EXPLORING THE POTENTIAL BENEFIT OF ADULT DAY CENTRE EXERCISE PROGRAMS

by

Lara Williams

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Name:	**Lara Williams**
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Examining Committee:

Chair: Dr. Habib Chaudhury, Assistant Professor, Gerontology Department, SFU

Dr. Gloria Gutman, Professor Emeritus, Gerontology Department, SFU
Senior Supervisor

Dr. Steve Robinovitch, Associate Professor, Kinesiology Department, SFU
Supervisor

Dr. Gareth Jones, Assistant Professor, Faculty of Health Sciences, University of Western Ontario
Supervisor

Dr. Andrew Wister, Professor and Chair, Gerontology Department, SFU
Supervisor

Dr. Ryan Rhodes, Associate Professor, Faculty of Education, University of Victoria
External Examiner

Date Defended: Oct. 2, 2006

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ABSTRACT

This thesis explores the potential physical benefit of exercise programs offered to clients from 54 Adult Day Centres in British Columbia, Canada. The purpose of the research was to determine characteristics of clients, exercise programs and leaders and to establish their relative influence on an exercise classification system (ECS) score, which categorized each program as offering minimal, moderate or optimal potential benefit.

Results indicated that a) exercise programs are offering moderate potential benefit to clients b) leaders had the most influence on scores (49.7%), followed by programs (25.5%) and clients (21.4%), c) inability to follow due to hearing loss was the client factor most closely associated with scores (B=-.46, p=.000), c) policy against standing during exercise was the program factor most closely associated with scores (B=-.37, p=.003) and d) perceived seriousness of falling on increased care needs was the leader factor most closely associated with scores (B=.-.32, p=.01).

For Don, Wren and Judah

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CHAPTER I
INTRODUCTION

Background

With the current emphasis on community care instead of institutionalization, regional health authorities in British Columbia (BC) have implemented services to assist frail adults in maintaining their independence in the community for as long as it is safe and reasonable to do so (Adult Day Care Operational Procedures, 1984; Gutman, Milstein, Killam, Lewis & Hollander, 1993). As part of this system, Adult Day Centres (ADC) are funded to promote the physical, cognitive, social and emotional well-being of frail adults, through promoting their independence and providing respite for their caregivers (Adult Day Care Operational Procedures, 1984; Gutman 1993; Strang & Neufeld, 1990). Furthermore, ADC offer group-based rather than individual based programs, thus decreasing costs to the health care system and to taxpayers (Sugar & Marienelli, 1997; Caldwell, 1996; Thomson & Born, 1999). These programs are well established and are hypothesized to have positive effects on health and functional status.

In a survey conducted to determine the characteristics of ADC in BC, Gutman et al. (1993) found that of the 49 then in operation, most were open for five hours, on weekdays and accommodated from 15 to 35 clients per day. Programming typically commenced with socialization and coffee time and was followed by a variety of activities, including physical exercises, mentally stimulating games, lunch and one or two afternoon programs, such as Bingo or carpet bowling. Other activities included outings,

craft programs, music therapy and various types of entertainment. Although most of the ADC surveyed offered similar programs, there were differences due to personal preferences of the participants and staff and the socioeconomic and cultural characteristics of each neighbourhood (Adult Day Care Operational Procedures, 1984; Gutman 1993).

A review of the research literature suggests gaps in the information characterizing ADC. For example, it is known that exercise programs are offered, but the characteristics of these classes are largely unknown. This would suggest a paucity in the information regarding the quality and applicability of exercise programming for this population. Based on five years of experience working as an ADC exercise leader and observing other exercise programs, it is the impression of the researcher that some factors, not yet addressed in the literature, make exercise program planning, implementation and evaluation for this population difficult.

Firstly, regarding client characteristics, there is a perception by staff that the nature of ADC programs in general is shifting from a health promotion model to a short-term solution for older adults awaiting long term care (LTC). As a result of this increasing level of frailty, programming for these clients is becoming more challenging. There also seems to be widening gaps between the levels and types of client impairment within the typical ADC. One exercise group may consist of older adults with various dementias, mobility impairments and language and cultural differences. To accommodate this, it would seem that some leaders are attempting to make "one size fit all " and in doing so are diluting the intensity of the program to meet the capabilities of the more frail clients.

Secondly, regarding exercise program characteristics, there seems to be variety in those being offered. For example, some centres offer seated exercises while others focus on walking programs. Furthermore, there may be operational issues affecting programs, such as the number of assistants available to monitor clients with mobility impairment, assist clients with dementia or translate instructions. Other challenges may include availability of equipment and suitable space.

Finally, regarding leader characteristics, exercise training is not regulated by health regions. Therefore, many ADC staff may be under-educated regarding exercise for frail seniors and ill-equipped to deal with this population. In many centres, staff are hired prior to obtaining education in exercise theory or leadership and training consists of observing the existing program. Staff may attend workshops or courses according to the discretion of their ADC, may research the topic of exercise themselves or have prior knowledge that they apply to their programs. However, there does not seem to be consistency in their training. Added to these issues are the beliefs of the leaders regarding the benefits of exercise for ADC clients. Leaders may believe that this population is not able to maintain or improve their ability levels and therefore see exercise programs as an enjoyable activity without much physical benefit. All of these factors combined may result in programs that do not benefit clients.

IMPLICATIONS FOR RESEARCH

In order to address these concerns, the following questions need to be considered:

1) What are the characteristics of clients, exercise programs and leaders?
    a. What are the characteristics of clients, including their levels of functional ability and special needs?

b. What are the content, frequency, duration and intensity of exercise programs and do they meet current recommendations?
c. What are the characteristics and beliefs of leaders?
d. What is the nature of leader education and training?
e. What challenges do leaders face in the planning, implementation and evaluation of exercise programs?

2) What is the quality of the current exercise programs provided by ADC?
   a. What is the level of potential benefit of programs, as determined by their content, frequency, duration and intensity?
3) To what extent are content, frequency, duration and intensity a function of characteristics of clients, exercise programs and leaders?

The current study focused on examining existing exercise programs through an evaluation of their level of potential physical benefit to the client. The assessment of programs was based on previously published recommendations for exercise programming with frail older adults (American College of Sports Medicine [ACSM], 1998).

CHAPTER II
LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Literature Review Process

A literature review was conducted using the ageline and medline search engines. The main keywords used were adult day care/centre/program, exercise and frail older adults/elderly/seniors. A priority was made for finding Canadian literature, however, some American information was included.

Characteristics of Adult Day Centres

In addition to the BC study outlined above, two other Canadian studies were reviewed that described the characteristics of ADC. While Gutman et al. (1993) focused on ADC operations, staff and programs, the other studies analyzed client characteristics.

In a study conducted in Alberta, Ross-Kerr, Warren, Schalm, Smith and Godkin (2003) compared nine adult day programs (ADP) with five adult day hospitals (ADH). The ADH offered high levels of professional assessment, support and treatment while the ADP were more socially based programs with support given, as needed. The clients of both had similar socio-demographic characteristics: they lived alone or with their families, were female and retained legal decision-making power. The most common reported diagnoses for both groups were depression (25.1%), stroke and high blood pressure (22.5%), osteoarthritis (20.2%) and diabetes mellitus (15.8%). However, ADP

clients averaged fewer days of attendance per week, continued in the program for longer, took fewer medications and fell less during the previous year than ADH clients.

In a Quebec study, Baumgarten, Lebel, Laprise, Leclerc and Quinn (2002) compared current ADC clients with potential ones on waiting lists and high attendees with low attendees on levels of anxiety, depression, functional status, caregiver burden and cost of health services. No significant differences were found between current and potential clients on measures of anxiety, depression, functional status, caregiver burden or cost of health services. However, results indicated that caregivers of current clients were younger than those on waiting lists. In addition, high attendees were more likely to be older, male, cognitively and functionally impaired, have higher depression scores and have older, female caregivers than low attendees. As can been seen, research on Canadian ADC has focused on operational and client characteristics of ADC in BC (Gutman et al., 1993), Alberta (Ross-Kerr, et al.,2003) and Quebec (Baumgarten et al., 2002). However, no research has been conducted regarding the characteristics of exercise programs or leaders.

Benefits Attributed to Exercise Programs for Frail Elders

According to current research, the effects of secondary aging, described as the product of environmental influences, health practices, or diseases that are not shared by all adults (Bee, 2000), can be prevented, mediated or reversed for many older adults via exercise. Many conditions once thought to result from □old age' actually result from sedentary lifestyles. In opposition to the belief that old age is a time of disengagement and inevitable decline, experts argue that exercise is necessary to maintain the health of older adults (O'Brien-Cousins, 2002).

In research conducted with older persons, exercise has been shown to stimulate the release of hormones that alleviate pain (Caldwell, 1996), slow muscle dysfunction, prevent or mediate chronic illness (Kaplan, Strawbridge, Camachon & Cohen, 1996; Sugar et al., 1997), improve flexibility and mobility (Caldwell, 1996; Hickey & Stilwell, 1991; Lazowski et al.,1999; Rikli & Jones, 1999) and increase independence in functional ability for activities of daily living (Brill, 1999; Caldwell, 1996). Exercise also prevents falls and related injuries (Buchner, Cress, de Lauter, Margherita, Price & Wagner, 1997; Campell, Robertson, Gardner, Norton, Tilyard & Buchner, 1997; Wolf, Barnhart, Kutner, McNeely, Coogler & Xu, 1996), which have been associated with lower body muscle weakness, decreased balance ability and range of motion, gait changes, lowered reaction time, neuromuscular conditions, and postural imbalances (Keller & Woolly, 1991). Fall related injuries are responsible for over 70% of hospital related care and two thirds of hospital discharges (Raina, Dukeshire, Chambers, Toivinen & Lindsay, 1997) at an estimate of 2.8 billion in Canada in 1994 (Asche, Gallagher & Coyle, 1997) and 180 million in BC in 1998 (Cloutier & Albert, 2001) in direct and indirect costs.

It is difficult to determine the effectiveness of any one type of exercise on functional ability and risk of falling because much of the research conducted has utilized multi-component exercise programs (Fiatarone-Singh, 2002). Exercise programs designed for use in recent studies have included many combinations of strength or resistance training, balance training, cardiovascular training, flexibility, range of motion and/or breathing and posture. This makes it difficult to determine exactly which exercises

are the most efficacious for reducing frailty and risk of falls. Furthermore, one mode of exercise cannot be seen as only affecting one body system.

There is no evidence that flexibility and range of motion-based programs have a significant impact on reducing disability (Mulrow, Gerety, Kanten, DeNino & Cornell 1994). The benefits of resistance training (Buchner et al., 1997; Campell, et al., 1997) and resistance training in conjunction with balance training (Lazwoski, et al.,1999) have been documented; both are both safe and efficacious for frail elders and should be facilitated in care facilities and other settings, according to Fiatrone-Singh (2002). Lazowski et al. (1999) demonstrated that exercise has positive effects on mobility, balance, flexibility, knee strength and hip strength with clients living in LTC. Tudor-Locke, Myers, Jacob, Jones, Lazowski, and Eccelstone (1996) demonstrated that exercise has positive effects on the maintenance of current levels of function for frail, homebound seniors. Despite these findings, many exercise programs for this population focus on stretching and range of motion exercises rather than resistance, aerobic and balance training (Lazowski, et al.,1999).

EXERCISE PROGRAMS OFFERED BY ADC

Three studies were found that have examined ADC exercise programs, all of them American. The first one described below examined a general population and the second and third narrowed their focus to clients with dementia. Deiner and Mitchell (2005) tested a multi-factorial falls prevention program consisting of exercise three to five times per week, an education program in the form of monthly newsletters and falls-related literature, coupled with a monthly falls follow up. The exercise program consisted of a) deep breathing, stretching and range of motion exercises for warm up, b) walking and

recumbent biking from two to fifteen minutes for conditioning, c) two sets of ten repetitions each of hip flexion, hip extension, hip abduction, knee extension, shoulder press-up and d) elbow flexion for strengthening and feet together stand, tandem stand and single leg stand for balance. These exercises incorporated increased amplitude and centre of mass on a progressively decreasing base of support, anterior/posterior and lateral sway of centre of mass and decreased kinesthetic information from the floor. A significant reduction in falls, higher scores on the timed up and go test used to measure balance and mobility, higher scores for fast gait velocity and a decrease in home hazards by 50% were found for the intervention group.

It is well established that many older adults with dementia are being referred to ADC, making it necessary to research the implications of cognitive impairment on the planning, implementation and evaluation of exercise programs. In keeping with this objective, Thomson and Born (1999) conducted a study to determine whether the quality of exercise participation could be increased with four ADC clients with dementia. To accomplish this, these researchers first demonstrated the exercise to the client, then modeled and described it and finally moved the subject's limb in the correct movement. Each time the exercise was performed correctly, the leader praised the client and after mastery was achieved, the leader eliminated prompting in the reverse order of the protocol. Using this method, Thomson and Born (1999) found that correct participation increased and concluded that meaningful participation can be achieved with this population. The limitations of this study, which include very small sample size and the lack of a control group, prevent the results from being generalized to other populations.

The final study examined the effects of a six-week resistance-training program on 26 ADC clients with dementia (Hageman and Salazaar, 2002). The program consisted of a total of 12 sitting and standing exercises completed 15 times each, targeting hip flexors and extensors, hip abductors and adductors and ankle plantar and dorsiflexors. Researchers tested lower extremity strength, gait, mobility and risk of falling and found that only fast gait time yielded a statistically significant change after the intervention period. Limitations of the study noted by the authors were small sample size, absence of a control group and an inadequate intervention period (Hageman et al.,2002).

Up to the present, information regarding the characteristics of ADC exercise programs in BC has been limited. The only information collected before the present survey was that 98% of ADC in BC surveyed in 1991 offered one (Gutman et al., 1993). Currently there are no prescribed guidelines for centres; exercise programming is the responsibility of activity personnel and the training of leaders is determined by individual ADC. Lazowski et al. (1999) suggest that many programs designed for frail adults in LTC focus on ball tosses or seated, range of motion exercises, rather than those shown to increase functional ability, such as balance, walking and resistance training. According to Newton (2003), exercise programs facilitated for frail seniors and older adults living in care homes often focus on flexibility, stretching or range of motion and are seated, regardless of ambulatory level.

Berg and Kairy (2003) suggest that this is common, most likely a result of perceptions of personnel that frail adults are unable to benefit from exercise. Lazowski et al. (1999) suggests that this is also due to fears surrounding liability from injury during exercise. These factors may influence the content and rigor of programs being offered, as

evidenced by the tendency in group-based programs to offer less strenuous exercises and to eliminate those that personnel perceive to increase risk of falling or injury, such as those performed while standing (ACSM Position Stand, 1998; Lazowski, et al., 1999). Other barriers to exercise programming that may be common to both ADC and LTC include limited funds for exercise equipment and leaders, lack of personnel with exercise training, diversity in physical and cognitive abilities of residents, and difficulty motivating participants and staff (Lazowski, et al., 1999; O'Brien-Cousins, 2002; Resnick, 2001; Wasner & Rimmer, 1998).

Despite these barriers, the research literature suggests that exercise programs for frail adults can be designed to maintain or enhance functional independence in activities of daily living and balance (Brill, 1999; Lazowski et al., 1999; Rikli et al., 1999) and should include recommendations in four major components: content, intensity, frequency and duration (Resnick, 2001). Regarding content, there are a variety of opinions regarding what exercises are most efficacious for frail seniors, including cardiovascular endurance (Keller & Wooly, 1991), flexibility and range of motion (Gladwin, 1996), resistance training to increase muscular strength and endurance (Caldwell, 1996; Keller et al., 1991) and standing and balance to maintain functional ability and mobility (ACSM, 1998; Buchner et al., 1997; Campell, et al., 1997; Wolf et al., 1996). According to ACSM (1998), the muscle groups used in resistance training should include hip extensors, knee extensors, ankle plantar flexors and dorsiflexors, biceps, triceps, shoulders, back extensors and abdominal muscles. Balance exercises should include progressive positions diminishing the base of support, dynamic movements which require precise

control of the centre of gravity and stress the muscle groups important in maintaining posture.

Regarding the intensity, frequency and duration of exercise for frail adults, higher intensity training is more beneficial than lower, although it too will yield positive results. Regimens should include progressive resistance training of two to three days per week, where adults are required to do two to three sets of each exercise. Frail adults should start with one set of five repetitions and gradually increase to two sets of ten before adding more weight (ACSM, 1998). Prior to the current research, it was not known how closely ADC exercise programs were meeting these criteria.

Characteristics of Exercise Leaders

The literature review yielded no information about exercise leaders working with ADC clients. However, three studies were found which looked at the characteristics of exercise leaders working in seniors living facilities and LTC. Wasner et al. (1997) examined the content of exercise programs offered and the type of education held by leaders working in senior living facilities in Illinois. In total, 93.7% of the facilities surveyed offered a program, with 30.8% offering specialized content for residents with various age-related diseases and conditions. Chair exercises were the most common (88.7%) and stretching and supervised walking were the next most frequent at 45.9% and 44%, respectively. Only 12.6 % of respondents reported a weight training component and no standing and balance exercise was reported. Just under half of respondents (45.9%) were certified, 16.4% had university degrees in physical therapy, 12.5% in recreation therapy, 11.3% in rehabilitation nursing and 8.8% in occupational therapy.

Schroeder (1995) determined the educational level of 13 exercise leaders working in seniors living facilities in the United States. Of the leaders, 11 had a college degree, 54% being in a fitness-related field and 77% in exercise and fitness. In total, 46% had taken courses in fitness programming and recreation and leisure studies, 39% had taken courses in exercise prescription and 54% had taken courses in senior fitness and wellness. Overall, 92% of instructors had taken courses in exercise physiology and/or fitness assessment, but none of the participants had specific certification to work with older adults. Only 21% of classes offered a strength-training component and 92% of respondents did not conduct pre and posttest assessments of their program participants. Schroeder (1995) concluded that additional training was needed for leaders working with older adults to develop more comprehensive exercise programs for this clientele.

A third survey, by the Canadian Centre for Activity and Aging (CCAA), was conducted to determine the quantity and quality of exercise programming currently being offered by 27 LTC in the London, Ontario region of Canada. Results indicated that there was a variety of exercises being performed, with warm up and stretching being the only common ones. The researchers also found that leaders were mainly from recreation and leisure backgrounds and had little training in exercise leadership. After the study, these leaders requested assistance from the CCAA for developing more comprehensive programs targeting the LTC population (Lazowski et al., 1999).

Currently there are no educational requirements for ADC exercise leaders working in BC. Although it is possible to obtain exercise education, it is not necessary and there are no provincial standards that regulate the type and quality of training offered. It is speculated that this may result in a prevalence of exercise personnel with limited

training. In addition, leaders may have misperceptions regarding the benefits of exercise for frail adults and lack of knowledge regarding which exercises are most efficacious for an ADC population. According to Jones and Clark (1998), a lack of training standards and a published curriculum may lead to dissemination of inaccurate information regarding seniors fitness, poor environmental conditions for exercise activities and fitness practices which may harm seniors. They suggest that educational programs for leaders should include information on the benefits of exercise training for older adults, definitions of regular versus pathologic aging and how exercise can prevent disease and promote healthy aging.

The CCAA has established guidelines for leaders, their trainers and organizations that designate and coordinate staff education in the long term care sector (Ecclestone & Jones, 2004). According to these principles, exercise leaders should have prior knowledge and/or experience in a related field and must adhere to certain performance standards. They must understand the physiological processes of aging and their relationship to exercise. They should also be knowledgeable regarding program content that has been proven to be safe and effective with this population. They should have the ability to evaluate clients' capacity to participate and be able to conduct long-term evaluation of their progress. They must understand the implications of diseases related to aging and be knowledgeable regarding safety issues, injury prevention and exercise that promotes functional ability. Finally, they should be able to motivate clients and be clear communicators with participants and staff. To become recognized, trainers must meet the requirements listed above by documenting courses meeting these standards and by completing both theoretical and practical evaluations. To maintain recognition, leaders

must continue their education in fitness and gerontology, maintain their prerequisites for certification and lead senior fitness programs for a minimum of 50 hours per year. A certification process is presently in the planning stages (Luxton & Jones, 2003).

These recommendations have also been combined with American Standards to develop the *International Curriculum Guidelines for Preparing Physical Activity Instructors of Older Adults,* designed for existing licensing and registration bodies (Ecclestone et al., 2004). This document outlines recommendations for exercise leaders preparing to work with older adults with a variety of abilities, ranging from healthy seniors to those living in facility care. According to the guidelines, advanced training would be required to work with seniors who had severe disabilities or cognitive impairment (Ecclestone et al., 2004, p.3). The recommended curriculum includes nine modules: a) Overview of aging and physical activity, b) psychological, socio-cultural and physiological aspects of physical activity and older adults, c) screening, assessment and goal setting, d) program designed and management, e) program design for older adults with stable medical conditions, f) teaching skills, g) leadership, communication and marketing skills, h) client safety and first aid, i) and ethics and professional conduct (Ecclestone et al., 2004).

Training for leading seniors exercise programs within BC is available through the British Columbia Recreation and Parks Association (BCRPA). To become registered, individuals must complete a 30-hour fitness theory course and exam and a specialty module focusing on one of four options: group fitness, aquatic fitness, weight training or personal training. After these are completed, one may complete a specialty designation focusing on seniors or adapted fitness, which is modified programming for special

populations. To maintain registration, exercise leaders are required to update their knowledge via workshops facilitated by the BCRPA, which, at the present time focuses on exercise for healthy rather than frail seniors (http: www.bcrpa.bc.ca/fitness/registered.htm).

Conceptual Framework

The conceptual framework used for this study was the Health Belief Model. Proposed by Rosenstock and Hochbaum in1964, this model originated in the 1950's as researchers sought to develop a theory that would address many health behaviours as opposed to simply solving problems one by one (Rosenstock, 1974). This conceptual approach was influenced by the theories of Kurt Lewin, which posit that individuals operate within a world filled with positively, negatively and neutrally valued regions. Applying this theory to health beliefs, Rosenstock (1974) hypothesized that diseases represent a negative valence that individuals will automatically move away from. Therefore, daily actions performed by an individual originate either from a pull towards positive forces or a push away from negative forces.

The main tenet of the health belief model is that a person's perception of the possible threat of a disease and her actions to decrease or limit the potential threat will be mediated by six factors. These factors include perceived susceptibility, perceived seriousness, perceived benefits of taking action, barriers to taking action, cues to action and level of self-efficacy (Rosenstock, 1974). The health belief model was used specifically for the current research since it has been frequently used in research with older adults (McDonald-Miszczak, Wister & Gutman, 2001) and in application to exercise among seniors (Chou & Wister, 2005). This model has also been applied to the

area of preventative health behaviours (McDonald-Miszczak et al., 2001), which was vital for its application to the current research, which analyzed exercise leaders' beliefs regarding the possibility and severity of falls in the ADC population. In this study, the model was not tested directly, but was used as a framework by which to understand the perspective and exercise choices of the leader. This modification was made since it was hypothesized that many ADC clients would have some type of cognitive impairment, making it difficult for them to consider the benefits of exercise themselves. As a result of this inability on the part of the client, it was thought that the leaders would recognize the risk of falling among their clients and would offer exercises shown to decrease that risk.

As previously mentioned, the risk of client falls in the ADC population is high. It was predicted that leaders who perceived their clients to be at risk for falling would be motivated to incorporate resistance training and balance exercises into their programs, as they have been shown to decrease risk of falling in this population. Regarding perceived seriousness, leaders who believed that a fall would have a serious effect on the health or functional ability of clients would be more likely to plan interventions to decrease the likelihood that a fall would occur. Regarding perceived benefits of taking action, it was assumed that if exercise leaders believed that balance and mobility abilities could be maintained or restored, they would be motivated to lead exercises to enhance them.

Although leaders may recognize these factors, there may be other barriers preventing them from implementing exercises recommended to decrease the risk of falls. According to Rosenstock (1974), it is the subjective belief that a certain course of action will be effective that will determine whether or not it will be taken. Although a leader may recognize the benefits of taking a particular health action, such as an exercise

protocol designed to reduce the risk of falls, she may be unable to take action due to certain barriers. Furthermore, she may implement an alternative course of action that does not actually reduce the threat. For example, the leader may compromise by offering a seated, range of motion exercise program instead of one focusing on resistance and/or balance training. In addition, Rosenstock (1974) recognizes that an individual's peer group may have a strong influence on whether or not she takes action. Using the example of falls, it is possible that the beliefs of others surrounding the leader, such as a belief that clients will become injured or fall while standing, will prevent the leader from leading balance exercises.

Other factors have an impact on the exercise programs being offered to ADC clientele. Cues to action represent the triggers necessary to cause an individual to take a specific health action. According to Rosenstock (1974), the relationship between perceived susceptibility and perceived severity of an illness will impact whether or not a health action is taken, however, a specific, instigating event may be necessary. Furthermore, the intensity of the cue needed will vary depending on the level of susceptibility and severity experienced. Using falls as an example, it may be necessary for an exercise leader to experience an event, such as a client falling, before she would recognize the need to offer exercises designed to prevent falls to her clientele. Finally, Rosenstock notes that self-efficacy will impact the probability that a health behaviour will be adopted. Using a falls example, self-efficacy could be understood as the belief of the exercise leader that she is able to effect change in this population.

Summary and Hypotheses

Despite the wealth of literature available on exercise for frail seniors, few studies have been conducted in this area using an ADC population. Three studies were reviewed, two of which focused exclusively on clients with dementia. To date there have been no studies examining the characteristics of individuals who serve as ADC exercise leaders. There has also been no research conducted using the health belief model to understand the exercise choices made by ADC exercise leaders in designing their programs.

Thus, the current study was exploratory in nature. First, it sought to determine characteristics of current clients, exercise programs and exercise leaders of ADC in BC. Second, it was designed to expand the limited information available concerning the level of potential benefit of exercise programs offered to ADC clients. Third, it explores the factors that might influence the differences in exercise level.

It was hypothesized that the level of potential benefit of exercise programs, as reflected by their content, frequency, duration and intensity, would be a function of three sets of variables: the characteristics of ADC clients, exercise programs and leaders.

Hypothesis 1: Of the three sets of variables, it was hypothesized that characteristics of exercise leaders would be the largest contributing factor to the level of potential benefit, followed by characteristics of the exercise program and then ADC clients. The expected relative weighting of components of these variables is indicated in the hypotheses below.

Hypothesis 2: For characteristics of clients, it was hypothesized that level of client impairment, as denoted by client care level, would be most closely associated with the level of potential benefit of programs.

Hypothesis 3: For characteristics of exercise programs, it was hypothesized that policies of ADC towards standing during exercise would be the operational characteristic most closely associated with the level of potential benefit of exercise programs.

Hypopthesis 4: For characteristics of exercise leaders, it was hypothesized that belief that clients were able to maintain and improve their functional ability, mobility and balance, would be the most closely associated with the level of potential benefit of exercise programs.

RATIONALE FOR THE HYPOTHESES

It was hypothesized that characteristics of the leader would have the most influence on the level of potential benefit of exercise programs, as reflected by content, frequency, duration and intensity, followed by characteristics of the exercise program and then characteristics of the clients. This hypothesis derives from the Health Belief Model, adapted to reflect the beliefs of the leader rather than the client. This model weighs the costs and benefits of taking a health action. It was thought that the leaders would have the largest influence on content, frequency, duration and intensity of exercise programs, despite any potential limitations that the other two sets of characteristics would impose. If exercise leaders were aware of and believed that current recommendations for frail seniors exercise would be beneficial for their clients, they would influence the operational characteristics of their exercise programs. For example, if an ADC had a policy for clients not to stand during exercise in order to avoid falls, the leader may provide research on how standing exercise is beneficial for this population and may suggest ways, such as smaller class sizes or increased program assistants, to make standing exercises safe for clients.

Secondly, it was hypothesized that exercise leader characteristics would have more influence on the level of potential benefit of programs, as reflected by content, frequency, duration and intensity, than client characteristics. Again, using the model as a framework, it was thought that if leaders believed that exercise was beneficial, they would match the ability level of clients with current recommendations when designing

their programs. For example, if leaders had clients with both high and low mobility, they may develop separate programs to adjust for the needs of each group. In doing so, clients with high mobility could be offered a program that was challenging to them and clients with low mobility could be offered one that was adjusted to their ability level and progressed with gains in ability.

Finally, it was hypothesized that characteristics of the exercise program would have more influence on the level of potential benefit of programs, as reflected by their content, frequency, duration and intensity, than client characteristics. This hypothesis did not have a theoretical rationale. However, it was thought that if the exercise program was developed according to recommendations, such as appropriate class size and ratio of clients to assistants, that the ability levels of clients would not hinder the selection of program components.

Of the client characteristics surveyed, it was hypothesized that client impairment, as denoted by care level, would be the characteristic most closely associated with the level of potential benefit of programs. This hypothesis was not based on the Health Belief Model, but on previously outlined levels of care, which categorize clients according to their level of ability and mobility (Adult Day Care Operational Procedures, 1984). It was thought that this would influence the type of exercise in which clients were able to participate and the perception of the leader regarding what each participant was capable of.

Of the characteristics of programs surveyed, it was hypothesized that policies of ADC towards standing during exercise would be the most closely associated with the

level of potential benefit, as reflected by content, frequency, duration and intensity. This hypothesis was also based on the assumption that policies against standing during exercise may be common. Furthermore, it was thought that staff from many centres may be unaware that standing and balance exercises are recommended for frail seniors and may prohibit exercises where there is potential for client falls.

Of the exercise leader characteristics surveyed, it was hypothesized that belief that clients were able to maintain and improve their functional ability, mobility and balance would be most closely associated with the level of potential benefit, as reflected by the content, frequency, duration and intensity of programs. Using the Health Belief Model as a framework, it was thought that such beliefs would be directly affected by the amount of research that leaders had conducted regarding exercise for frail seniors. If leaders were aware of current recommendations for frail seniors exercise and believed that their clients were capable of maintaining and improving their abilities, it was suspected that they would be more likely to follow them.

CHAPTER III
METHOD

Overview of Study Design

The current research consisted of a cross-sectional survey of ADC exercise leaders designed to obtain information regarding characteristics of clients, exercise programs and of exercise leaders. The questions asked were based on previous studies of BC ADC (Gutman et al., 1993), seniors exercise leaders (Jones et al., 1998 & Schroeder, 1995) and LTC exercise programs (Lazowski et al., 1999). The survey was also formulated based on five years experience that the researcher has leading ADC exercise programs.

Study Participants

Potential subjects consisted of one exercise leader from each ADC currently operating in BC, Canada. A list containing contact information for 80 centres throughout the province was obtained from the Lower Mainland Adult Day Care Association. An additional 23 were identified during the initial stages of participant recruitment. The survey and follow up took place between November 2004 and February 2005.

The staff member in charge of exercise programming at each of the 103 ADC was contacted by telephone, advised of the proposed survey and asked if he or she would be willing to participate. At this time, the researcher also determined whether the exercise leader wanted the survey to be sent to them via mail or fax. Two centres refused to participate due to lack of time and policy of the centre not to become involved in

research. The survey package was then sent to ADC that were willing to participate (n=101). In addition to the survey, a letter of introduction was included in each package outlining instructions, thanking the leader for their participation and providing contact information for the researcher and her faculty advisor (Appendix A). An informed consent form (Appendix B) was also sent to participants with the instruction to sign and date it and return it with their completed survey. Potential participants were advised that the purpose of the study was to obtain information on ADC throughout the province, with an emphasis on the characteristics of clients, exercise programs and leaders.

Two rounds of follow up were undertaken for potential participants who did not return their surveys within one month. In each round, the researcher attempted to establish contact, but if the individual was not available, messages were left for them. In total, 101 ADC agreed to participate and 57 returned completed forms, a response rate of 56.44%.

Table 1: Responding ADC and Rate of Return by Health Region

Health Region	No. ADC contacted	No. and Percentage of Responding ADC	Rate of Return by Health Region
Fraser	17	9 (16.7%)	52.9%
Interior	32	10 (18.5%)	31.3%
Northern	13	6 (11.1%)	46.2%
Vancouver Coastal	17	16 (29.6%)	94.1%
Vancouver Island	24	12 (22.2%)	50.0%
Missing Data		1 (1.9%)	
Total	103	54 (100%)	

Table 1 shows the number and percentage of responding ADC by health region. As can be seen, there was response from all five health regions. The largest response was

from Vancouver Coastal (29.6%), followed by Vancouver Island (22.2%), Interior (18.5%), Fraser (16.7%) and Northern (11.1%). One survey, totaling 1.9% was missing all forms of identification. As can be seen, there were differences in the rate of return by health region. For example, 94.1% of those contacted in the Vancouver Coastal Region responded, compared to only 31.3% on the Interior Region. Therefore, one must be careful when generalizing the results of this survey to all BC ADC exercise leaders, programs and centres. Three responding ADC reported that they currently did not run an exercise program and were therefore removed from the study. No analysis of refusals was possible as most potential participants did not give a reason for not returning their surveys.

INSTRUMENTS

The exercise leader survey was divided into eight sections. The first section was designed to provide general information about program characteristics, clients and socio-demographic characteristics of exercise leaders. Client characteristics consisted of the distribution of clients by level of care. In the current BC system, all clients are assigned a level of care, which outlines their health and functional status and care needs. As summarized in the Service Provider Handbook, produced by the Ministry of Health and Ministry Responsible for Seniors, Continuing Care Division (1984), Personal Care (PC) recognizes the client who is independent in mobility, but still requires minimal assistance with activities of daily living (ADLs). Intermediate Care Level 1 (IC1) recognizes the client who is independently mobile, requires moderate assistance with ADLs and requires daily professional care and/or supervision. Intermediate Care Level 2 (1C2) recognizes the individual who requires more care and or supervision. Intermediate Care Level 3

(IC3) recognizes either the individual who has a psycho-geriatric diagnosis and has severe, ongoing behavioural problems or the individual who requires a heavier level of care than one at an IC2 level. The individual at an Extended Care (EC) level, the heaviest level in the system, usually requires 24 hour supervision due to a severe chronic disability or a functional deficit, has limited potential for rehabilitation and usually requires institutional care.

In the second section, respondents provided information about their exercise programs. This included the number of days exercise was offered, the number of programs offered by the centre, how many minutes each session lasted, number of assistants in each class and number of clients. Questions were also asked about types of exercises that were not to be led and whether the respondents had designed or influenced the exercise program. In the third section, information was obtained about the type of equipment used and the content, frequency, duration and intensity of the exercise program offered. In the fourth section, respondents indicated their level of experience and education in exercise theory and leadership as well as the sources of information used for their program. The fifth section outlined the beliefs of the exercise leader regarding their perceived benefit of exercise to seniors and the challenges they faced in implementing exercise programs with this population. In the sixth section, information was obtained about health improvements that had been observed in clients and the assessment techniques used to determine benefits. In the seventh section, respondents reported on their beliefs about the likelihood of falls and rated their seriousness on the health of clients. Finally, exercise leaders were asked about their own exercise practices (Appendix C).

The exercise leader survey used four types of questions: Open-ended, multiple choice, yes or no and questions employing scales. For questions employing a scale, two systems were used. The first scale, used to rate leaders' opinions regarding the ability of clients to maintain or improve their health, consisted of the following five points: five=yes, definitely; four=yes; three=somewhat; two=no; one=definitely not. The second scale, used to rate severity of falls on client health also had five points: five=very serious; four=serious; three=moderately serious; two=slightly serious; one=not serious.

Pilot Test of Exercise Leader Survey and Ethics Review

Prior to distributing the survey, it was reviewed and pilot tested by 17 ADC exercise leaders working in the Toronto region of Ontario and was amended based on their recommendations. In addition, ethics approval for the research was obtained from the University Research Ethics Review Committee at Simon Fraser University.

Independent Variables

Table 2 shows the components of the three groups of independent variables examined in the study. As can be seen, group one includes characteristics of the ADC clients, group two includes characteristics of the exercise program and group three includes characteristics of the exercise leaders.

Table 2: Independent Variables

Independent Variables	Section and Question Number
1. Characteristics of ADC clients	
– Client care level: PC, IC1, IC2, IC3, EC – Client impairment: mobility, cognition, vision, hearing – Perceived challenges to designing exercise programs for ADC clients: interest level, cooperation, ability, medical conditions, mobility, inability to follow due to dementia, inability to follow due to hearing loss, inability to follow due to vision loss.	- Section 1, Question 11 - Section 1, Question 12 - Section 5, Question 37.a-h
2. Characteristics of exercise programs	
– Number of staff leading programs – Number of assistants in programs – Number of clients per session – Policy of centre towards used of weights – Policy of centre towards standing exercises	- Section 2, Question 19 - Section 2, Question 20 - Section 2, Question 21 - Section 2, Question 22.1 - Section 2, Question 22.2
3. Characteristics of exercise leaders	
– Gender – Age – Job position – Number of years leading exercise – Level of education and training – Certification status – Years of formal education in exercise theory/leadership- – Short term workshop education – Information from: supervisor or other ADC staff, physiotherapist, non-profit organizations, personal trainer or exercise leader, internet, books, magazines. – Fear clients will injure themselves during exercise – Fear clients will fall during exercise – Belief that functional ability, mobility and balance can be maintained – Belief that functional ability, mobility and balance can be improved – Has seen improvements in client ability – Perception of the risk of falls to clients – Perception of the seriousness of falls on client mobility, functional ability, increased care needs and death. – Whether leaders question abilities – Whether leader engages in regular exercise	- Section 1, Question 1 - Section 1, Question 2 - Section 1 Question 5 - Section 4, Question 31 - Section 4, Question 32 - Section 4, Question 33 - Section 4, Question 33 - Section 4, Question 34 - Section 4, Question 35 - Section 5, Question 37.i - Section 5, Question 37.j - Section 5, Question 38 - Section 5, Question 39 - Section 6, Question 40 - Section 7, Question 41 - Section 7, Question 42 - Section 5, Question 36 - Section 8, Question 43

Dependent Variable

An exercise classification system (ECS) score developed by the researcher was used to quantify the level of potential physical benefit that current ADC exercise programs offer to their clients. It was applied to data from Section 3 of the exercise leader survey where participants recorded the content, frequency, duration and intensity of six

exercise components: stretching/flexibility, range of motion, aerobic training, resistance training of the upper body, resistance training of the lower body and balance exercises performed while standing. The numerical scores assigned to each exercise component (Table 3) were formulated based on current recommendations for exercise of frail elders, as outlined by ACSM (1998) and Lazowski et al. (1999).

The rationale for the use of the term "level of potential benefit" is as follows.

The current research was based on the perceptions and practices of the exercise leader, The level of actual benefit of programs could only be determined by conducting a randomized control trial of ADC clients. However, the level of potential benefit could be determined based on how closely the components of exercise programs approximated the guidelines for frail seniors exercise programs. Using this method, programs that more closely met these recommendations would be seen as having more potential benefit to clients.

Describing programs as either having met current recommendations or not may have been a simpler rating system. However, a program would need a perfect score to be considered as having met the recommendations. Since a review of the literature suggested that most programs were not meeting a majority of these guidelines (Lazowski et al., 1999), a scaling system was deemed more appropriate. Using the system developed by the researcher, exercise programs meeting fewer of the recommendations received lower scores than those meeting more of the recommendations. However, the term," level of potential benefit" more aptly reflected the nature and purpose of the exercise

classification system, as it suggested that more advantages could be derived from a program with a higher score.

For example, since research indicates that most exercise programs for frail seniors focus primarily on stretching and range of motion (Lazowski, et al., 1999), the scoring for content was designed to reward ADC offering exercise shown to have the most benefit. Therefore, participants received one point each for completing stretching and range of motion exercises and three points each for aerobic, resistance training of the upper body, resistance training of the lower body and standing and balance exercises. As shown at the bottom of Table 3, the total possible score for content was 14.

Table 3: ECS Scoring System

Content	Frequency	Duration	Intensity-Meas	Intensity-Meth	Intensity-Tar
Stretching **A.** No 0 **B.** Yes 1	A. 1 time 0 B. 2 times .5 C. 3 times 1 D. 4 times 2 E. 5 times 3 F. 5 times 3	**A.** 15 min 1 **B.** 10-14 min 1 **C.** 5-9 min 1 **D.** 5 min 0			
ROM **A.** No 0 **B.** Yes 1	A. 1 time 0 B. 2 times .5 C. 3 times 1 D. 4 times 2 E. 5 times 3 F. 5 times 3	**A.** 15 min 1 **B.** 10-14 min 1 **C.** 5-9 min 1 **D.** 5 min 0			
Aerobic **A.** No 0 **B.** Yes 3	A. 1 time 0 B. 2 times .5 C. 3 times 1 D. 4 times 2 E. 5 times 3 F. 5 times 3	**A.** 15 min 3 **B.** 10-14 min 2 **C.** 5-9 min 1 **D.** 5 min 0	**A.** Yes 1 **B.** No 0	A. HR 1 B. RPE 1 C. Other 1	**A. HR** i. 0-20% 0 ii. 21-40% 1 iii. 41-60% 2 iv. 61-80% 1 v. 81% plus 0 **B. RPE** i. 8 under 0 ii. 9-10 1 iii. 11-13 2 iv. 14-15 1 v. 16 plus 0
Resistance **Upper Body** **A.** No 0 **B.** Yes 3	**A.** 1 time 0 **B.** 2 times .5 **C.** 3 times 1 **D.** 4 times 2 **E.** 5 times 3 F. 5 times 3	**A.** 15 min 2 **B.** 10-14 min 2 **C.** 5-9 min 1 **D.** 5 min 0	**A.** Yes 1 **B.** No 0	A. Reps/sets1 B. Other 1	**A. Reps** i. 1-5 0 ii. 5-9 1 iii. 10-15 2 **B. Sets** i. 1 1 ii. 2 2 iii. 3 2 iv. 4 1
Resistance **Lower Body** **A.** No 0 **B.** Yes 3	**A.** 1 time 0 **B.** 2 times .5 **C.** 3 times 1 D. 4 times 2 **E.** 5 times 3 F. 5 times 3	**A.** 15 min 2 **B.** 10-14 min 2 **C.** 5-9 min 1 **D.** 5 min 0	**A.** Yes 1 **B.** No 0	A. Reps/sets1 B. Other 1	**A. Reps** i. 1-5 0 ii. 5-9 1 iii. 10-15 2 **B. Sets** i. 1 1 ii. 2 2 iii. 3 2 iv. 4 1
Balance **A.** No 0 **B.** Yes 3	**A.** 1 time 0 **B.** 2 times .5 **C.** 3 times 1 **D.** 4 times 2 **E.** 5 times 3 F. 5 times 3	**A.** 15 min 2 **B.** 10-14 min 2 **C.** 5-9 min 1 **D.** 5 min 0		A. 1 leg 1 B. tandem 1 C. circle 1 D. heel 1 E. close eyes 1	
Total Possible Score 14	**Total Possible Score 18**	**Total Possible Score 11**	**Total Possible Score 3**	**Total Possible Score 8**	**Total Possible Score 10**
Total Score					**64**

For frequency, participants recorded whether they offered each exercise component one, two, three, four, five or more than five times per week. Those recording the exercise frequency as once per week received zero points, twice per week received half a point, three times per week received one point, four times, two points and five times, three points. Those recording a frequency of more than five times per week only received three points as it was anticipated prior to the study that most centres are not open more than five days per week. The survey did ask participants if they offered more than one program per day, however, it was assumed that most centres would not. Therefore, total possible score for frequency was 18 points.

For duration, participants indicated whether each exercise component was less than five minutes, five to nine minutes, 10-14 minutes or >=15 minutes. The scores for duration were scaled according to their overall importance in the exercise program, based on Lazowski et al. (1999). For stretching and range of motion exercises, participants received zero points for offering exercise for under five minutes and one point for offering exercise for five to fifteen or more minutes. Again, because it was hypothesized that most ADC would focus primarily on stretching and range of motion exercises, participants received no more points for offering stretching for 15 minutes than for five minutes. For aerobic exercises, participants received zero points for less than five minutes, one point for five to nine minutes, two points for 10-14 minutes and three points for more than 15 minutes. For resistance training of the upper and lower body and balance exercises, participants received zero points for less than five minutes, one point for five to nine minutes and two points for 10 or more minutes. Total possible score for duration was 11 points (Table 3).

There were two main reasons for scaling duration scores as described above. Firstly, most exercise programs facilitated by an ADC were hypothesized to be between 30 and 45 minutes long. However, if one were to increase points based on the duration of the exercise components, the highest possible score would be for a program that lasted for an hour and a half. Therefore, centres would have been penalized for a 30 to 45 minute program. Secondly, according to the recommendations by ACSM (1998) and Lazowski et al. (1999), every exercise component should be completed for a specific duration. However, it was speculated that many ADC would not complete the recommended durations for each exercise component, but would allocate more time for stretching and range of motion exercises than aerobic training, resistance training and balance exercises. If this was so, and one was to allocate more points for a program that offered stretching for 15 minutes and range of motion for 15 minutes, based only on duration, they might receive more points than a program offering five minutes of each of stretching and range of motion exercises in addition to five minutes of resistance training of the lower body and five minutes of resistance training of the upper body. Therefore, the scores for duration were scaled.

For measuring intensity, three questions were asked: was a method used, was it acceptable and was the target intensity suitable. Intensity was measured for aerobic exercise, resistance training of the upper and lower body and balance exercises. A different format was used for measuring intensity for standing and balance exercises. If a method was used, participants received one point each for aerobic exercise, resistance training of the upper body and resistance training of the lower body, for a total possible score of three points.

Participants received one point each for accepted methods of aerobic exercise, resistance training of the upper body and resistance training of the lower body. Accepted methods for aerobic exercise included measure of heart rate reserve (HR) and rating of perceived exertion using the 20 point scale. Heart rate reserve is measured with the following formula: Training Heart Rate = Maximum Heart Rate (220) - Resting Heart Rate x Desired Intensity + Resting Heart Rate. Therefore, for an 80 year old client with a resting heart rate of 70 beats per minute, wishing to reach a target HHR of 60%, the formula would be as follows: 220 (Maximum Heart Rate) □70
(Resting Heart Rate) x 60% (Desired Intensity) + 70 (Resting Heart Rate) = 112
(Training Heart Rate).

Despite its recognition as a measure of intensity, maximum heart rate has not been validated for use with older adults. Tanaka, Monahan and Seals (2001) completed a meta-analysis of current research on maximum heart rate and conducted a laboratory study to corroborate the findings of their analysis. These researchers were not able to validate the use of maximum heart rate with a population of healthy older adults and determined that it may underestimate the stress felt by subjects during exercise. They concluded that a different equation more precisely reflected the maximum heart rate that older adults could safely achieve: HRmax=(208-0.7 x age). However, the purpose of the current study was to determine if exercise leaders were measuring intensity, if they were using an accepted measure and if their target intensity was within a recommended range. Therefore, despite these limitations, heart rate was accepted as a measurement of intensity for this study.

Rate of perceived exertion (RPE), developed by Gunnar Borg, rates the "degree of heaviness and strain experienced in physical work" (Borg, 1998, p. 9), on the

musculoskeletal, cardiovascular and pulmonary systems. Borg asserts that RPE can be used as a measurement of exercise intensity and has developed both a 20-point and a 10-point scale to measure it. Using these scales, the exercise participant is asked: "How hard do you feel it (the exercise) to be?" Both scales attach a verbal description to each number on which users may rate themselves. As shown in Table 4, a low rating indicates that no exertion is being felt and a high rating indicates that the exertion being felt is extremely strong. The 20-point scale was used for the current research since it corresponded with ACSM (1998) recommendations.

Table 4 Rating of Perceived Exertion

20 Point Scale	
6	
7	Very, very light
8	
9	Very light
10	
11	Fairly light
12	
13	Somewhat hard
14	
15	Hard
16	
17	Very hard
18	
19	Very, very hard
20	

□Adapted from Borg, 1998

Accepted measures of intensity for resistance training of the upper and lower body included repetitions and sets. In the current survey, intensity for standing and balance exercise was recorded. According to ACSM (1998), while balance training is recommended for frail adults, no standards have been developed to measure its intensity. However, the exercises that are recommended include "progressively more difficult postures that gradually reduce the base of support (one-legged stand), require dynamic

movements that perturb the center of gravity (tandem walk, circle turns), stress posturaly important muscle groups, such as the dorsiflexors (heel stands), and reduce other sensory input (vision) and conform to the accepted theories of balance control and adaptation (ACSM, 1998, p. 16)." Therefore, to measure balance intensity in the survey, participants were asked whether they led clients in the following exercises and received one point for each exercise they led, for a total of five points: standing on one leg; tandem walk; circle turns; heel and toe stands; closing eyes while standing. Total possible score for target method of intensity used was eight points.

If the target for intensity was acceptable, the following scores were awarded. For aerobic exercise measured by heart rate reserve, a target intensity of 40-60% is recommended (ACSM, 1998). Therefore, participants received zero points for a rating of 0-20%, one point for 21-40%, two points for 41-60%, one point for 60-80% and zero points for over 80%. For aerobic exercise measured by ratings of perceived exertion, scores assigned to the various categories reflected the idea that intensity should be at a moderate level. According to ACSM (1998), aerobic intensity for frail seniors should be between 11-13. Therefore, participants received zero points for scores of eight and under, one point for a score of nine to ten, two points for a score of 11-13, one point for a score of 14-15 and zero points for a score of 16 and over.

For resistance training measured by repetitions, Porter (2002) suggests that eight to fifteen repetitions should be completed for each set. Therefore, participants received zero points for sets of one to four repetitions, one point for a set of five to nine and two points for sets of 10-15 repetitions. According to ACSM (1998), frail adults should complete two to three sets of exercises that stress major muscle groups of the upper and

lower extremities and torso. Relevant muscles include hip extensors, knee extensors, ankle plantar flexors, biceps, triceps, shoulders, back extensors and abdominal muscles. Therefore, participants received one point for one set, two points for two sets, two points for three sets and one point for four sets. Total possible score for target intensity was 10 points. The total ECS score for each respondent was calculated and entered into SPSS version 13.0 for statistical analysis.

It is important to note that this system did not measure the actual benefit that exercise programs have on ADC clients; to determine actual benefit, a randomized control trial study of individual clients would have had to be done. Instead, it was decided that the level of "potential benefit" would be estimated by determining how closely the exercise program met current guidelines and recommendations for exercise programs for frail adults. Furthermore, the exercise leaders were only asked to record the characteristics of the general program without having to take any client measurements, thereby potentially increasing participation in the survey.

Validity Check

To establish preliminary validity, the ECS was sent to 10 qualified experts in the field of exercise for older adults. Raters were asked to use their expertise to assess how well the ECS covered the most important domains of exercise for frail adults. Using a rating scale of zero to ten, with zero being not effective and ten being extremely effective, experts rated how well the scale measured content, frequency, duration and intensity. Raters were universally concerned about the measurement of intensity. In the original system, exercise leaders were asked to rate the average RPE that their clients

were actually obtaining, however, the purpose of the study was to determine the level of potential benefit that exercise programs were offering to ADC clients. To better reflect this purpose, the intensity section of the ECS was revised; leaders were asked to rate whether they measured intensity and to list the method and target of measurement used.

Missing Data

There were a small number of missing cases in the data. For categorical and ordinal variables, the mode of each variable was used to fill in the missing cases. For continuous variables, the mean of each variable was used to fill in the missing cases.

CHAPTER IV
RESULTS

Introduction

This chapter is divided into four sections, beginning with an overview of the distribution of ECS scores. This is followed by the results of crosstabular analyses conducted to show differences between ADC exercise programs falling into minimal, moderate and optimal potential benefit categories. Since the current research was primarily exploratory, there were a large number of characteristics of ADC clients, exercise programs and leaders chosen as independent variables. Therefore, correlational analyses were used to reduce the number of variables entered into regression models. The final section summarizes the results of three regression analyses conducted to determine the contribution of each of the three sets of characteristics and the relative weighting of the factors within each set on the ECS score.

Distribution of ECS Scores

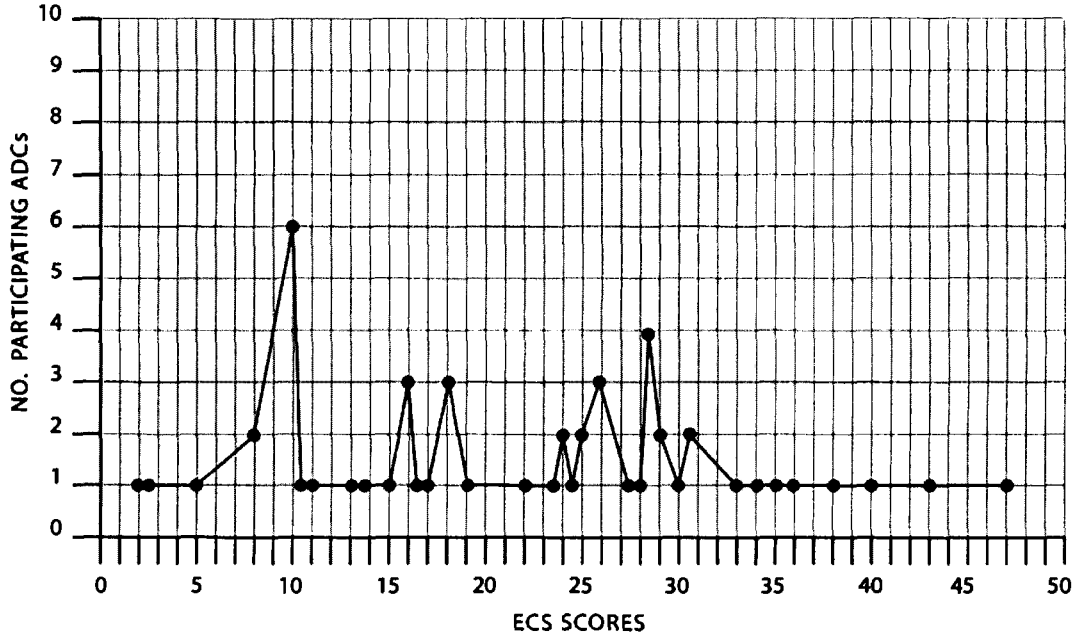
Because a broad distribution of ECS scores ranging from 0-64 had been expected, centres were to have been classified into three categories based on implementation of under one-third, one-third to two-thirds or more than two-thirds of the recommendations. Using this method, ADC with scores of 0-20 were to have been categorized as offering an exercise program with minimal potential benefit, those with scores of 21-43 as offering one with moderate potential benefit and those with scores of 44-64 as offering one with optimal potential benefit. Using these categories, 25 qualified for the minimal group,

27 qualified for the moderate group and only two qualified for the optimal group. Aside from the obvious problem of rendering meaningless comparisons between the minimal and moderate groups on the one hand, and the optimal group on the other, the above categories did not reflect the distribution of ECS scores. As can be seen in Table 5, the actual range of scores was 2-47, the mode was 10, the median was 23.75 and the mean was 22.17 yielding, when the scores were plotted and as can be seen in Figure 1, a right skewed distribution.

Table 5: Range and Measurement of Central Tendency of ECS Scores

	Range	Mode	Median	Mean	Standard Deviation
ECS Score	2-47	10	23.75	22.17	11.03

Figure 1: Distribution of ECS Scores



To better reflect the distribution, new categories were constructed, again dividing the distribution into three groups but using the following sets of scores to differentiate them: 0-16.4 (35.2% of the distribution); 16.5-27.5 (31.5% of the distribution); and 27.6-47 (31.5% of the distribution). Using this method, 19 ADC qualified for the minimal group, 17 qualified for the moderate group and 18 qualified for the high score or "optimal" group. Overall, the level of potential benefit being offered was at a moderate level.

Table 6: Potential Benefit Groupings: Original vs. Revised Categories

	Minimal Potential Benefit	Moderate Potential Benefit	Optimal Potential Benefit
Original ECS Categories	0-20	21-43	44-64
No. ADC in each original score category	25	27	2
Revised ECS Categories	0-16.4	16.5-27.5	27.6-47
No. ADC in each revised score category	19	17	18

Descriptive and Crosstabular Analyses

This section begins with a brief comparison of overall findings with those from the 1991 survey of British Columbia ADC reported by Gutman et al. (1993). The remainder of the section compares the three ECS score levels using crosstabular analyses, which were computed using the ordinal level data of the ECS score categorizing ADC exercise programs into those offering minimal, moderate or optimal potential benefit. To determine the direction and magnitude of the relationships between the ECS levels and the independent variables, chi square was used for categorical variables and kendall's tau b and c were used for ordinal and dichotomous variables. Correlations ranging from zero to .20 were considered weak, those between .20 and .30 were considered moderate and those .30 and above were considered strong. For the direction of relationships between

variables, a negative sign indicated an inverse relationship and a positive sign indicated a positive relationship. A level $p<.05$ was used as a cut-off to identify statistically significant associations, but exact levels are reported. The statistical program used rounded off significance levels to three decimal places, therefore it was necessary to report some of these as $p=.000$.

COMPARISON OF ADC OPERATING CHARACTERISTICS WITH FINDINGS FROM PRIOR BC STUDY

Operating characteristics in the current study were consistent with those from the 1991 survey of BC ADC by Gutman et al. (1993). In the current study, results indicated that ADC were funded for an average of 13.3 clients per day and served an average of 13.9 clients per day, compared with 13.6 in 1991. Currently, the number of days per week that any one client attends ADC averages 1.8, compared to 1.7 in 1991, but days of operation have increased from one to five days per week (Gutman et al. 1993) to one to seven days per week. The current research found that most clients were categorized at an IC2 or IC3 level whereas Gutman et al. (1991) showed that IC1 clients were most commonly represented, followed by IC2 and PC clients. The number of ADC operating more than five days per week was small; in total, only three centres were open for six days per week and one centre was open for seven days per week. Gutman et al. (1993) found that 37 of 49 centres surveyed (75.5%) had one or more full time equivalent (FTE) staff overall. The current study found that 48 of 54 (85.2 %) centres had one or more FTE activity staff, with an average of 2.3 per centre.

Descriptive Profile and Comparison Across Revised ECS Groupings

This section combines a descriptive profile of ADC with crosstabular analyses of the independent variables and ECS level. As can be seen in Table 7, most ADC were open for five days per week (59.3%), but no association was found between number of days open and ECS level. Most centres were funded for 10-19 clients per day (53.7%). A moderate positive association was found between clients funded per day and ECS level (tau b=.25, p=.02), showing that centres with higher scores were funded for more clients per day. In addition, a strong, positive association was found between number of clients served per day and ECS level (tau b=.33, p=.002), showing that centres with higher scores served more clients per day than those with lower ones. Finally, there was a moderate, positive association found between number of FTE activity staff and ECS level (tau b=.24, p=.05), showing that centres with more FTE staff have higher scores than those with lower ones.

Regarding client characteristics, overall the most common care level for all ECS levels was Intermediate 2. As is shown in Table 7, none of the associations between level of care and ECS were statistically significant. The association between percentage of clients cognitively impaired and ECS was also not statistically significant. It is interesting to note that ADC had more EC clients, on average, than PC clients. In total, the average number of PC clients per centre was 0.7 and the average number of EC was 2.2. Given that the level of impairment for the average EC client is high and that these older adults usually require 24 hour supervision, it is surprising that ADC are serving this number of EC clients. A moderate, positive association was found between the percentage of clients

with visual impairment and ECS levels (tau b=.27, p=.02), showing that the percentage of those who are visually impaired increases in programs with higher ECS levels (Table 7).

Table 7: Operational and Client Characteristics of ADC by ECS Level

Characteristics	Minimal Potential Benefit (0-16.4) N=19		Moderate Potential Benefit (16.5-27.5) N=17		Optimal Potential Benefit (27.6-47) N=18		Total N=54		Statistical Tests
	n	%	n	%	n	%	n	%	
No. days open per week									
▯ 5	6	33.3	5	27.8	7	38.9	18	33.3	tau b=-.05
5	12	37.5	10	31.3	10	31.3	32	59.3	p=.70
▯ 5	1	25.0	2	50.0	1	25.0	4	7.4	
Range: 1-7	1-6		1-6		1-6				
Mean: 4.4	4.2		4.2		4.2				
SD: 1.2	1.4		1.4		1.4				
No. clients funded per day									
0-9	8	53.3	4	26.7	3	20.0	15	27.8	**tau b=.25**
10-19	10	34.5	9	31.0	10	34.4	29	53.7	**p=.02**
20 or more	1	10.0	4	40.0	5	50.0	10	18.5	
Range: 0-25.5	5-20		5-20		0-25.5				
Mean: 13.3	11.4		11.4		15.1				
SD: 5.8	4.5		4.5		7.2				
No. clients served per day									
0-9	8	61.5	3	23.1	2	15.4	13	24.1	**tau b=.33**
10-19	10	33.3	10	33.3	10	33.3	30	55.6	**p=.002**
20 or more	9.1	5.3	4	36.4	6	54.5	11	20.4	
Range: 3-27.5									
Mean: 13.9	3-27.5		5-25		6-26				
SD: 6.3	11.3		14.4		16.5				
	6.1		6.2		5.9				
Average no. days per client									
0-1.5	8	36.4	8	36.4	6	27.3	22	40.7	tau b=-.01
1.6-2.5	7	25.9	9	33.3	11	40.7	27	50.0	p=.95
2.6 or more	4	80.0	0	0.0	1	20.0	5	9.3	
Range: 1-3.5	1-3		1-2.5		1-3.5				
Mean: 1.8	1.9		1.7		1.8				
SD: 0.6	0.7		0.4		0.6				
No. FTE activity staff									
0-2	13	44.8	9	31.0	7	24.1	29	53.7	**tau b=.24**
2.1-5	6	26.1	7	30.4	10	43.5	23	42.6	**p=.05**
6 or more	0	0.0	1	50.0	1	50.0	2	3.7	
Range: 0-8	0-4		0-8		0-6				
Mean: 2.3	1.9		2.4		2.7				
SD: 1.6	1.1		1.9		1.8				

Characteristics	Minimal Potential Benefit (0-16.4) N=19		Moderate Potential Benefit (16.5-27.5) N=17		Optimal Potential Benefit (27.6-47) N=18		Total N=54		Statistical Tests
No. PC clients									
0-20	19	100.0	17	100.0	18	100.0	54	100.0	N/A
Range: 0-12	0-3		0-12		0-5				
Mean: 0.7	0.3		1.3		0.6				
SD: 1.9	0.8		3.1		1.4				
No. IC1 clients									
0-20	19	37.3	16	31.4	16	31.4	51	94.4	tau b=.19
21-40	0	0.0	1	33.3	2	66.7	3	5.6	p=.13
41-60	0	0.0	0	0.0	0	0.0	0		
Range: 0-31	0-17		0-3		0-28				
Mean: 6.3	4.2		8.2		6.9				
SD: 7.2	5.6		8.0		7.7				
No. IC2 clients									
0-20	14	35.9	12	30.8	13	33.3	39	72.2	tau b=.03
21-40	4	40.0	3	30.0	3	30.0	10	18.5	p=.84
41-60	1	20.0	2	40.0	2	40.0	5	9.3	
Range: 0-57	0-57		0-57		2-39.3				
Mean: 18.9	16.9		20.2		19.8				
SD: 13.4	14.8		15.1		10.6				
No. IC3 clients									
0-20	15	35.7	13	31.0	14	33.3	42	77.8	tau b=.02
21-40	4	36.4	4	36.4	3	27.3	11	20.4	p=.86
41-60	0	0.00	0	0.0	1	100.0	1	1.9	
Range: 0-58	0-34		0-34		0-58				
Mean: 13.7	12.2		13.1		15.7				
SD: 11.5	10.9		9.6		13.9				
No. EC clients									
0-20	19	35.2	17	31.5	18	33.3	54	100.0	N/A
Range: 0-13	0-13		0-11		0-7				
Mean: 2.2	2.4		2.5		1.7				
SD: 3.0	3.6		3.3		1.9				
% Mobility impaired									
0-33%	5	45.5	2	18.2	4	36.4	11	20.4	tau b=.06
34-67%	10	41.7	5	20.8	9	37.5	24	44,4	p=.61
68-100%	4	21.5	10	52.6	5	26.3	19	35.2	
Range%: 2-98	3-85		8-95		2-98				
Mean%: 55.9	50.2		65.4		53.3				
SD%: 24.8	21.8		23.7		27.4				

Characteristics	Minimal Potential Benefit (0-16.4) N=19		Moderate Potential Benefit (16.5-27.5) N=17		Optimal Potential Benefit (27.6-47) N=18		Total N=54		Statistical Tests
% Cognitively impaired									
0-33%	5	50.0	2	20.0	3	30.0	10	18.5	tau b=.14
34-67%	7	41.2	5	29.4	5	29.4	17	31.5	p=.24
68-100%	7	25.9	10	37.0	10	55.6	27	50.0	
Range%: 5-100	5-100		5-100		8-95				
Mean%: 60.2	56.3		64.8		59.9				
SD%: 27.7	33.8		23.3		26.3				
% Visually impaired									
0-33%	17	44.7	11	28.9	10	26.3	38	70.4	**tau b=.27**
34-67%	1	9.1	4	36.4	6	54.5	11	20.4	**p=.02**
68-100%	1	20.0	2	40.0	2	40.0	5	9.3	
Range%: 0-85	0.5-75		0-75		5-85				
Mean%: 27.0	19.4		30.3		31.9				
SD%: 20.8	17.4		21.4		22.2				
% Hearing impaired									
0-33%	14	41.2	9	26.5	11	32.4	34	63.0	tau b=.12
34-67%	4	30.8	5	38.5	4	30.8	13	24.1	p=.32
68-100%	1	14.3	3	42.9	3	42.9	7	13.0	
Range%: 0-80	0-80		2-80		0-80				
Mean%: 31.8	24.3		39.6		32.4				
SD%: 22.9	19.3		22.5		25.5				

Note: Percentages for independent variables add to 100% across rows. Percentages for the total add to 100% for column.

CHARACTERISTICS OF THE EXERCISE PROGRAMS

As can be seen in Table 8, most centres (85.2%) offered one exercise program per day, while 14.8% offered two or more per day. There was a strong, positive association between number of minutes per session and ECS levels (tau b=.34, p=.002), indicating that those in programs in higher ECS levels exercised for longer than those in lower levels.

Since some respondents gave a range for the number of clients they had in each exercise session, the average of that range was computed. For example, if they said that they had 15-20 clients per session, the average of 17.5 was used. Therefore, the range of clients per session was not in whole numbers, but was 2.5-22.5. Overall, the average number of clients per session was 13.3 which is close to the number of 10-13 recommended by Lazowski et al. (1999). However, this guideline is for clients without mobility or cognitive challenges and in the current study over half of clients were estimated to have such impairments. For these clients, a group of three to five persons has been recommended, also dependant on the number of staff and assistants available to the leader (Lazowski et al, 1999). However, no association between number of clients per session and ECS level was found. There was a significant difference between ECS levels and the number of leader per centre. A strong, positive association was found between number of leaders per centre and ECS levels (tau c=.32, p=.02), indicating that programs with higher levels had more leaders.

Just under half (42.9%) of ADC had policies against performing certain exercises. Of those centres, 9.3% had policies against using weights and 22.2% against standing during exercise. ECS scores were higher among centres without such policies. There was a moderate, inverse relationship between policy against standing and ECS levels (tau c=-.28, p=.02), indicating that those with higher scores had less policies against standing during exercise.

Table 8: Exercise Program Characteristics by ECS Level

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
	n	%	n	%	n	%	n	%	
No. days per week offer exercise program									
▯5	10	15.6	8	29.6	9	33.3	27	50.0	tau b=.02
5	9	36.0	7	28.0	9	36.0	25	46.3	p=.86
▯5	0	0.0	2	100.0	0	0.0	2	3.7	
Range: 1-7	1-5		1-7		1-5				
Mean: 3.9	3.5		4.1		4.8				
SD: 1.5	1.6		1.7		1.1				
No. programs per day									
1	17	37.0	14	30.4	15	32.6	48	88.9	tau b=.07
2 or more	2	25.0	3	37.5	3	37.5	6	11.1	p=.58
Range: 1-4	1-4		1-2		1-3				
Mean: 1.2	1.2		1.2		1.2				
SD: 0.6	0.7		0.4		0.6				
More than one session per day									
No	17	38.6	15	34.1	12	27.3	44	81.5	tau c=.20
Yes	2	20.0	2	20.0	6	60.0	10	18.5	p=.09
No. minutes per session									
▯30	10	76.9	1	7.7	2	15.4	13	24.1	**tau b=.34**
30	7	30.4	7	30.4	9	39.1	23	42.6	**p=.002**
▯30	2	11.1	9	50.0	7	38.9	18	33.3	
Range: 7.5-60	7.5-4		25-60		20-60				
Mean: 32.7	24.9		39.4		34.6				
SD: 11.6	8.8		11.7		9.4				
No. leaders per centre									
1	12	52.2	6	26.1	5	21.7	23	42.6	**tau c=.32**
▯1	7	22.6	11	35.5	13	41.9	31	57.4	**p=.02**
Range: 1-6	1-4		1-6		1-5				
Mean: 2.4	1.8		2.6		2.9				
SD: 1.4	1.2		1.5		1.5				
No. assistants per centre									
▯1	8	40.0	6	30.0	6	30.0	20	37.0	tau b=.18
1	10	37.0	11	40.7	4	22.2	25	46.3	p=.18
▯1	1	11.1	0	0.0	8	88.9	9	16.7	
Range: 0-2	0-2		0-1.5		0-2				
Mean: .8	0.7		0.7		1.1				
SD: 0.7	0.6		0.5		0.8				

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
No. of clients per session									
0-7	6	66.7	1	11.1	2	22.2	9	16.7	tau b=.20
8-15	9	34.6	8	30.8	9	34.6	26	48.2	p=.10
16-22.5	4	23.5	8	35.3	7	41.2	19	35.2	
Range: 2.5-22.5	3-22.5		7-22		2.5-22				
Mean: 13.3	10.9		14.9		14.3				
SD: 5.3	5,3		4.5		5.4				
Policy for program content									
No	11	36.7	7	23.3	12	40.0	30	55.6	tau c=-.07
Yes	8	33.3	10	41.7	6	25.0	24	44.4	p=.61
Policy against weights									
No	16	32.7	15	30.6	18	36.7	49	90.7	tau c=-.14
Yes	3	60.0	2	40.0	0	0.0	5	9.3	p=.07
Policy against standing									
No	11	26.2	15	35.7	16	38.1	42	77.8	**tau c=-.28**
Yes	8	66.7	2	16.7	2	16.7	12	22.2	**p=.02**

Note: Percentages for independent variables add to 100% across rows. Percentages for the total add to 100% for column.

As can be seen in Table 9, stretching and range of motion were the most common exercises offered to ADC clients; in total, 100% of centres offered stretching and 94.4% offered range of motion. For the remaining exercises, the percentage of centres that offered them increased in higher ECS levels. Strong, positive relationships were found between ECS level and aerobic (tau c=.61, p=.000), resistance training of the upper body (tau c=.72, p=.000) and lower body (tau c=.66, p=.000) and standing exercises (tau c=.70, p=.000).

Stretching (100%) and range of motion (94.4%) were the most frequently offered exercises. Although they were not offered as frequently as stretching and range of motion, aerobic exercises, resistance training and standing exercise increased in higher ECS levels. There were strong, positive relationships between aerobics

(tau c=.42, p=.000), resistance training of the upper body (tau c=.46, p=.000) and lower body (tau c=.44, p=.000) and standing exercises (tau c=.48, p=.000).

Regarding duration, there was a moderate, negative association between time spent on stretching exercises and ECS level (tau b=-.23, p=.05), indicating that those in lower levels spent more time on this component than those in higher ones. Conversely, those in higher levels spent more time on aerobic, resistance training and standing exercises than those in lower ones. Strong, positive relationships were found between aerobic (tau b=.38, p=.000), resistance training of the upper body (tau b=.303, p=.01), resistance training of the lower body (tau b=.34, p=.003) and standing (tau b=.30, p=.02).

Table 9: Content, Frequency, Duration and Intensity of Exercise Programs by ECS Level

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
Content Characteristics									
	n	%	n	%	n	%	n	%	
Stretching									
No	0	0.0	0	0.0	0	0.0	0	0.0	N/A
Yes	19	35.2	17	31.5	18	33.3	54	100.0	
Range of motion									
No	1	33.3	2	66.7	0	0.0	3	5.6	tau c=.05
Yes	18	35.3	15	29.4	18	35.3	51	94.4	p=.35
Aerobic									
No	15	65.2	6	26.1	2	8.7	23	42.6	**tau c=.61**
Yes	4	12.9	11	35.5	16	51.6	31	57.4	**p=.000**
Resistance training upper body									**tau c=.72**
No	15	78.9	4	21.1	0	0.0	19	35.2	**p=.000**
Yes	4	11.4	13	37.1	18	51.4	35	64.8	
Resistance training lower body									
No	17	60.7	8	28.6	3	10.7	28	51.9	**tau c=.66**
Yes	2	7.7	9	34.6	15	57.7	26	48.1	**p=.00**
Standing									
No	17	58.6	10	34.5	2	6.9	29	53.7	**tau c=.70**
Yes	2	8.0	7	28.0	16	64.0	25	46.3	**p=.000**

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
Frequency Characteristics									
Times per week	n	%	n	%	n	%	n	%	
Stretching									
0-2x	8	53.3	5	33.3	2	13.3	15	27.8	tau b=.13
3-4 x	3	18.8	5	31.3	8	50.0	16	29.6	p=.27
5 or more x	8	34.8	7	30.4	8	34.8	23	46.3	
Range: 0-7	0-5		1-7		1-5				
Mean: 3.6	3.2		3.7		3.9				
SD: 1.6	1.8		1.8		1.2				
Range of motion									
0-2x	8	47.1	7	41.2	2	11.8	17	31.5	tau b=.11
3-4 x	3	18.8	4	25.0	9	56.3	16	94.1	p=.33
5 or more x	8	38.1	6	28.6	7	33.3	21	38.9	
Range: 0-7	0-5		0-7		0-5				
Mean: 3.4	3.2		3.2		3.9				
SD: 1.8	1.9		2.1		1.2				
Aerobic									
0-2x	18	51.4	10	28.6	7	20.0	35	64.8	**tau**
3-4 x	1	11.1	2	22.2	6	66.7	9	16.7	**b=.42**
5 or more x	0	0.0	5	50.0	5	50.0	10	18.5	**p=.000**
Range: 0-6	0-4.5		0-6		0-5				
Mean: 1.7	0.2		2.2		2.7				
SD: 2.1	1.0		2.4		2.1				
Resistance training upper body									
0-2x	19	45.2	14	33.3	9	21.4	42	77.8	**tau b=.46**
3-4 x	0	0.0	1	14.3	6	85.7	7	13.0	**p=.000**
5 or more x	0	0.0	2	40.0	3	60.0	5	9.3	
Range: 0-7	0-2		0-7		0.5-5				
Mean: 1.6	0.2		1.9		2.8				
SD: 1.9	0.5		2.1		1.6				
Resistance training lower body									
0-2x	19	45.2	14	33.3	9	21.4	42	77.8	**tau b=.44**
3-4 x	0	0.0	1	14.3	6	85.7	7	13.0	**p=.000**
5 or more x	0	0.0	2	40.0	3	60.0	5	9.3	
Range: 0-7	0-1		0-7		0-5				
Mean: 1.3	0.1		1.4		2.4				
SD: 1.8	0.3		2.1		1.8				

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
Standing									
0-2x	19	43.2	16	36.4	9	20.5	44	81.5	**tau b=.48**
3-4 x	0	0.0	0	0.0	6	100.0	6	11.1	**p=.000**
5 or more x	0	0.0	1	25.0	3	75.0	4	7.4	
Range: 0-5	0-1.5		0-5		0-5				
Mean: 1.1	0.2		0.7		2.4				
SD: 1.6	0.5		1.4		1.8				
Duration Characteristics									
Min. per session	n	%	n	%	n	%	n	%	
Stretching									
0-9 min	8	32.0	4	16.0	13	52.0	25	46.3	
10-19 min	9	37.5	10	41.7	5	20.8	24	44.4	**tau b=-.23**
20 or more	2	40.0	3	60.0	0	0.0	5	9.3	**p=.05**
Range: 0-30	0-20		5-30		0-15				
Mean: 9.8	10.3		12.5		6.9				
SD: 5.8	5.5		6.9		3.3				
Range of motion									
0-9 min									
10-19 min	7	28.0	8	32.0	12	48.0	27	50.0	tau b=-.17
20 or more	9	50.0	6	33.3	3	16.7	18	33.3	p=.16
	3	33.3	3	33.3	3	33.3	9	16.7	
Range: 0-35									
Mean: 9.8	0-20		0-35		0-20				
SD: 7.6	10.2		10.3		8.9				
	6.6		9.4		6.2				
Aerobic									
0-9 min	18	48.6	10	27.0	9	24.3	37	68.5	**tau b=.38**
10-19 min	1	6.3	7	43.8	8	50.0	16	29.6	**p=.000**
20 or more	0	0.0	0	90.0	1	10.0	1	1.9	
Range: 0-20	0-15		0-15		6-20				
Mean: 5.1	1.1		6.1		8.4				
SD: 5.9	3.5		5.6		5.9				
Resistance training upper body									
0-9 min	17	47.2	9	25.0	10	27.8	36	66.7	**tau b=.30**
10-19 min	2	12.5	8	50.0	6	37.5	16	29.6	**p=.01**
20 or more	0	0.0	0	0.0	2	100.0	2	3.7	
Range: 0-30	0-10		0-15		3-30				
Mean: 5.8	1.3		6.9		9.6				
SD: 6.3	3.3		5.6		6.8				

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
Resistance training lower body									
0-9 min	19	44.2	12	27.9	12	27.9	43	79.6	**tau b=.34**
10-19 min	0	0.0	5	55.6	4	44.4	9	16.7	**p=.003**
20 or more	0	0.0	0	0.0	2	100.0	2	3.7	
Range: 0-30	0-5		0-15		0-30				
Mean: 4.4	0.5		4.1		8.7				
SD: 6.7	1.9		5.1		8.8				
Standing									
0-9 min	19	38.8	16	32.7	14	28.6	49	90.7	**tau b=.28**
10-19 min	0	0.0	1	20.0	4	80.0	5	9.3	**p=.02**
20 or more	0	0.0	0	0.0	0	0.0	0	0.0	
Range: 0-15	0-3.5		0-15		0-10				
Mean: 2.7	0.3		2.8		5.3				
SD: 3.7	0.9		4.2		3.3				
Intensity Characteristics									
	n	%	n	%	n	%	n	%	
Aerobic intensity									
No	19	36.5	16	30.8	17	32.7	52	96.3	tau c=.05
Yes	0	0.0	1	50.0	1	50.0	2	3.7	p=.29
Resistance training upper body									
No	18	36.7	17	34.7	14	28.6	49	90.7	tau c=.15
Yes	1	20.0	0	0.0	4	80.0	5	9.3	p=.14
Resistance training lower body									
No	18	34.6	17	32.7	17	32.7	52	96.3	tau c=.001
Yes	1	50.0	0	0.0	1	50.0	2	3.7	p=.98

Note: Percentages for independent variables add to 100% across rows. Percentages for the total add to 100% for column.

CHARACTERISTICS OF THE EXERCISE LEADERS

In total, 90.7% of the responding exercise leaders were female, and their age ranged from 26-86 years, with the average age being 46.2 years and the median age being 46.7 years. As can be seen in Table 10, there was an strong, inverse association found between age and ECS level (tau b=-.33, p=.004), indicating that scores decreased with

increasing age. Regarding job position, the majority of respondents were either program coordinators (50.0%) or program workers (33.3%). A significant difference was found between ECS level on job position (X2=19.72, p=.03).

Table 10: Socio-Demographic Characteristics of Exercise Leaders by ECS Level

Characteristics	Minimal (0-16) N=19		Moderate (16.5-27.5) N=17		Optimal (28-47) N=18		Total N=54		Statistical Tests
	n	%	n	%	n	%	n	%	
Sex									
Female	19	38.8	15	30.6	15	30.6	49	90.7	tau c=.15
Male	0	0.0	2	40.0	3	60.0	5	9.3	p=.06
Age									
0-35	1	9.1	3	27.3	7	63.6	11	20.4	**tau b=-.33**
36-49	8	32.0	10	40.0	7	28.0	25	46.3	**p=.004**
50 or more	10	55.6	4	22.2	4	22.2	18	33.3	
Range: 26-86	28-6		33-59		26-86				
Mean: 46.2	49.8		44.7		43.8				
SD: 10.8	8.2		9.8		14.6				
Type of education									
High school or less	2	40.0	2	40.0	1	20.0	5	9.3	tau b=.07
College diploma or certificate	9	36.0	7	29.2	8	33.3	24	44.4	p=.56
Bachelors degree or higher	8	32.0	8	32.0	9	36.0	25	46.3	
Years of job experience									
0-8	9	33.3	8	29.6	12	44.4	29	53.7	tau b=-.14
9-17	7	36.8	8	42.1	4	21.0	19	35.2	p=.27
18-25	3	50.0	1	16.7	2	33.3	6	11.1	
Range: .0.17-25	0.17-25		1.5-21		0.5-23.5				
Mean: 8.9	9.8		8.7		8.3				
SD: 6.56	7.1		5.4		7.3				
Job position									
Administrator	3	100.0	0	0.0	0	0.0	3	5.6	**x2=19.72**
Prog coordinator	8		9	33.3	10	37.0	27	50.0	**p=.03**
Prog worker	3	29.6	8	44.4	7	38.9	18	33.3	
Nurse	1	16.7	0	0.0	0	0.0	1	1.9	
Volunteer	1	100.0	0	0.0	1	50.0	2	3.7	
Other	3		0	0.0	0	0.0	3	5.6	

Note: Percentages for independent variables add to 100% across rows. Percentages for the total add to 100% for column.

For exercise leader education, exercise workshop attendance increased with higher ECS scores. In total, 79.6% of leaders had attended workshops. A strong, positive association was found between workshop attendance and ECS level (tau c=.38, p=.000. Receipt of information from various sources also was more frequent in groups with higher ECS scores. There was a moderate, positive relationship found between information obtained from workshops or courses and ECS level (tau c=.28, p=.02).

Table 11: Exercise Education and Training of Exercise Leaders by ECS Level

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
	n	%	n	%	n	%	n	%	
No. years formal training in exercise theory/leadership									
1 or less	10	43.5	7	30.4	6	26.1	23	42.6	tau b=.15
2-3	6	31.6	6	31.6	7	36.8	19	35.2	p=.20
4 or more	3	25.0	4	33.3	5	41.7	12	22.2	
Range: 0-20	0-10		0-20		0-16				
Mean: 2.7	1.9		3.2		3.2				
SD: 4.0	2.6		5.2		4.0				
Have attended workshops									
No	8	72.7	3	27.3	0	0.0	11	20.4	**tau c=.38**
Yes	11	25.6	14	32.6	18	41.9	43	79.4	**p=.000**
No. years leading exercise									
0-9	12	35.3	11	32.4	11	32.4	34	63.0	tau b=.09
10-19	7	50.0	5	35.7	2	14.3	14	25.9	p=.49
or more	0	0.0	1	16.7	5	83.3	6	11.1	
Range: 0.17-65	0.17-19		1.58-20		0.5-65				
Mean: 9.5	7.9		8.6		12.1				
SD: 9.6	4.9		5.2		15.1				
Registration status									
No	17	36.2	15	31.9	15	31.9	47	87.0	tau c=.13
Yes	2	28.6	2	28.6	3	42.9	7	13.0	p=.39
Obtained info from ADC									
No	10	41.7	7	29.2	7	29.2	24	44.4	tau c=.13
Yes	9	30.0	10	33.3	11	36.7	30	55.6	p=.39

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
Obtained info from physio									
No	10	47.6	6	28.6	5	23.8	21	38.9	tau c=.20
Yes	9	27.3	11	33.3	13	39.4	33	61.1	p=.11
Obtained info from non-profit organization									
No	18	40.0	13	28.9	14	31.1	45	83.3	tau c=.16
Yes	1	11.1	4	44.4	4	44.4	9	16.7	p=.12
Obtained info from personal trainer									
No	11	35.5	11	35.5	9	29.0	31	57.4	tau c=.06
Yes	8	34.8	6	26.1	9	39.1	23	42.6	p=.64
Obtained info from books, magazines and internet									
No	8	50.0	4	25.0	4	25.0	16	29.6	tau c=.18
Yes	11	28.9	13	34.2	14	36.8	38	70.4	p=.18
Obtained info from workshops or courses									
No	8	53.3	5	33.3	2	13.3	15	27.8	**tau c=.28**
Yes	11	28.2	12	30.8	16	41.0	39	72.2	**p=.02**

Note: Percentages for independent variables add to 100% across rows. Percentages for the total add to 100% for column.

Of the leaders, 85% had designed their own programs, 83.3% believed their programs reflected how one for seniors should be run and 38.9% questioned their ability to lead exercise. Respondents were presented with a list of 12 potential challenges to designing programs (Table 12). Three challenges were found to be negatively associated with ECS level, including client mobility (tau c=-.26, p=.03), inability of client to follow due to hearing loss (tau c=-.46, p=.000) and inability of client to follow due to vision loss (tau c=-.31, p=.02), indicating that ECS levels increased with a decrease in the prevalence of these client characteristics.

For the degree to which leaders believed that clients were able to maintain various abilities, there were no differences between ECS levels. However, there were several

strong, positive associations between the belief that clients could improve abilities and ECS level, including belief clients can improve functional ability (tau c=.46, p=.000), mobility (tau c=41, p=.002), balance (tau c=.50, p=.000), stamina (tau c=.51, p=.000), strength (tau c=.51, p=.000) and flexibility (tau c=51, p=.000). Positive associations were also found between ECS level and has seen improvement in client ability (tau c=.33, p=.004) and rating of the seriousness of falling on increased care needs (tau b=.27, p=.03). These findings indicated that those with higher ECS levels were more likely to have seen an improvement in their clients and to rate the seriousness of falling on increased care needs as higher.

Table 12: Beliefs and Opinions of Exercise Leaders by ECS Level

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
	n	%	n	%	n	%	n	%	
Designed program									
No	4	50.0	2	25.0	2	25.0	8	17.4	tau c=.09
Yes	15	32.6	15	32.6	16	34.8	46	85.2	p=.40
Reflects beliefs re how exercise program for seniors should be run									
No	4	44.4	2	22.2	3	33.3	9	16.7	tau c=.04
Yes	15	33.3	15	33.3	15	33.3	45	83.3	p=.25
Question ability to lead exercise									
No	12	36.4	11	33.3	10	30.3	33	61.1	tau c=.07
Yes	7	33.3	6	28.6	8	38.1	21	38.9	p=.64
Challenges to leading exercise programs									
Client interest									
No	6	25.0	8	33.3	10	41.7	24	44.4	tau c=-.22
Yes	13	43.3	9	30.0	8	26.7	30	56.6	p=.13
Client cooperation									
No	9	27.3	11	33.3	13	39.4	33	61.1	tau c-.23
Yes	10	47.6	6	28.6	5	23.8	21	38.9	p=.11

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
Client ability									
No	3	27.3	3	27.3	5	45.5	11	20.4	tau c=-.11
Yes	16	37.2	14	32.6	13	30.2	43	79.6	p=.38
Client medical conditions									
No	4	28.6	4	28.6	6	42.9	14	25.9	tau c=-.11
Yes	15	37.5	13	32.5	12	30.0	40	74.1	p=.40
Client mobility									
No	2	14.3	5	35.7	7	50.0	14	25.9	**tau c=-.26**
Yes	17	56.7	12	40.0	11	36.7	40	74.1	**p=.03**
Inability of client to follow due to dementia									
No	4	33.3	4	33.3	4	33.3	12	22.2	tau c=-.01
Yes	15	35.7	13	31.0	14	33.3	42	77.8	p=.93
Inability of client to follow due to hearing loss									
No	6	20.7	8	27.6	15	51.7	29	53.7	**tau c=-.46**
Yes	13	52.0	9	36.0	3	12.0	25	46.3	**p=.000**
Inability of client to follow due to vision loss									
No	5	23.8	5	23.8	11	52.4	21	38.9	**tau c=-.31**
Yes	14	42.4	12	36.4	7	21.2	33	61.1	**p=.02**
Fear clients will fall									
No	8	38.1	5	23.8	8	38.1	21	38.9	tau c=-.02
Yes	11	33.3	12	36.4	10	30.3	33	61.1	p=.90
Fear clients will be injured									
No	11	36.7	8	26.7	11	36.7	30	55.6	tau c=-.03
Yes	8	33.3	9	37.5	7	29.2	24	44.4	p=.86
Cost of equipment									
No	11	42.3	11	42.3	14	15.4	36	66.7	tau c=.-18
Yes	8	44.4	6	33.3	4	22.2	18	33.3	p=.19
Amount of staff assistance									
No	8	26.7	11	36.7	11	36.7	30	55.6	tau c=-.17
Yes	11	45.8	6	25.0	7	29.2	24	44.4	p=.24
To what degree believe clients can maintain and improve abilities									
Maintain functional ability									
No to somewhat	8	50.0	3	18.8	5	31.3	16	29.6	tau c=.13
Yes	11	28.9	14	36.8	13	34.2	38	70.4	p=.35
Maintain mobility									
No to somewhat	6	35.3	5	29.4	6	35.3	17	31.5	tau c=-.02
Yes	13	35.1	12	32.4	12	32.4	37	68.5	p=.91

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
Maintain balance									
No to somewhat	15	42.9	10	28.6	10	28.6	35	64.8	tau c=.21
Yes	4	21.1	7	36.8	8	42.1	19	35.2	p=.12
Maintain stamina									
No to somewhat	14	43.8	8	25.0	10	31.3	32	59.3	tau c=.17
Yes	5	22.7	9	40.9	8	36.4	22	40.7	p=.24
Maintain strength									
No to somewhat	13	40.6	8	25.0	11	34.4	32	59.3	tau c=.07
Yes	6	27.3	9	40.9	7	21.9	22	40.7	p=.63
Maintain flexibility									
No to somewhat	12	41.4	6	20.7	11	37.9	29	53.7	tau c=.03
Yes	7	28.0	11	44.0	7	28.0	25	46.3	p=.87
Improve functional ability									
No to somewhat	15	51.7	9	31.0	5	17.2	29	53.7	**tau c=.46**
Yes	4	16.0	8	32.0	13	52.0	25	46.3	**p=.000**
Improve mobility									
No to somewhat	15	50.0	9	30.0	6	20.0	30	55.6	**tau c=.41**
Yes	4	16.0	8	32.0	12	48.0	24	44.4	**p=.002**
Improve balance									
No to somewhat	17	50.0	11	32.4	6	17.6	34	63.0	**tau c=.50**
Yes	2	10.0	6	30.0	12	60.0	20	37.0	**p=.000**
Improve stamina									
No to somewhat	17	51.5	10	30.3	6	18.2	33	61.1	**tau c=.51**
Yes	2	9.5	7	33.3	12	57.1	21	38.9	**p=.000**
Improve strength									
No to somewhat	16	53.3	9	30.0	5	16.7	30	55.6	**tau c=.51**
Yes	3	12.5	8	33.3	13	54.2	24	44.4	**p=.000**
Improve flexibility									
No to somewhat	15	53.6	9	32.1	4	14.3	28	51.9	**tau c=.51**
Yes	4	15.4	8	30.8	14	54.9	26	48.1	**p=.000**
Other Beliefs									
Has seen improvement in client ability									
No	8	80.0	1	10.0	1	10.0	10	18.5	**tau c=.33**
Yes	11	25.0	16	36.4	17	38.6	44	81.5	**p=.004**

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
Believe clients are at risk for falling									
Less likely	0	0.0	1	33.3	2	66.7	3	5.6	tau b=-.17
Somewhat likely	2	16.7	7	58.3	3	25.0	12	22.2	p=.14
Yes to very likely	17	43.6	9	23.1	13	33.3	39	72.2	
Rate seriousness of falls on mobility									
Min serious	1	25.0	2	50.0	1	25.0	4	7.4	tau b=-.04
Mod serious	2	22.2	4	44.4	3	33.3	9	16.7	p=.63
Serious	16	39.0	11	26.8	14	34.2	41	75.9	
Seriousness of falls on functional ability									
Min serious	5	55.6	2	22.2	2	22.2	9	16.7	tau b=.04
Mod serious	1	5.6	4	22.2	13	72.2	18	33.3	p=.70
Serious	13	48.2	11	40.7	3	11.1	27	50.0	
Seriousness of falls on increased care needs									
Min serious	1	20.0	1	20.0	3	60.0	5	9.3	**tau b=-.27**
Mod serious	0	0.0	2	40.0	3	60.0	5	9.3	**p=.03**
Serious	18	40.9	14	31.8	12	27.3	44	81.5	
Seriousness of falls on risk of death									
Min serious	5	26.3	8	42.1	6	31.6	19	35.2	tau b=-.14
Mod serious	1	14.3	2	28.6	4	57.1	7	13.0	p=.26
Serious	13	46.4	7	25.0	8	28.6	28	51.9	

Note: Percentages for independent variables add to 100% across rows. Percentages for the total add to 100% for column.

As can be seen in Table 13, 94.4% of respondents reported that they exercised outside of the workplace. The most common exercises were walking (64.8%), aerobic exercise (61.1%) and strength training (53.7%). A moderate, positive association was found between aerobic exercise and ECS level (tau c=.27, p=.05) and strong, positive associations were found between ECS level and dancing (tau c=.30, p=.01) and

swimming (tau c=.45, p=.000). These exercises were more frequently practiced by leaders with higher ECS levels than lower ones.

Table 13: Personal Exercise Patterns of Exercise Leader by ECS Level

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
	n	%	n	%	n	%	n	%	
Exercises outside of work									
No	3	15.8	0	0.0	0	0.00	3	5.6	tau c=.146
Yes	16	84.2	17	100.0	18	100.0	51	94.4	p=.06
Times per week									
0-2	4	21.1	3	17.7	3	16.7	10	18.5	tau b=.126
3-4	10	52.6	9	52.9	7	38.9	26	48.2	p=.32
5 or more	5	26.3	5	29.4	8	44.4	18	33.3	
Range: 1-7	0-6		1.5-7		0-6				
Mean: 3.9	3.3		4.0		4.1				
SD: 1.7	1.9		1.6		1.5				
Minutes per session									
0-30	6	31.6	9	52.9	4	22.2	19	35.2	tau b=.16
31-59	9	47.4	3	17.7	5	27.8	17	31.5	p=.16
60 or more	4	21.1	5	29.4	9	50.0	18	33.3	
Range: 0-135	0-90		20-75		0-135				
Mean: 45.3	40.9		41.5		53.3				
SD: 24.1	24.3		17.7		28.1				
Type of Exercise Engaged In									
Aerobic exercise									
No	11	52.4	5	23.8	5	23.8	21	38.9	**tau c=.27**
Yes	8	24.2	12	36.4	13	39.4	33	61.1	**p=.05**
Walking									
No	13	68.4	4	21.1	2	10.5	19	35.2	tau c=.04
Yes	6	17.1	13	37.1	16	45.7	35	64.8	p=.65
Yoga									
No	12	33.3	13	36.11	11	30.6	36	66.7	tau c=.02
Yes	7	38.9	4	22.2	7	38.9	18	33.3	p=.92
Pilates									
No	17	39.5	13	30.2	13	30.2	43	79.6	tau c=.16
Yes	2	18.2	4	36.4	5	45.5	11	20.4	p=.17
Tai chi									

Characteristics	Minimal (0-16.4) N=19		Moderate (16.5-27.5) N=17		Optimal (27.6-47) N=18		Total N=54		Statistical Tests
No	16	34.8	15	32.6	15	32.6	46	85.2	tau c=.01
Yes	3	37.5	2	25.0	3	37.5	8	14.8	p=.96
Strength training									
No	13	52.0	5	20.0	7	28.0	25	46.3	tau c=.14
Yes	6	20.7	12	41.4	11	37.9	29	53.7	p=.21
Dancing									
No	18	42.9	13	31.0	11	26.2	42	77.8	**tau c=.30**
Yes	1	8.3	4	25.0	7	58.3	12	22.2	**p=.007**
Sports									
No	17	37.0	13	28.3	16	34.8	46	85.2	tau c=.01
Yes	2	25.0	4	50.0	2	25.0	8	14.8	p=.93
Swimming									
No	18	46.2	13	33.3	8	20.5	39	72.2	**tau c=.45**
Yes	1	6.7	4	26.7	10	66.7	15	27.8	**p=.000**

Note: Percentages for independent variables add to 100% across rows. Percentages for the total add to 100% for column.

Crosstabular analyses revealed several significant relationships between independent variables and ECS levels, indicating that there are differences between programs in minimal, moderate and optimal potential benefit levels. As can be seen in Table 14, characteristics of clients, programs and leaders were all represented in these analyses. Further analyses will determine which of these characteristics have the most influence on ECS scores.

Table 14: Summary of Significant Differences Across ECS Levels

Independent Variables	Correlation	Significance Value
Operational and Client Characteristics		
No. clients funded for per day	tau b=.25	p=.017
No. clients served per day	tau b=.33	p=.002
No. FTE activity staff	tau b=.24	p=.05
% Visually impaired	tau b=.27	p=.02
Exercise Program Characteristics		
No. minutes per session	tau b=.34	p=.002
No. leaders per centre	tau c=.32	p=.02
Policy against standing	tau c=-.28	p=.02
Content, Frequency, Duration and Intensity of Exercise Programs		
Content		
Aerobic	tau c=.61	p=.000
Resistance training upper body	tau c=.72	p=.000
Resistance training lower body	tau c=.66	p=.000
Standing	tau c=.70	p=.000
Frequency		
Aerobic	tau b=.42	p=.000
Resistance training upper body	tau b=.46	p=.000
Resistance training lower body	tau b=.44	p=.000
Standing	tau b=.48	p=.000
Duration		
Stretching	tau b=-.23	p=.05
Aerobic	tau b=.38	p=.000
Resistance training upper body	tau b=.30	p=.01
Resistance training lower body	tau b=.34	p=.003
Standing	tau b=.30	p=.02
Characteristics of Exercise Leaders		
Socio-Demographic Characteristics		
Age	tau b=-.33	p=.004
Job Position	x2=19.72	P=.03
Education and Training		
Have attended workshops	tau c=.38	p=.000
Obtained info from workshops or courses	tau c=.29	p=.02
Challenges to leading programs		
Client mobility	tau c=-.26	p=.03
Inability of client to follow due to hearing loss	tau c=-.46	p=.000
Inability of client to follow due to vision loss	tau c=-.31	p=.02
Belief that clients can maintain and improve ability		
Improve functional ability	tau c=.46	p=.000
Improve mobility	tau c=.41	p=.002
Improve balance	tau c=.50	p=.000
Improve stamina	tau c=.51	p=.000
Improve strength	tau c=.51	p=.000
Improve flexibility	tau c=.51	p=.000
Other Beliefs		
Has seen improvement in client ability	tau c=.33	p=.004
Seriousness of falls on increased care needs	tau b=-.27	p=.03
Personal Exercise Patterns of Leaders		
Aerobic exercise	tau c=.27	p=.05
Dancing	tau c=.30	p=.007
Swimming	tau c=.45	p=.000

Data Reduction

Since the literature suggested so many possible associations between ECS scores and characteristics of ADC clients, exercise programs and leaders, a correlation matrix was constructed to determine if there was multi-collinearity between any of the independent variables proposed for further analyses. These overlapping variables were eliminated.

The following relationships were found to be over the cut-off point of r=.6: "has attended a workshop" and "workshops as an information source" (r=.610, p=.000), "belief that clients can improve functional ability" and "belief that clients can improve mobility" (r=.862, p=.000), "belief that clients can improve mobility" and "belief that clients can improve balance" (r=.798, p=.000) and "belief that clients can improve functional ability" and "belief that clients can improve balance" (r=.772, p=.000). The following independent variables were eliminated from the analyses: workshop as an information source and beliefs that clients can improve functional ability and mobility.

Correlational Analyses

The purpose of the correlational analyses was to further reduce the number of variables entered into the regression analyses. For these analyses the interval level of the ECS score was used. To determine the direction and magnitude of the relationships between the dependent and independent variables, chi square was used for categorical variables, kendall's tau b and c were used for ordinal variables and pearson's correlation was used for continuous variables. For the magnitude of relationships between variables, correlations ranging from zero to .20 were considered weak, those between .20 and .30 were considered moderate and those between .30 and .40 were considered strong. For the

direction of relationships between variables, a negative sign indicated an inverse relationship and a positive sign indicated a positive relationship. A significance level of $p < .05$ was used.

As can be seen in Table 15, a strong inverse relationship was found between ECS scores and belief in the inability of clients to follow due to hearing loss (r=-.46, p=.000). This indicates that ECS scores were lower for leaders who held the belief that clients were unable to follow if they had hearing loss.

Table 15: Correlations for ECS Scores and Characteristics of ADC Clients

Independent Variables	Correlation	Significance Value
Client Care Level		
PC	r=.06	p=.64
IC1	r=.21	p=.13
IC2	r=.09	p=.50
IC3	r=.16	p=.24
EC	r=-.13	p=.34
Perceived Challenges of Leading Exercise with an ADC Population		
Client Interest level	r=-.19	p=.16
Client cooperation	r=-.18	p=.20
Client Ability	r=-.11	p=.45
Client Medical Conditions	r=-.10	p=.48
Client Mobility	r=-.24	p=.08
Inability of clients to follow due to dementia	r=-.07	p=.61
Inability of clients to follow due to hearing loss	**r=-.46**	**p=.000**
Inability of clients to follow due to vision loss	r=-.25	p=.07
Client Impairment		
% Clients with mobility impairment	r=.12	p=.39
% Clients with cognitive impairment	r=.04	p=.75
% Clients with visual impairment	r=.25	p=.07
% Clients with hearing impairment	r=.16	p=.26

As can be seen in Table 16, a strong, positive relationship was found between ECS scores and number of staff leading exercise (r=.34, p=.01), indicating that ECS scores increase with an increase in the number of leaders per centre. A strong, inverse relationship was found between ECS scores and policies regarding standing exercises

(r=-.35, p=.01), indicating that ECS scores decrease with an increase in policies against standing exercises.

Table 16: Correlations for ECS Scores and Characteristics of Exercise Programs

Independent Variable	Coefficient of Correlation	Significance Value
Number of staff leading exercise programs	**r=.34**	**p=.01**
Number of assistants in exercise program	r=.24	p=.09
Average number of clients per session	r=.22	p=.11
Whether ADC had policies against using weights	r=-.24	p=.09
Whether ADC had policies against standing exercises	**r=-.35**	**p=.01**

As can be seen in Table 17, a strong, positive relationship was found between ECS scores and short-term workshop attendance (r=.43, p=.001), indicating that ECS scores increase with workshop attendance. A moderate, positive relationship was found between ECS scores and belief that clients can maintain balance, (tau c=.24, p=.03), indicating that ECS scores increase with an increase in the belief that clients can maintain balance. A strong, positive relationship was found between ECS scores and belief that clients can improve balance (tau c=.34, p=.001), indicating that ECS scores increase with an increase in the belief that clients can improve balance. A strong, positive relationship was found between ECS scores and has seen improvements in client functional ability (tau c=.37, p=.01), indicating that ECS scores increase with an increase in the having seen improvements in client functional ability. A strong, inverse relationship was found between ECS scores and belief that the majority of ADC clients are at risk for a fall (tau c=-.38, p=.000), indicating that ECS scores decrease with the increased likelihood that ADC clients are at risk for falling. A moderate, inverse relationship was found between ECS scores and perceived seriousness of a fall on client increased care needs

(tau c=-.27, p=.01), indicating that ECS scores decrease with an increase in rating of the seriousness of a fall on client increase care needs. A strong, positive relationship was found between ECS scores and personal exercise (r=.37, p=.01), indicating that ECS scores increase with an increase in exercise engagement.

Table 17: Correlations for ECS Score and Characteristics of the Exercise Leader

Independent Variables	Coefficient of Correlation	Significance Level
Socio-demographic Characteristics		
Gender	r=.25	p=.07
Age	r=-.24	p=.08
Job	x2=11.43	p=.33
Years of Experience	r=-.11	p=.45
Type of education	tau c=.17	p=.09
Training in Exercise Theory/Leadership		
Years of experience leading exercise	r=-.16	p=.24
Registration status	r=.02	p=.88
Years of formal education in exercise theory/leadership	r=.14	p=.32
Workshop Education	**r=.43**	**p=.001**
Whether get information from ADC	r=.07	p=.63
Whether get information from physiotherapist	r=.26	p=..06
Whether get information from non-profit organization	r=.20	p=.16
Whether get information from personal trainer or exercise leader	r=.12	p=.41
Whether get information from internet, books or magazines	r=.21	p=.14
Opinions and Beliefs Regarding Exercise for Seniors		
Did you design or influence the design of your program	r=.10	p=.50
Does your program reflect you beliefs on appropriate exercise for seniors	r=.06	p=.69
Fear clients will fall if standing	r=-.003	p=.98
Fear clients will be injured during exercise	r=-.014	p=.92
Belief clients can maintain functional ability	tau c=.183	p=.07
Belief clients can maintain mobility	tau c=.14	p=.20
Belief clients can maintain balance	**tau c=.24**	**p=.03**
Belief clients can improve balance	**tau c=.39**	**p=.001**
Have seen improvement in client ability	**r=.37**	**p=.01**
Believe clients are at risk for fall	**tau c=-.38**	**p=.000**
Rating of seriousness of fall on mobility	tau c=-.08	p=.52
Rating of seriousness of fall on functional ability	tau c=.03	p=.80
Rating of seriousness of falling on increased care needs	**tau c=-.27**	**p=.01**
Rating of seriousness of falling on risk of death	tau c=-.06	p=.60
Personal Exercise Practice		
Questions ability to lead exercise	r=.07	p=.64
Personal exercise practice	**r=.37**	**p=.01**

Table 18 presents a summary of statistically significant findings from the correlational analysis. The small number of cases tested in these analyses potentially resulted in two issues. Firstly, because there were many potential reasons for low ECS scores, the large number of variables tested may have influenced the results by increasing the probability of a false positive. Secondly, there may have been variables tested that were not statistically significant resulting from the low power due to the small number of cases.

Table 18: Summary of Statistically Significant Results

Independent Variable	Correlation	Significance Value
Perceived inability of clients to follow exercise due to hearing loss	r=-.46	p=.000
Number of exercise leaders	r=.34	p=.01
Policy of centre towards balance exercises	r=-.35	p=.01
Workshop Education	r=.43	p=.001
Belief in client ability to maintain balance	tau c=.21	p=.03
Belief in client ability to improve balance	tau c=.30	p=.001
Has seen improvement in client ability	r=.37	p=.01
Belief that clients are at risk for falling	tau c=-.35	p=.000
Seriousness of falls on increased care needs of clients	tau c=-.27	p=.01
Personal Exercise	r=.37	p=.01

Regression Analyses

Correlational analyses indicated that 10 independent variables were associated with the ECS score. These variables were placed in a multivariate linear regression analysis to determine the individual effects of each independent variable on the ECS score. However, due to the small number of cases, all 10 variables could not be entered into the same model. Therefore, they were divided into three models to reflect the characteristics of the clients, exercise programs and leaders.

Independent variables that were not continuous or dichotomous were re-coded prior to multivariate analyses. Effect coding was not used because of the limited number

of cases in each group. The following independent variables were re-coded into dichotomous variables: belief in the ability of clients to maintain balance, belief in the ability of clients to improve balance and rating of likelihood that clients are at risk for falls. These variables were originally measured using a scale of one to five, where one=definitely not, two=no, three=somewhat, four=yes and five=yes, definitely. In the new scale, one=no to somewhat, two=yes or definitely yes. New frequency results were as follows: for belief in the ability of clients to maintain balance: no=35.2%, yes=64.8%; belief in the ability of clients to improve balance: no=63.0%, yes=37.0%; and rating of likelihood that clients were at risk for falls: no=27.8%, yes=72.2%. For the variable, rating of the seriousness of a fall on client increased care needs, the original scale was: one=not serious, two=slightly serious, three=moderately serious, four=serious and five=very serious. New frequency results for one=not serious to moderately serious was 18.5% and for two=serious and very serious was 81.5%.

The standardized beta coefficient was used to determine the strength and magnitude of the relationship between the dependent variable and independent variables and a multiple R2 was used to determine the variance between subjects. The significance level used was $p<.05$. The correlational analysis indicated that one client characteristic, perceived inability of clients to follow exercise due to hearing loss, was associated with ECS scores. This variable was entered into regression analysis and was found to be statistically significant. A strong, inverse relationship was found between ECS scores and perceived inability of clients to follow exercise due to hearing loss (B=-.46, p=.000), indicating that ECS scores decreased with an increase in the perceived inability of clients

to follow exercise due to hearing loss. In total, the overall percentage of the variance found between subjects on ECS scores was 21.4% (R2=.214, p=.00).

Table 19: Linear Regression of ECS Score and Client Characteristics

Client Characteristics		
Variance	R2=.214	p=.000
Independent Variables		
Inability of clients to follow due to hearing loss	B=-.46	p=.000

The correlational analysis had indicated that two exercise program characteristics were associated with ECS scores, number of exercise leaders per centre and policy towards standing during exercise. Both variables were entered into a regression analysis and were found to be statistically significant. A strong, positive relationship was found between ECS score and number of exercise leaders (B=.39, p=.004), indicating that ECS scores increased with an increase in the number of leaders per centre. A strong, inverse relationship was found between ECS score and policy of ADC towards standing during exercise (B=-.37, p=.003), indicating that ECS scores decrease with policies to not allow standing during exercise. In total, the overall percentage of the variance found between subjects on the ECS score was 25.5% (R2=.255, p=.001).

Table 20: Linear Regression of ECS Score and Exercise Program Characteristics

Characteristics of the Exercise Program		
Variance	R2=.255	p=.001
Independent Variables		
Number of leaders	B=.37	p=.004
Policy against standing	B=.-.37	p=.003

The correlational analyses indicated that seven exercise leader characteristics were associated with ECS scores: personal exercise practice, workshop attendance, belief that clients are at risk for falling, rating of the seriousness of a fall on increased care

needs, belief that clients are able to maintain balance, belief that clients are able to improve balance and has seen improvement in client ability. These variables were entered into regression analysis and two were found to be statistically significant. A strong, inverse association was found between ECS scores and ratings of the seriousness of a fall on client increased care needs (B=-.32, p=.01), indicating that ECS scores decrease with an increase in the perceived seriousness of a fall on client increased care needs. A moderate, positive association was found between ability of clients to improve balance (B=.24, p=.05), indicating that ECS scores increase with an increase in the perceived ability of clients to improve balance.

Table 21: Linear Regression of ECS Score and Exercise Leader Characteristics

Exercise Leader Characteristics		
Variance	R2=.497	P=.000
Independent Variables		
Personal Exercise	B=.20	p=.08
Workshop attendance	B=.14	p=.24
Believe clients are at risk for falling	B=-.03	p=.78
Seriousness of falling on increased care needs	B=-.32	p=.01
Maintain balance	B=.19	p=.12
Improve balance	B=.24	p=.05
Has seen improvement in client ability	B=.18	p=.12

In summary, characteristics of the exercise leaders tested explained 49.7% of the variance between subjects on ECS scores, followed by 25.5% for exercise program characteristics and 21.4% for client characteristics.

CHAPTER V
DISCUSSION

Introduction

This chapter begins with discussion of the support of hypotheses and findings in terms of the health belief model, which was used as a framework for the present research. Secondly, the results of the survey will be compared to existing research and to observations of ADC clients, exercise programs and leaders that were suggested earlier by the researcher. Finally, some limitations of the present study and recommendations for future research will be presented.

Support of Hypotheses

The first purpose of the current study was to determine the level of potential benefit being offered by ADC exercise programs. This benefit was reflected by the ECS score, which measured the content, frequency, duration and intensity of each program offered. ECS scores were divided into three levels, which categorized each program as offering minimal, moderate or optimal potential benefit. Crosstabular analyses were computed using ordinal level data of the ECS score to determine significant differences between the three levels. No formal hypotheses were made for these analyses and although a normal distribution was expected across the three levels, results showed one that was skewed to the right.

The second purpose of the study was to determine the relative influence of characteristics of clients, exercise programs and leaders on ECS scores and to determine

which of the factors within each set were most closely associated with the scores. It was hypothesized that characteristics of exercise leaders would have the most influence on ECS scores, followed by characteristics of the exercise program and client characteristics. This hypothesis was supported; exercise leader characteristics explained 49.7% of the variance, program characteristics explained 25.5% of the variance and client characteristics explained 21.4% of the variance between subjects on ECS scores. For characteristics of clients, it was hypothesized that client impairment, as denoted by care level, would be the factor most closely associated with ECS scores. This hypothesis was not supported. Neither care level or type of impairment were significantly associated with ECS scores, indicating that the compliment of clients in an ADC exercise group did not affect the outcome of ECS scores. For characteristics of exercise programs, it was hypothesized that policy of ADC towards standing during exercise would be the operational characteristic most closely associated with ECS scores. This hypothesis was supported. Regression analysis determined that policy of ADC towards standing during exercise was the exercise program characteristic that had the strongest association with ECS scores (B=-.37, p=.003). For characteristics of exercise leaders, it was hypothesized that beliefs that clients were able to maintain and improve their functional ability, mobility and balance would be the most closely associated with ECS scores. This hypothesis was not supported.

Health Belief Model

As previously noted, an adaptation of the health belief model was used as a framework to guide this research. This model maintains that the perception of the threat of disease and actions to decrease or limit its occurrence will be mediated by perceived

susceptibility, perceived seriousness, perceived benefits of taking action, barriers to taking actions, cues to action and level of self-efficacy. For the purposes of the current research, the risk of client falls and the cost and benefits of offering exercises to reduce them was assessed using the beliefs of leaders rather than clients.

Regarding perceived susceptibility, no association was found between the belief that clients were at risk for falling and ECS scores, despite the finding that almost three-quarters of those surveyed believed that clients were at risk for falls. One may assume that if clients were at risk for falling that leaders would offer exercises known to decrease the risk. However, the results may indicate that leaders believe that standing during an exercise class will put their clients at unnecessary risk of falling and have decided to eliminate the risk by not leading the exercises. Supporting this idea is the finding that standing and resistance training were not offered to clients as frequently as stretching and range of motion exercises. This is consistent with Lazowski et al's. (1999) study, which found that most programs for residents consisted of seated, range of motion type exercises.

Regarding perceived seriousness, given the frailty of the ADC population reported in the current research, one may assume that leaders would be concerned about the effects of falling on the health of their clients and would offer exercises to decrease their severity. However, a strong, inverse association was found between ECS scores and rating of perceived seriousness of falling on increased care needs. This may indicate that leaders have decided that the severity of falling on increased care needs outweighs the benefits of recommended exercise.

Regarding perceived benefits, ECS scores increased with an increase in the belief that clients could improve balance. This indicates that leaders believe that clients can enhance their balance ability. Regarding barriers to action, it was hypothesized that policies for ADC exercise programs would be associated with ECS scores. Results indicated that ECS scores decreased with an increase in the prevalence of policies against standing during exercise. This finding seems fairly straightforward, given that offering standing and balance scores contributed to overall ECS scores, but it also leads one to question the rationale behind such policies. It is possible that current ADC staff are unaware of recommended exercises for frail seniors or of current research outlining their benefits. However, it is also possible that the ADC have concluded that the risk of falls outweighs the benefits of the exercise.

According to the model, barriers may prevent action even if leaders realize the benefits. It is possible that other logistical issues, such as number of assistants, variable group composition and number of clients per session may cause exercise leaders to view the effort to design, implement and evaluate a recommended program as outweighing the potential benefits and therefore they do not lead the exercises. It is also possible that consideration of the potential harm to clients if they fall during exercise, as well as the legal repercussions that their falling would have on the ADC, could influence these decisions.

Regarding cues to action, regression analysis did not reveal an association between ECS scores and having seen improvement in client ability. Using a scale of one to five, the participants who noted an improvement were asked to rate the degree to which they believed the following abilities had been improved: mobility, balance,

stamina or endurance, strength, flexibility and range of motion. Range of motion and flexibility were the most strongly rated abilities and mobility and balance were the least strongly rated abilities. However there was a low percentage of participants who completed ongoing assessments of client physical status, such as balance tests. Therefore, it is assumed that having seen improvement in client status was largely based on observation of the leader. It is possible that seeing these changes in ability is still enough to motivate leaders to offer a higher quality program.

Finally, regarding self-efficacy, no relationship was found between the belief of the exercise leader in their ability to effect change in the ADC population and ECS score. Only 36.8% of exercise leaders questioned their ability to lead an exercise program. Based on the low average ECS score, this finding is not surprising. If leaders do not question the quality of their programs, they may not question their ability to lead them.

The use of the health belief model was limited in the current research as data relating to all constructs were not collected. In addition, due to the small sample size, not all of the variables could be entered into one regression analysis, thereby decreasing the possibility of testing the model in understanding the perspective of the leader and how his/her beliefs influence the program offered to ADC clients. Further testing of the health belief model in this context is merited. Due to high rates of cognitive and physical impairment in the ADC population, it is thought that many clients are unable to weigh the costs and benefits of exercise on their risk of falling. Therefore, it becomes the responsibility of their caregivers to do so on their behalf, facilitating various health interventions shown to decrease that risk. Such interventions may include specific

exercises shown to decrease the risk of falls and others focusing on nutrition or medication use.

Further testing of the six main tenets of the health belief model in relation to the current research would also be useful. For example, while it is thought that perceived susceptibility, seriousness, benefits, cues and barriers to taking action were tested adequately, self-efficacy merits further research. Despite leaders' high level of confidence in their ability to lead programs, the average ECS score was low. It seems likely that leaders are unaware of current exercise recommendations for frail seniors and of the importance of accurate application for this population. More research is needed to determine possible reasons for this discrepancy.

Characteristics of ADC Clients

The present study found several similarities with other research, suggesting that some characteristics of ADC in BC have remained unchanged. Where Gutman et al. (1993), reported that clients attended ADC on an average of two days per week and Ross-Kerr et al. (2003), found that the average days of attendance for any one client was 1.70 days, the present research found that the average client attends ADC 1.84 days per week. Gutman et al. (1993) also found that the average number of clients attending, per day, was 13.6, compared to 13.9 in the present research. Therefore, it would seem that there have been few changes in attendance, although there is a slight decrease of client days offered to clients in BC. One possible reason for this could be policy and budget changes over time.

Regarding client acuity, the current research found that the majority of clients were at an IC2 or IC3 level and that mobility and cognitive impairment was common. In contrast, Gutman et al. (1991) found that the care level most commonly represented in BC ADC was IC1, followed by IC2 and then PC. This shows an increase in the average care level of clients over the past 15 years. It is possible that this shift has presented challenges to ADC exercise programmers and that ECS scores are low due to the increase in level of client frailty.

Crosstabular analyses indicated that there were several client characteristics associated with ECS levels. The percentage of clients who were visually impaired was positively associated with ECS level, indicating that those in higher scoring levels had more visually impaired clients than those in lower scoring levels. In addition, several client characteristics seen as challenges to leaders were also associated with ECS level. Client mobility and the inability to follow due to both hearing and vision loss were negatively associated with ECS level, indicating that these challenges decreased with an increase in ECS scores. It would seem, therefore, that those in higher scoring levels have developed more strategies to deal with these issues than those in lower ones.

Characteristics of Exercise Programs

There were few characteristics of exercise programs to compare with the present research due to the lack of information regarding them in the literature. However, in similarity to findings of Gutman et al. (1993), it was determined that most ADC offer an exercise program for clients. The current research also yielded statistics consistent with Lazowski et al. (1999), which reported that the average seniors exercise program in LTC occured three days per week, compared to the present research of 3.9 days. This is not

surprising as it was expected that most ADC would offer exercise as programming to meet the physical needs of clients is recommended (Adult Day Care Operational Procedures, 1984). It is interesting to note that one ADC contacted by the researcher reported that although it did not have a group exercise program, a physiotherapist provided one-on-one sessions with certain clients.

Regarding the composition of classes, Lazowski et al. (1999), found that for high mobility clients without dementia, a group size of ten was feasible and that for low mobility clients and for those with dementia, a group of three to five with added assistance was manageable. The current research found that the average class size was 13 clients, despite the fact that the levels of mobility and cognitive impairment for the entire clientele were high. In addition, few of the ADC surveyed offered a secondary exercise program; it is evident that more differentiation of these populations needs to take place.

The current research found that the most common content for programs used with this population are stretching and range of motion exercises, a finding consistent with other research (Lazowski, et al.,1999). Indeed, most ADC offered stretching and range of motion, compared with a smaller number offering aerobic (n=31), resistance training for the upper (n=35) and lower body (n=26) and standing exercises (n=25). It was also suggested earlier that there was great variability in what was being offered in the way of program content and this idea was supported as some centres reported only offering stretching exercises while others offered all six types outlined in the survey. However, crosstabular analyses for the current research also found that those in higher ECS levels included these exercises in their programs, offered them more frequently and for longer

durations than those in lower scoring levels. Conversely, those programs offering stretching exercises for longer periods of time were associated with lower scoring levels.

Possible reasons for the lower number of ADC offering standing exercise include policies not to incorporate them into their programs and the low number of assistants available to the exercise leader in each session. Indeed, policy against standing was the exercise program characteristic most strongly associated with ECS scores, which decreased with an increasing prevalence of policies. This finding supports ACSM (1998) and Lazowski, et al. (1999), which posit that content and rigor of exercise programs for frail seniors may be less strenuous due to fears surrounding the safety of exercises and of clients falling.

The current research supported the idea that the intensity of most ADC exercise programs is not monitored. Indeed, 91.2% of respondents reported that they did not measure intensity for aerobic exercises, 86.0% did not measure it for resistance training of the upper body and 91.2% did not measure it for resistance training of the lower body. Interestingly, only 24.6% of respondents reported using periodic pre and post-tests to assess the physical condition of their clients. 3.5% reported using the Berg Balance Scale, 1.5% to using the TUG and 10.5% to using other assessments, however, only 8.9% reported repeating these tests every four to six months, which leads one to question whether or not respondents understood the question. These findings are consistent with Schroeder (2003) who found that 92.0% of exercise leaders surveyed did not conduct such assessments. It would be interesting to know whether or not exercise leaders are aware of the existence of such assessments and if so, why they do not conduct them. Speculated challenges include time constraints.

Logistical issues of the program are also of concern. It has been noted that ADC clients present with high levels of impairment and the average exercise program has less than one assistant. Furthermore, class sizes average 13 clients, which is over the recommended number of 10 for classes including clients without cognitive impairment and three to five for classes for clients with it (Lazowski et al., 1999). These issues alone would make it difficult for the leaders. Offering exercises requiring the application of equipment and monitoring the safety of standing clients would increase this difficulty level. If exercise leaders were to assess clients and place them into separate exercise classes based on their abilities, thereby decreasing the number in each group, these issues could be addressed.

Characteristics of Exercise Leaders

Only 12.9% of BC ADC leaders reported being registered exercise leaders, compared with 45.9% in the survey by Wasner et al. (1997). As suggested earlier, it is thought that there is great variability in the training of exercise leaders. The current research found that participants reported a high level of workshop education (73.7%) in the past two years and noted that a high percentage of these classes were taken at conferences (42.1%) or in-services offered by other facilities (43.9%). Workshop attendance was also higher in groups with higher ECS levels. Leaders also seemed active in seeking out information sources. The most popular source was workshops or courses, the use of internet, books and magazines and information from physiotherapists. It would seem, therefore, that ongoing self-education and formal education are priorities for exercise leaders. Therefore, leaders may be receptive to a comprehensive course

providing a thorough overview of exercise planning, implementation and evaluation and including a registration process.

Exercise leaders seemed confident in their abilities to lead programs. Over 75% of them stated that their programs reflected their beliefs on how an exercise program for seniors should be run and only 38.9 % questioned their ability to lead an exercise program. Of those who did, almost one-quarter questioned the content of programs and safety of exercises and one-fifth questioned whether the program was too easy or was having a positive impact on client health. Overall, leaders seemed quite confident in their ability to lead exercise programs. This is interesting in light of low ECS scores, which placed the average program score in the moderate potential benefit category. It suggests that if leaders believe their programs are beneficial, that they must be unaware of the exercise recommendations for their clients.

Exercise leaders are aware of the risk of falling to the ADC population and believe that clients are somewhat capable of maintaining and improving their health. Crosstabular analyses showed a positive association between higher scoring ECS levels and belief in the ability of clients to improve their health. This indicates that leaders who are following current recommendations for seniors exercise do not believe that old age is a time of disengagement and that frail elders are unable to improve their functional status.

Despite these increases with higher ECS scores, the average is still low and indicates a need for leader education in exercise theory and practice.

Limitations of the Research

There were several limitations of the current research that resulted from its exploratory nature including measurement issues, sample size and generalizability of findings. The first measurement issue was the use of the ECS score. This score was designed to measure the potential rather than actual physical benefit of exercise programs, which would have required direct testing of clients themselves using a before and after randomized control trial. Therefore, this system was only able to provide a partial analysis of exercise programs in ADC in BC. However, the use of the ECS system was merited as it a) provided a scale by which to determine the degree to which programs were meeting current recommendations for frail seniors exercise, b) categorized ADC exercise programs in BC into those offering minimal, moderate and optimal potential benefit, c) helped to determine which characteristics of ADC clients, exercise programs and leaders were predictive of scores and d) provided insight into how programs may be further enhanced to meet the needs of ADC clients.

Another measurement concern was that many of the independent variables tested were subjective as they were based on the observations of the leader, rather than client records. These variables included client characteristics that leaders perceived as challenges to leading exercise with this population, such as mobility, interest and inability to follow due to various impairments. Although more objective client measures were also analyzed, such as care level and type of impairment, it is possible that the records from which this information was obtained were not accurate. The recording of other client characteristics in future studies, such as age, gender and diagnoses, may provide further information useful in determining how client characteristics contribute to overall ECS

scores. In addition, as previously mentioned, not all constructs of the health belief model could be tested in the current study and more research regarding the use of this model with ADC clients and its application to exercise leaders is needed.

Sample size limitations also impacted the current research, possibly eliminating several associations that may have been made between the ECS score and various independent variables. First of all, because the total sample size was only 54, the power needed to detect an association between variables had to be moderate to strong, and therefore, weaker associations would not have been statistically supported. This may explain why 10 variables were found to be statistically significant at the bivariate level and only five variables were found to be statistically significant at the multivariate level. Secondly, the sample size also placed limits on model testing. Although a large number of variables were eliminated prior to the regression analyses, there were still too many to be entered into a single model. Of the ten variables found to be significant at the bivariate level, one was entered into the first model, two into the second model and seven into the third model. According to Tabachnick and Fidell (2001), the maximum number of cases for every one independent variable tested in the model should adhere to the following formula: N>=50 + 8m, where N=the number of subjects and m= the number of independent variables used. Using a large effect size with a maximum of two independent variables in each model, N>=50 + 8(2), the minimum number of cases used should be 66.

The total number of variables in the third analysis exceeded the recommended number of two. Given the calculations obtained from Tabachnick et al. (2001) made for a normal distribution and a skewed distribution of the dependent variable, one can conclude that there were too few subjects for a normal distribution, too few subjects for a

skewed distribution using a small effect size and an adequate number of subjects for a skewed distribution using both a medium and large effect size. Given a larger sample size, all ten variables could have been entered into the same model, potentially increasing the likelihood of finding statistical significance at the multivariate level and therefore changing the results of the study.

Another methodological issue with the current study is that it was cross-sectional, obtaining a one-time only snapshot of this population rather than being a longitudinal study, which would have examined effects over time. In addition, caution must be taken when generalizing the results of the research to other ADC. It is possible that this survey may not have obtained a representative sample of the exercise leader population in BC as the response rate was only just over 56% and was higher in certain health regions than others.

Future Research

The current research has provided useful information regarding ADC clients, the composition of exercise programs and the characteristics and beliefs of ADC exercise leaders in BC. However, more information is needed to determine possible reasons for low ECS scores. Regarding ADC clients, it was speculated that the characteristics of this population have changed over time from a recreational, social group to one with more complicated health concerns requiring more care. The current research confirmed this by showing that the average client care level in BC has increased and it is possible that these changes have impacted current exercise programs. Research documenting changes in the health and cognitive status of the ADC client population and their relation to ECS scores would be useful for future programming.

Regarding exercise leader characteristics, the current research analyzed many potential reasons for low ECS scores, including education, exercise training and beliefs. Workshop education seemed to be important, however, more research is needed in order to determine the characteristics of these workshops. It is likely that workshops designed specifically to educate leaders about current recommendations for frail seniors exercise and assessment may further increase ECS scores. Although currently there are various ones available for leaders to attend, they may not address these issues. Instead, it is speculated that many focus on teaching exercises that have not been shown to reduce disability, but that seem enjoyable for clients and feasible for the leader to implement in a large group setting.

More research is needed to support the use of the ECS score. Although this system measured the potential benefit of ADC exercise programs in BC, the actual health benefits to clients is unknown. A study to determine the actual benefit of exercise programs would validate the use of the term "level of potential benefit," as determined by the ECS score. Such a study would consist of comparing the perceptions of leaders with the actual benefit that clients were receiving from exercise programs. To validate the use of the ECS score, a second wave of the current research would be conducted with a larger sample of ADC in various Canadian provinces. Leaders would again record the content, frequency, duration and intensity of their programs, however this time a researcher would also observe each program, recording the same components. At this time, both self-reported and observed ECS scores would be computed and programs would be divided into those offering minimal, moderate and potential benefit. The two sets of scores would

be compared to verify whether the self-reports reflected the observations of the researcher.

A randomized control trial of clients would be then be conducted to determine the actual benefit of exercise programs. Clients would be randomized into three groups and tested on strength and balance measures. The three groups would be assigned an exercise program offering minimal, moderate and potential benefit to clients. At the end of the program, each group would again be tested to determine whether their strength and balance had improved and scores would be compared across the three levels.

The ECS score used for the current research was a composite variable consisting of four separate components reflecting the content, frequency, duration and intensity of each exercise program. However, further analyses of the effects on each of these four components separately may find additional significant associations that were not found between certain independent variables and the composite score. For example, it is surprising that more client characteristics, such as care and impairment levels, were not associated with ECS scores, since one would think that client ability would have an impact on what the leader was offering in the exercise program. However, it is possible that content may have more impact on the nature of programs than frequency, duration or intensity. Furthermore, it was found that most ADC do not measure the intensity of programs and this may have been reflected in the limited number of client characteristics found to be associated with the total ECS score. Therefore, further analyses of these component parts may reveal meaningful information regarding which of the four factors was more predictive of ECS scores,

There were a large number of questions used in the current survey and it is possible that they could be reduced for future research. For example, a scale system of one to five was used to determine if leaders believed their clients were capable of maintaining and improving functional ability, mobility, balance, stamina or endurance, strength and flexibility. These scales measured each item separately, however, the data reduction exercise indicated that these factors were highly inter-correlated. To eliminate this redundancy, the scales could be combined using factor analyses. This same technique could also be used to determine if there were other questions in the survey that could be combined into composite variables.

Given a larger sample size, future research could also more closely examine the role of the health belief model in the context of understanding exercise behaviours from the perspective of leaders rather than clients. A hierarchical analysis of the six components of the model would allow the researcher to determine which ones were most important to the ECS score. In addition, with a larger sample size, one could also control for other factors, such as age and gender. Further analysis could also determine the effects of self-efficacy on ECS scores. In the current research, leaders were asked if they questioned their ability to lead exercise and no relationship was found between this factor and ECS scores. It is possible that not questioning ability could be associated with a decreased effort to research exercise for this population and to evaluate on-going client progress. Perhaps leaders are not interested in making changes to their programs or they are unaware that they can positively affect client health, causing them to be content with the current status of their exercise programs.

Recommendations

Research investigating the centralized organization of ADC both on a regional and provincial level would provide valuable information regarding client, program and exercise leader characteristics. At the present time, ADC are regulated separately by each health region and it is thought that even within these areas there is inconsistency in the planning, implementation and evaluation of programs being offered to clients. For example, the tools used to monitor programs may be different in each ADC, making it difficult to compare characteristics across this population. If all ADC were required to use the same recording system, it would be possible to compare them and to determine whether the programs being offered were beneficial to clients.

Coordination of ADC would also positively impact exercise leader education. Given the variety of exercise programs presented by the current research, it is speculated that ADC do not follow strict guidelines for the composition of their programs or for the certification of their leaders. If guidelines were introduced in health regions and made criteria for continuation of ADC contracts, there would be more consistency of programs offering benefit to clients. According to the current research, the leader is the most important factor in determining ECS scores, superseding program and client characteristics. If a centralized education and registration system was implemented, the benefits of exercise for frail adults would likely be more feasible.

It is possible that existing recommendations for frail seniors exercise do not reflect the needs of the current ADC population. Given the low ability and high impairment level of clients and the group nature of ADC, exercise leaders may require more comprehensive guidelines to plan, implement and evaluate their programs. An

updated version of existing guidelines and exercise plans moderated specifically for an ADC clients would be useful to those working with population.

APPENDICES

APPENDIX A
LETTER TO PARTICIPANT

LETTER TO EXERCISE LEADER

January 2004

Dear Colleague:

I recently contacted you to inform you of the research that I am conducting for my Masters Degree in Gerontology at Simon Fraser University. As you may recall, I am conducting a survey of Adult Day Centre exercise leaders currently working within British Columbia, Canada.

Currently, there are over 80 Adult Day Centres operating in BC. However, to date there has been no information collected regarding the exercise programs being offered by these centres. Through my research, I hope to gather some information regarding the adult day centres operating within the province, the exercise programs offered by these centres and the exercise leaders facilitating these programs.

As an Adult Day Centre program coordinator, I am aware of the time constraints and work-load that ADC workers are under. Therefore, I appreciate the time that you took to speak with me about my project and the effort that you will take to fill out this short survey. If you have any questions about this research, please do not hesitate to contact either myself, or my supervisor, using the contact information provided below.

After completing this survey, you can return it to me either by mailing it in the self-addressed, stamped envelope provided or by faxing it to me at 604-251-9919.

Once again, thank you for your valuable time and information.

Sincerely,

Lara Williams
604-874-4231 (Work)
604-251-9919 (Home Tel/Fax)
email: donlara@telus.net

Supervisor: Gloria Gutman
Simon Fraser University
604-291-5062 (Work)
email: gutman@sfu.ca

APPENDIX B
INFORMED CONSENT FORM

Informed Consent Form

The University and those conducting this research study subscribe to the ethical conduct of research and to the protection at all times of the interests, comfort, and safety of participants. This research is being conducted under permission of the Simon Fraser Research Ethics Board. The chief concern of the Board is for the health, safety and psychological well-being of research participants.

Should you wish to obtain information about your rights as a participant in research, or about the responsibilities of researchers, or if you have any questions, concerns or complaints about the manner in which you were treated in this study, please contact the Director, Office of Research Ethics by email at hweinber@sfu.ca or phone at 604 268-6593.

Your signature on this form will signify that you have received a document which describes the procedures, possible risks, and benefits of this research study, that you have received an adequate opportunity to consider the information in the documents describing the study, and that you voluntarily agree to participate in the study.

Any information that is obtained during this study will be kept confidential to the full extent permitted by professional ethics. Names of participants and Adult Day Centres will be recorded on each survey only for the purpose of providing contact information for participants whose surveys are incomplete. Once the questionnaires are returned and completed, they will be assigned an ID number, which will afterwards be the only means by which individual surveys can be identified. During the conduct of the study, data will be stored in a locked file cabinet and at the conclusion of the study; completed surveys (or any other data collection materials that can be linked to an individual) will be shredded.

Title: **Exploring the potential benefit of adult day centre exercise programs in BC**
Investigator Name: **Lara Joanne Williams**
Investigator Department: **Gerontology**

Having been asked to participate in the research study named above, I certify that I have read the procedures specified in the Study Information Document describing the study. I understand the procedures to be used in this study and the personal risks to me in taking part in the study as described below:

Risks to the participant, third parties or society: **None**

Benefits of study to the development of new knowledge: **To obtain information about existing adult day centres, adult day centre clientele, exercise programs and exercise leaders in BC.**
Procedures: **Complete a questionnaire**

I understand that I may withdraw my participation at any time. I also understand that I may register any complaint with the Director of the Office of Research Ethics or the researcher named above or with the Chair, Director or Dean of the Department, School or Faculty as shown below.

Andrew Wister
Department of Gerontology
8888 University Way,
Simon Fraser University,
Burnaby, British Columbia, V5A 1S6, Canada

I understand that I may obtain copies of the results of this study, upon its completion by contacting:

Lara Williams
604-251-9919

Gloria Gutman
604-215-5062

I have been informed that the research will be confidential.

I understand that my supervisor or employer may require me to obtain his or her permission prior to my participation in a study of this kind.

I understand the risks and contributions of my participation in this study and agree to participate:

The participant and witness shall fill in this area. Please print legibly.

Participant Last Name: **Participant First Name:**

Participant Contact Information:

Participant Signature: **Witness Signature:**

Date (use format MM/DD/YYYY)

APPENDIX C
EXERCISE LEADER SURVEY

Thank you for taking the time to fill out this short survey. Please indicate your answer(s) to each question by filling in the blanks or circling the correct letter or number.

1. **What is your gender?**

    a. Female
    b. Male

2. **Please indicate your age:** _____

3. **How many years of education do you have:**_____

4. **Please indicate your level/type of education achieved:**

    a. Master Degree or higher: please specify department: _____
    b. Post Baccleaureate Diploma: please specify department: _____
    c. Bachelor of Arts degree: please specify major and minor: _____
    d. Therapeutic Recreation Diploma
    e. Activation Cooridnator Diploma
    f. Geriatric Based Recreation Diploma
    g. Geriatric Activity Worker Certificate
    h. Geriatric Based Recreation Diploma
    i. Resident Care Attendant Certificate
    j. High School Diploma
    k. Other, please specify:_____

5. **Please indicate your current position at your adult day centre:**

    a. Administrator
    b. Program or activity coordinator
    c. Program or activity worker
    d. Nurse
    e. Resident care attendant
    f. Volunteer
    g. Other, please specify:

6. **For how many years have you been employed as an ADC worker:** _____

7. **How many days per week does your adult day centre operate:** _____

8. **How many clients is your centre <u>funded for</u>, per day:** _____

9. What is the average number of clients that your centre serves, per day: _____

10. How many days per week does the average client attend your program: _____

11. How many clients do you have in each care level?

	Personal Care Level	Intermediate Care level 1	Intermediate Care Level 2	Intermediate Care Level 3	Extended Care Level
Number of Clients					

12. What percentages of your clients have the following impairments?

	Mobility Impairment	Cognitive Impairment	Visual Impairment	Hearing Impairment
Percentages				

13. How many FTE activity staff are employed by your ADC: _____

14. Does your ADC facilitate an exercise program for clients?

a. No **(Go to question 42)**
b. Yes

15. How many days per week does your ADC facilitate an exercise program: _____

16. How many exercise programs does your ADC offer each day: _____

17. Does your center offer two or more exercise sessions per day?

a. No
b. Yes

i. If yes, please indicate whether or not the following are reasons for why the sessions are divided.

1. By the time of day the programs are offered No Yes
2. By the language the program is delivered in No Yes
3. By the mobility level of clients No Yes
4. By the cognitive ability of the clients No Yes
5. Other, please specify:_____

18. Approximately many minutes does each exercise session last: _____

19. How many activity staff at your ADC lead exercise programs: _____

20. How many staff and/or volunteers assist the leader with the exercise program:_____

21. What is the average number of clients in your exercise group, per session: _____

22. Does you Adult Day Centre follow any policies regarding exercises that are not to be led during an exercise program?

a. No
b. Yes

i. If yes, please indicate which exercises are not to be led:

1. Exercises using weights No Yes

2. Standing exercises No Yes
3. Other, please specify: _____

23. Did you design or influence the design of the exercise program that you lead?

a. No
b. Yes

Please comment:_____
_____

24. Please complete this chart. In the first column, indicate whether or not you use the following equipment for your exercise program(s). In the second column, indicate the highest resistance level of the equipment that you use.

Type of Equipment	Resistance Level
Hand Weights **A.** No **B.** Yes	**A.** ≥ 5 lbs **B.** 4 lbs **C.** 3 lbs **D.** 2 lbs **E.** ≤ 1 lbs
Leg Weights **A.** No **B.** Yes	**A.** ≥ 5 lbs **B.** 4 lbs **C.** 3 lbs **D.** 2 lbs **E.** ≤ 1 lbs
Therabands **A.** No **B.** Yes	**A.** ≥ 5 lbs **B.** 4 lbs **C.** 3 lbs **D.** 2 lbs **E.** ≤ 1 lbs
Other, please specify:	

25. Please complete this chart. In the first column, indicate whether or not you include the listed exercises in your program. In the second column, indicate how many times, per week, you lead each exercise. In the third column, indicate how many minutes, per session, your clients complete each exercise.

Type of Exercise	Times Per Week	Minutes per session
Stretching **A.** No **B.** Yes		
Range of Motion **A.** No **B.** Yes		
Aerobic **A.** No **B.** Yes i. **If yes, what kind of aerobic exercises do you lead:** _____ _____ _____ _____ _____		
Resistance Training of **<u>Upper Body</u>** **(with weights or therabands)** **A.** No **B.** Yes		
Resistance Training of **<u>Lower Body</u>** **(with weights or therabands)** **A.** No **B.** Yes		
Balance Exercise Performed <u>While Standing</u> **A.** No **B.** Yes		

26. Do you measure intensity for aerobic exercise?

a. No
b. Yes
   i. If yes,
      1. **What method do you use to measure intensity:** _____

_____

2. **What is the target intensity you believe your clients should aim for using that method:**_____

27. Do you measure intensity for resistance training of the <u>upper body?</u>

a. No
b. Yes
   i. If yes,
      1. **What method do you use to measure intensity:**_____
      _____
      2. **What is the target intensity you believe your clients should aim for using that method:** _____

28. Do you measure intensity for resistance training of the <u>lower body</u>?

a. No
b. Yes
   i. If yes,
      1. **What method do you use to measure it:** _____
      2. **What is the target intensity you believe your clients should aim for using that method:** _____

29. If you lead balance exercises performed while standing, please indicate whether or not you lead the following exercises:

a.	Standing on one leg	No	Yes
b.	Tandem walk	No	Yes
c.	Circle turns	No	Yes
d.	Heel and toe stands	No	Yes
e.	Closing eyes while standing	No	Yes

30. Does your current exercise program reflect your beliefs on how an ADC exercise program should be run?

a. No
b. Yes

Please comment:_____

31. For how many years have you been leading exercise programs: _____

32. Are you registered with any exercise certification boards, such as the BC Parks and Recreation Board?

a. No
b. Yes

Please list your certification and membership with related professional associations:
_____

33. How many years of formal training in exercise theory and/or leadership do you have: _____

34. Have you attended any short-term workshops or courses for exercise leaders?

a. No
b. Yes

i. If yes, how many workshops have you attended in the past 5 years:_____

ii. If yes, please indicate whether or not you received training from the following sources:

1.	College or university courses	No	Yes
2.	Conference/workshop for seniors workers	No	Yes
3.	ADC/care facility in-services	No	Yes
4.	Other, please specify:_____		

35. Please indicate whether or not you have received information or assistance for your exercise program from the following sources:

a.	Supervisor or other ADC staff members	No	Yes
b.	Physiotherapist within your health region	No	Yes
c.	Non-profit organizations	No	Yes
d.	Your own personal trainer or exercise leader	No	Yes
e.	Internet, books or magazines	No	Yes
f.	Short term workshops or courses for exercise leaders	No	Yes
g.	Other, please specify:_____		

36. Do you ever question your ability to lead an exercise program?

a. No
b. Yes

i. **If yes, please indicate whether or not you question the following areas:**

1.	Appropriate speed of the program	No	Yes
2.	Appropriate exercises for the program	No	Yes
3.	Proper or improper form of certain exercises	No	Yes
	Safety of certain exercises	No	Yes
4.	Contra-indicated exercises	No	Yes
	Program is too challenging	No	Yes
5.	Program is not challenging enough program	No	Yes
6.	If my exercise program is having a positive effect on the health my clients	No	Yes

37. Please indicate whether or not you see the following as challenges to designing exercise programs for ADC clients:

a.	Interest level of clients	No	Yes
b.	Cooperation of clients	No	Yes
c.	Level of client ability	No	Yes
d.	Medical conditions of clients	No	Yes
e.	Client mobility	No	Yes
f.	Inability of clients to follow due to dementia	No	Yes
g.	Inability of clients to follow due to hearing loss	No	Yes
h.	Inability of clients to follow due to vision loss	No	Yes
i.	Fear that clients will fall while exercising, if standing	No	Yes
j.	Fear that clients will injure themselves while exercising	No	Yes
k.	Cost of equipment	No	Yes
l.	Amount of staff assistance available	No	Yes
m.	Other, please specify:_____		

38. Using the following scale, please indicate if you believe that the majority of your clients are capable of <u>maintaining</u> their current level of ability in the following areas:
Scale: 5=yes, definitely; 4=yes; 3=somewhat; 2=no; 1= definitely not

a. Functional Ability	5	4	3	2	1
b. Mobility	5	4	3	2	1
c. Balance	5	4	3	2	1
d. Stamina or Endurance	5	4	3	2	1
e. Strength	5	4	3	2	1
f. Flexibility and range of motion	5	4	3	2	1

39. Using the following scale, please indicate if you believe the majority of your clients are capable of <u>improving</u> their current level of ability in the following areas:
Scale: 5=yes, definitely; 4=yes; 3=somewhat; 2=no; 1=definitely not

a. Functional Ability	5	4	3	2	1
b. Mobility	5	4	3	2	1
c. Balance	5	4	3	2	1
d. Stamina or Endurance	5	4	3	2	1
e. Strength	5	4	3	2	1
f. Flexibility and range of motion	5	4	3	2	1

40. Have you seen improvements in the following abilities of the clients who participate in your exercise program?

a. No
b. Yes
   i. **If yes, please used the following scale to indicate to what degree you believe the following abilities have been improved:**
   5=yes, definitely; 4=yes; 3=somewhat; 2=no; 1=definitely not

1.	Mobility	5	4	3	2	1
2.	Balance	5	4	3	2	1
3.	Stamina or endurance	5	4	3	2	1
4.	Strength	5	4	3	2	1
5.	Flexibility	5	4	3	2	1
6.	Range of motion	5	4	3	2	1
7.	Other, please specify:_____					

40. Do you conduct periodic physical assessments to determine your clients' levels of physical ability?

a. No
b. Yes
   i. **If yes, please specify what assessment tool(s) you use: _____**
   ii. **If yes, what is the time interval, in months, between testing times:_____**

41. Using the following scale, rate how likely the majority of your clients are at risk of falling: Scale: 5=yes, definitely; 4=yes; 3=somewhat; 2=no; 1=definitely not. Please circle the appropriate number:

5 4 3 2 1

42. Using the following scale, rate the seriousness of a fall on the following components of health for your ADC clients:
Scale: 5=Very serious; 4=Serious 3=Moderately Serious; 2=Slightly Serious; 1=Not serious

1.	Mobility	5	4	3	2	1
2.	Functional Ability	5	4	3	2	1
3.	Increased Care Needs	5	4	3	2	1
4.	Risk of Death	5	4	3	2	1

43. Do <u>you</u> exercise regularly outside of work?

a. No
b. Yes
   i. If yes,
      1. **How often many times per week, do you exercise: _____**
      2. **How many minutes, per session, do you exercise: _____**
      3. **Please indicate if you participate in the following exercises:**

a.	Aerobic activity	No	Yes
b.	Brisk walking	No	Yes
c.	Yoga	No	Yes
d.	Pilates	No	Yes
e.	Tai Chi	No	Yes
f.	Strength training	No	Yes
g.	Dancing	No	Yes
h.	Organized sports	No	Yes
i.	Swimming	No	Yes

Thank you. If you have any questions or comments regarding this survey, please outline them on the following page and return this <u>survey</u> and your <u>signed informed consent form</u> via mail in the self-addressed and stamped envelope you received with the survey package, or by fax to 1-604-291-5066.

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