., Jerome, G.H., Blissmer, B., & Katula, J. (2002). Physical activity and physique anxiety in older adults: fitness and efficacy influences. *Ageing & Mental Health, 6(3),* 222-230.

McAuley, E., & Mihalko, S.L. (1998). Measuring exercise-related self-efficacy. In J.L. Duda (Ed.), *Advances in sport and exercise psychology measurement.* (pp. 371-390). Morgantown, WV: Fitness Information Technologies.

McAuley, W. (1990). [Self-efficacy measures]. Unpublished raw data.

McDowell, I., & Newell, C. (1996). *Measuring health: a guide to rating scales and questionnaires.* New York: Oxford University Press.

Meichenbaum, D., & Fong G.T. (1993). How individuals control their own minds: A constructive narrative perspective. In D.M. Wegner & J. W. Pennabaker (Eds.). *Handbook of mental control* (pp. 473-490). Englewood Cliffs: Prentice-Hall.

Mills K.M., Stewart A.L. Sepsis, P.G. & King A.C. (1997). Consideration of older adults' preferences for format of physical activity. *Journal of Ageing and Physical Activity, 5(1),* 50-58.

Mithal, M., Mann, W.C., & Granger, C.V. (2001). The role of coronary heart disease (CHD) in functional limitations in community dwelling elders. Physical & Occupational Therapy in Geriatrics, 19(3), 35-48.

Minor, M.A. and Kay, D.R. (1997). *ACSM's, Exercise management for persons with chronic diseases and disabilities*. Windsor: Human Kinetics.

Murray, C.J., & Lopez, A.D. (1997). Alternative projections of mortality and disability by cause 1990-2020.: global burden of disease study. *Lancet, 349,* 1498-1504.

Muse, T. (2005). Motivation and Adherence to Exercise for Older Adults. *Topics in Geriatric Rehabilitation , 21(2),* 107-115.

Myers, J.N. (1997). Congestive heart failure. *ACSM's Exercise management for persons with chronic diseases and disabilities* (pp. 48-53). Windsor: Human Kinetics.

Narci, M. V., Susta, D., Cuiffreda, L., Ferri, A., Scaglioni, G., & Capodaglio, P. (1999). Changes in human gastrocnemius muscle architecture with ageing. *Journal of Physiology (London), 518P, 87.*

National Institutes of Health (2000). Osteoporosis prevention, diagnosis and therapy. *NIH Consensus Statement 2000.* Retrieved May 30, 2006 from http://consensus.nih.gov/2000/2000Osteoporosis111html.htm.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd Ed.), New York: McGraw-Hill.

Odding, E., Valkenburg, H.A., Stam, H.J., & Hofman, A. (2001). Determinants of locomotor disability in people aged 55 years and over: The Rotterdam study. *European Journal of Epidemiology, 17*, 1033-1041.

Oka, R.K., King, A.C., & Young D.R. (1995). Sources of social support as predictors of exercise adherence in women and men 50-65 years. *Women's Health, 1,* 161-175.

Oka, R.K., Gortner, S.R, Stotts, A.S., & Haskel, W.L. (1996). Predictors of physical activity in patients with chronic heart failure secondary to either ischemic or idiopathic dilated cadiomyopathy. *American Journal of Cardiology, 77(2),* 159-163.

Oman, R.F., & King, A.C., (2000). The effect of life events and exercise program format on the adoption and maintenance of exercise behavior. *Health-Psychology, 19(6),* 605-612.

O'Shea, S.D., Taylor, N.F., & Paratz, J. (2004). Peripheral muscle strength training in COPD: a systematic review. *Chest, 135,* 903-914.

Osteoporosis Canada, (2006) Retrieved May 30, 2006, from http://www.osteoporosis.ca/english/For%20Health%20Professionals/Research/default.asp?s=1.

Palmer-McLean, K., & Wilberger, J.E. (1997). Stroke and Head Injury. *ACSM's Exercise management for persons with chronic diseases and disabilities*, (pp. 169-174). Windsor: Human Kinetics.

Petersen, C. (2003). *Exercise adherence/behavior change exercise adherence improved by a plan for behavior change*. Retrieved April 10, 2003 from http://www.uoregon.edu/~iishp/Peter3.html.

Pinsky, J., Jette, A., Branch, L., Kannel, W. & Fienlieb, M. (1990). The Framingham disability study: relationship of various coronary heart disease manifestations to disability in older persons living in the community. *American Journal of Public Health, 80(11),* 1363-67.

Podsiadlo, D., & Richardson, S. (1991). The timed "up and go": a test of basic functional mobility for frail older adult persons. *Journal of American Geriatric Society, 39(2),* 142-8.

Polit, D.F. & Beck, C.T. (2004). *Nursing Research: Principles and Methods*, (7th Ed.). Philadelphia: Lippincott Williams & Wilkins.

Portney, L. G., & Watkins, M.P. (2000). *Foundations of Clinical Research: Applications to Practice,* (2nd Ed.). Upper Saddle River, NJ: Prentice-Hall.

Prochaska, J., & DiClemente, C. (1983). Stages and processes of self-change in smoking: Toward a more integrative model of change. *Journal of Consulting Clinical Psychology, 51,* 390-395.

Public Health Agency of Canada (n.d.a) *Cancer Surveillance Online, 2001.* Retrieved May 30, 2006 from http://dsol-smed.phac-aspc.gc.ca/dsol-smed/cancer/index_e.html.

Public Health Agency of Canada (n.d.b). *Diabetes in Canada,* (2nd Ed.). Retrieved December 30, 2003 from http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/dic-dac2/english/01cover_e.html.

Purdie, N., & McCrindle, A. (2002) Self-regulation, self-efficacy and health behavior change in older adults. *Educational Gerontology, 28,* 379-400.

Reh-fit Centre (n.d.) *Who are we?* Retrieved June 3, 2006 from http://www.reh-fit.com/whoweare.html.

Rejeski, W.J., Brawley, L.R., Ambrosius, W.T., Brubaker, P.H., Focht, B.C., Foy, C.G., et al. (2003). Older adults with chronic disease: benefits of group-mediated counseling in the promotion of physically active lifestyles. *Health Psychology, 22(4)*, 414-423.

Rejeski, W. J., Brawley, L. R., Ettinger, W. M., & Thompson, C. (1997). Compliance to exercise therapy in older participants with knee osteoarthritis: implications for treating disability. *Medicine & Science in Sports & Exercise, 29(8),* 977-985.

Reginster, J.Y. (2002). The prevalence and burden of arthritis. *Rheumatology, 41(Suppl. 1)*, 3-6.

Resnick, B. (1995). Measuring tools: do they apply equally to older adults? *Journal of Gerontological Nursing, 21 (7),* 18-22.

Resnick, B. (2001). A prediction model of aerobic exercise in older adults living in continuing-care retirement community. *Journal of Ageing and Health, 13(2),* 287-310.

Resnick, B., & Jenkins, L. S. (2000). Testing the Reliability and Validity of the Self-Efficacy for Exercise Scale. *Nursing Research, 49(31),* 154-59.

Resnick, B., & Nigg, C. (2003). Testing a theoretical model of exercise behavior for older adults. *Nursing Research, 52(2),* 80-88.

Resnick, B., Zimmerman, S.I., Orwig, D., Furstenberg, A.L., & Magaziner, J. (2000). Outcome Expectations for Exercise Scale: utility and psychometrics *Journals of Gerontology, Series B: Psychological Sciences and Social, 55B(6),* S352-356.

Rockwood, K., Howlett, S., Stadnyk, K., Carver, D., Powell, C., & Stolee, P. (2003). Responsiveness of goal attainment scaling in a randomized controlled trial of comprehensive geriatric assessment. *Journal of Clinical Epidemiology, 56(8)*, 736-43.

Rodin, J. (1990). Control by any other name: definitions, concepts and processes. In J. Rodin, C. Schooler, & K.W. Schaie, (Eds.). *Self-directedness: Cause and Effects throughout the life course,* (pp. 1-17). Hillsdale: Lawrence Erlbaum Publishers.

Rodgers, W.B., & Brawley, L.R. (1993). Using both self-efficacy theory and the theory of planned behavior to discriminate adherers and drop outs from structured programs. *Journal of Applied Sport Psychology*, 5(2), 195-206.

Rodosky, M.W., Andriacchi, T.P., & Anderson, G.B. (1989). The influence of chair height on lower limb mechanics during rising. *Journal of Orthopedic Research, 7,* 266-271.

Romanow, R.J. (2002). *Building on values: the future of health care in Canada – final report.* Ottawa: National Library of Canada.

Rudman, D., Feller, A.G., Nagraj, H.S., Gergans, G.A., Lalitha, P.Y., Goldberg, A.F., et al. (1990). Effects of human growth hormone in men over 60 years old. *New England Journal of Medicine, 323*, 1-6.

Ryckman, R.M., Robbins, M.A., Thornton, B., & Cantrell, P (1982). Development and validation of a physical self-efficacy scale. *Journal of Personality and Social Psychology, 42,* 891-900.

Schenkman, M.L. Berger, R.A., Riley, P.O., Mann, P.W., & Hodge, W.A. (1990). Whole body movements during rising from sitting to standing. *Physical Therapy, 70,* 638-651.

Schenkman, M., Cutson, T.M., Kuchibhatla, M., Chandler, J., Pieper, C.F., Ray, L., et al. (1998). Exercise to improve spinal flexibility and function for people with Parkinson's disease: a randomized controlled trial. *Journal of the American Geriatrics Society, 46,* 1207–1216.

Schulz, R., & Heckhausen, J. (1996). A life span model of successful ageing *American Psychologist, 51(7),* 702–714.

Seguin, R., & Nelson M.E. (2003). The benefits of strength training for older adults. *American Journal of Preventive Medicine, 35,* 141-149.

Shepard, R.J. (1994). Determinants of exercise in people 65 years and older. In R.K. Dishman (Ed.). *Advances in Adherence to Exercise* (pp.343-360). Windsor: Human Kinetics.

Shin, Y., Yun, S., Pender, N.J., & Jang, H. (2005). Test of the health promotion model as a causal model of commitment to a plan for exercise among Korean adults with chronic disease. *Research in Nursing & Health, 28,* 117-125.

Shumway-Cook, A., Brauer, S., & Woollacott, M. (2000). Predicting the probability for falls in community-dwelling older adults using the timed-up & go test. *Physical Therapy, 80,* 896-903.

Sin, J-K, LoGerfo, J., Belza, A., & Cunningham, S. (2004). Factors influencing exercise participation and quality of life among elderly Korean Americans, *Journal of Cultural Diversity, 11(4),* 139-145.

Singh, N.A., Stavrinos, T.M., Scarbek, Y., Galambos, G., Liber, C., & Fiatarone-Singh, M.A. (2005). A randomized controlled trial of high versus low intensity weight training versus general practitioner care for clinical depression in older adults. *Journal of Gerontology A. Biological Science and Medical Science 60(6),* 768-76.

Skelton, D.A., Young, A., Greig, C.A. and Malbut, K.E. (1995). Effects of resistance training on strength, power and selected functional abilities of woman aged 75 and older. *Journal of the American Geriatric Society, 43,* 1081-1087.

Statistics Canada (1996). *Canadian statistics - disability-free life expectancies, provinces and territories.* Retrieved November 8, 2004 from http://www.statcan.ca/english/Pgdb/health38.htm.

Statistics Canada (2000, March 31). *How healthy are Canadians, health reports, 11(3).* Retrieved November 16, 2004 from http://prod.library.utoronto.ca:8090/datalib/codebooks/cstdli/nphs/cycle3/SUMMARYE.PDF.

Statistics Canada. (2001). *Participation and Activity Limitation Survey: A profile of disability in Canada.* Retrieved November 21, 2003 from http://www.statcan.ca/Daily English/021203/d021203a.htm.

Statistics Canada, (2003). The increasing physical activity: assessing trends from 1998-2003 report. Retrieved December 16, 2005 from: http://www.cflri.ca/pdf/e/2003pam.pdf.

Statistics Canada (2004) *Table 051-0001[1,2] - Estimates of population, by age group and sex, Canada, provinces and territories, annual (Persons).* Retrieved May 14, 2005 from http://estat.statcan.ca.proxy2.lib.umanitoba.ca/cgi-win/CNSMCGI.EXE

Steadman, J., Donaldson, N. & Kalra, L. (2003). A randomized control trial of enhance balance training program to improve mobility and reduce falls in elderly patients. *Journal of American Geriatrics Society, 51,* 847-852.

Stephens, R.J., & Craig, C. (1990). *The Well Being of Canadians: Highlights of the 1988 Campbell's Soup Survey.* Ottawa: Canadian Fitness and Lifestyle Research Institute.

Stewart, K.J., Turner, K.L, Bacher, A.C, Degis, J.R., Sung, J., Tayback, M., et al. (2004). Are fitness, activity, and fatness associated with health-related quality of life and mood in older persons? *Journal of Cardiopulmonary Rehabilitation, 23,* 115-121.

Strawbridge, W.J., Deleger, S., Roberts, R.E. & Kaplan, G.A. (2002). Physical activity reduces the risk of subsequent depression for older adults. *American Journal of Epidemiology, 156(4),* 328-34.

Sullivan, T., Allegrante, J.P., Peterson, M.G.E., Kovar, P.A., & MacKenzie, C.R., (1998). One-year follow-up of patients with osteoarthritis of the knee who participated in a program of supervised fitness walking and supportive patient education. *Arthritis Care and Research, 4,* 228-33.

Sullivan, M. & Hawthorne, M. (1995) Exercise tolerance in patients with congestive heart failure. *Progress in Cardiovascular Disease, 38,* 1-12.

Taylor, H., Klepetar, A, Keys, W., Parline, H., Blackburn, H. & Puchner, T. (1962). Death rates among physically active and sedentary employees of the railroad industry. *American Journal of Public Health, 52,* 1697-1707.

Taylor, A.H., Cable, N.T., Faulkner, G., Hillsdon, M., Narici, M. & Van der Bij, A.K. (2004). Physical activity and older adults: a review of health benefits and the effectiveness of interventions. *Journal of Sports Sciences, 22,* 703-725.

Teixeira-Salmela, L.F., Santiago, L, Lima, R.C.M., Lana, D.M., Camargos, F.F.O., & Cassiano, J.G. (2005). Functional performance and quality of life

related to training and detraining of community-dwelling elderly. *Disability & Rehabilitation, 27(17),* 1007-1012.

The Writing Group for Activity Counseling Trial Research Group. (2001). Effects of physical activity counseling in primary care: The Activity Counseling Trial. *Journal of American Medicine Association, 286,* 677-687.

Thune, I. & Furberg, A.S. (2001). Physical activity and cancer risk: dose-response and cancer, all sites and site-specific. *Medicine & Science in Sports & Exercise, 33,* S530-S550.

Tilling, L.M., Darawil, K. & Britton, M. (2006). Falls as a complication of diabetes mellitus in older people. *Journal of Diabetes Complications, 20(3),* 158-62.

Topp, R., Woolley, S., Hornyak, J. III., Khuder, S., & Kahaleh, B. (2002). The effect of dynamic versus isometric resistance training on pain and functioning among adults with osteoarthritis of the knee. *Archives of Physical Medicine, Rehabilitation, 83*, 1187-1195.

Tunney, N., Taylor, L.F., Gaddy, M., Rosenfeld, A., Pearce, N., Tamanini, J., et al. (2003). Ageing and motor learning of a functional skill. *Physical and Occupational Therapy in Geriatrics, 21(3),* 1-16.

Uusi-Rasi, K., Sievanen, H., Pasanen, M., Oja, P. & Vuori, I. (2002). Associations of calcium intake and physical activity with bone density and size in pre-menopausal and postmenopausal women: a peripheral quantitative computed tomography study. *Journal of Bone Mineral Research, 17*, 544-522.

van Baar, M.E., Assendelft, W.J.J., Dekker, J., Oostendorp, R.A.B., & Bijlsma, J.W.J. (1999). Effectiveness of exercise therapy in patients with osteoarthritis of the hip or knee: a systematic review of randomized clinical trials. *Arthritis Rheumatology, 42*, 1361-1369.

Verbrugge, L.M., & Juarez, L. (2006). Profile of arthritis Disability II. *Arthritis and Rheumatism, 15(1),* 102-113.

Visser, M., Simonsick, E.M., Colbert, L.H., Brach, J., Rubing, S.M., Kritchevsky, S.B., Newman, A.B. & Harris, T.B. (2005). Type and intensity of activity and risk of mobility limitations: the mediating role of muscle parameters. *Journal of American Geriatrics Society, 53,* 762-770.

Weinberg, L., & Szturm, T. (2005). *A pilot investigation into the benefits of a fall prevention program for older adults.* Unpublished manuscript, University of Manitoba.

Weiss, E.P., Spina, R.J., Holloszy, J.O. & Ehsani, A.A. (2006). Gender differences in decline of aerobic capacity and its physiological determinants during later decades in life. *Journal of Applied Physiology,* 1-27.

Welsh, L., & Rutherford, O.M. (1996). Hip bone mineral density is improved by high-impact aerobic exercise in postmenopausal woman and men over 50 years. *European Journal of Applied Physiology and Occupational Physiology, 74*, 511-517.

Whaley, M.H, Brubaker, P.H., & Otto, R.M. (Eds.). (2006). *American college of sport medicine's guidelines for exercise testing and prescription*, (7th Ed). Maryland: Lippincott William & Wilkins.

Wilcox, S., King, A.C., Brassington, G., & Ahn, D. (1999). Physical activity preferences of middle-aged and older adults: a community analysis. *Journal of Ageing and Physical Activity, 7,* 386-399.

Wise, J.B., & Trunnell, E.P. (2001). The influence of sources of self-efficacy upon efficacy strength. *Journal of Sport and Exercise Psychology, 23(4),* 268-280.

Wolinsky F.D., Stump, T.E., & Clark D.O. (1995). Antecedents and consequences of physical activity and exercise among older adults *Gerontologist, 35,* 451-462.

World Health Organization (2001). International classification of functioning, disability and health. Retrieved March 1, 2006 from Web site: http://www.who.int/inf-pr-2001/en/pr2001-48.html

World Health Organization (2006). 138th Session of Executive Committee. Retrieved June 19 from Web site: http://www.paho.org/English/GOV/CE/ce138-15-e.pdf.

Young Men's Christian Association (n.d.) Retrieved June 3, 2005 from Web site: http://www.ymca.ca/eng_abouty.htm.

Young, D.R., & King, A.C. (1995). Exercise adherence: determinants of physical activity and applications of health behavior change theories. *Medicine, Exercise, Nutrition in Health, 4,* 335-348.