PREDICTORS OF PHYSICAL ACTIVITY AMONG INDIVIDUALS WITH SPINAL CORD INJURIES

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Abstract

This study used the theoretical framework of Pender's Health Promotion Model (HPM) to predict physical activity patterns in a sample of spinal cord injured (SCI). The model was adapted to better fit the population under study by including coping style, level of lesion and weight as individual characteristics and physical self-efficacy as a behaviour-specific cognition. The relationships of personal factors, coping strategies, social support, barriers to action, and physical self-efficacy were explored. A sample of 33 respondents who had either quadriplegia (19) or paraplegia (14) completed the study instruments. There were 29 males and 4 females with a mean age of 40.5 years and a mean age of injury of 24 years. Participants completed each of six instruments including: Physical Self-Efficacy (PSE) and its two subscales Perceived Physical Ability (PPA) and Physical Self-Presentation Confidence (PSPC); Exercise Benefits Barrier Scale (EBBS); Jalowiec Coping Scale (JCS); Personal Resource Questionnaire (PRQ-85); Leisure Time Exercise Questionnaire (LTEQ); and a personal inventory for demographic and health risk information. It was hypothesized that high physical self efficacy, few barriers to action, and high social support would be positively related to involvement in physical activity, and conversely, that high lesion levels (quadriplegia), overweight and use of an affective coping style would relate to low involvement in physical activity. Results of the present study provide some support for applying the adapted model of health promotion to explain the physical activity patterns of people with SCI. Participation in moderate, strenuous, sweat inducing and total weekly physical activity was moderately correlated to high levels of both PPA and PSE. A clear but weaker relationship was also shown between few perceived barriers to participation and involvement in mild, strenuous and total weekly physical activity. In addition, severity of impairment or comparison of activity level to lesion level indicated that paraplegics were more involved in strenuous activity than quadriplegics. No relationship was found between level of social support or affective copying style and physical activity. The strongest predictors of physical activity were high PPA and short time since injury (TSI). Sixty-seven percent of the variance in participation in strenuous activity was accounted for by PPA (38%), height (15%) and age (14%). Fifty-five percent of the variance in total weekly activity (LTEQ) was explained by PPA (35%), TSI (11%) and stiffness and soreness (9%). Fifty-one percent of the variance in mild activity was explained by TSI (36%) and PSPC (15%) and 48% of moderate exercise was explained by TSI (34%) and PPA (14%). As a consequence of this investigation, a revised model of health promotion was presented. It was concluded that those people with SCI who adopt an active approach to health promotion are young, recently injured, have a high PPA and are paraplegic. It was recommended that rehabilitation practices concentrate on increasing physical self efficacy and empowerment through the use of situation-specific learning environments and a variety of activities that have a life span approach.

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Introduction

There are approximately 30,000 persons with spinal cord injuries (SCI) living in Canada (Ontario Neurotrauma Fund Initiative (ONFI), 1996), an incidence rate of injury that is both significant and preventable. The prevalence of spinal cord injuries in Canada is approximately 1000 persons per year (McColl & Skinner, 1992). In 1993, an estimated 910 individuals, predominantly young adult males, sustained a spinal injury. Thirty-five percent of spinal paralysis is caused by motor vehicle accidents (ONFI, 1996). Every traumatic spinal injury constitutes a powerful challenge to whatever life stage individuals are engaged in. Such an injury could pressure them into making cognitive appraisals and decisions that are difficult and stressful. The Ontario Trauma Registry (1995), reported 511 admissions with traumatic SCI in 1994 with falls accounting for 43% (221) of spinal cord injury. Approximately 34% (176) of these trauma admissions were individuals over the age of 54, which raises concerns for treatment of older adults who already may be experiencing some physical limitation. Spinal cord injuries are among the most serious and costly injuries sustained and have a dramatic physical, psychological, social and economic impact on the lifestyle of those affected. For persons who acquire spinal cord injuries from traumatic events such as falls, motor vehicle accidents, and diving mishaps, very few will return to a lifestyle similar to that experienced prior to injury (ONFI, 1996).

A spinal cord injury infers a partial or total loss of voluntary motor function, sensation and supraspinal control of sympathetic nervous activity at or below the injured spinal cord segment (Figoni, 1984; Teasell, Arnold, & Delaney, 1996). A traumatic spinal cord injury resulting in paraplegia or quadriplegia is a life changing experience that impacts suddenly on the person's health status. For these individuals, exercise becomes crucial for maintaining their physical health. The coping strategies of persons with spinal cord injuries are intertwined with many individual characteristics and cognitive-perceptual factors including age, severity of spinal injury, past experiences, employment, social support and physical self-efficacy. For some individuals who have sustained spinal paralysis, the management of their abilities has lead to very successful lives while for others, the physical and psychological adjustment has been a problem. Perceptions of physical self-efficacy (i.e., skill and confidence) have an effect on perceived opportunities and influence an individual's decision to exercise. An individual with spinal paralysis is also confronted with a change in body appearance, and both environmental and social barriers that may be difficult to acknowledge. People with SCI have reported a variety of experiences with adjustment including shock, grieving, depression, and helplessness (Frank, Van Valin, & Elliott, 1987). There is evidence to support the notion that individuals who experience spinal paralysis reduce their involvement in physical activity and are vulnerable to unemployment, underemployment and passive, non-social and home-based activities (Caldwell & Weissinger, 1994; DeVivo, Rutt, Stover, & Fine, 1987).

McColl and Skinner (1992) conducted an assessment of health risk with 78 people with SCI from Ontario's Lyndhurst Hospital in 1991. The findings indicated that 56% of participants engaged in less than a half-hour of exercise a week. In fact, these results are comparable with the evidence from Statistics Canada (1991) which states that approximately 69% of Canadians aged 15 and over with severe disabilities never participate in physical exercise. According to a Stockholm spinal cord injury study by

Levi, Hultling, Nash, and Seiger (1995), almost two-thirds of the 353 participants reported pain. The existence of joint and chest pain is a problem and for these individuals physical activity may be less of a priority than for those who do not experience a troublesome level of pain. In addition, the physical strain that may exist during activities of daily living (ADL) can cause fatigue and discomfort reducing the incentive of being more active (Janssen, Van Oers, Van Der Woude, & Hollander, 1993).

As well as physical discomfort, persons are in danger of physical complications as a result of being wheelchair-dependent. They may experience lifelong secondary complications including muscle atrophy, osteoporosis, bladder/bowel dysfunction, pressures sores, septicaemia, pneumonia, and cardiovascular diseases (CVD) (Davis, 1993; DeVivo, Black & Stover, 1993; Glaser, 1994; Hopman, 1994; Szollar, Martin, Sartoris, Parthemore & Deftos, 1998; Wells & Hooker, 1990). DeVivo et al. (1993) conducted a 12 year study on 9,135 persons with SCI to identify risk factors and the leading causes of death. At the conclusion of the study, 854 persons had died. The report states that heart diseases (both ischemic and nonischemic) were involved in 20.9% of deaths. The other leading causes of death were diseases of the respiratory system, urinary system, septicemia and diseases of arteries. In another study, Bauman, Raza, Chayes, and Machac (1993) studied 6 persons with quadriplegia who were 40 to 52 years old. Each of the respondents had an average of five risk factors for coronary heart disease. They reported that in those individuals who are physically restricted, symptoms of coronary heart disease may go unprovoked by ADL and be totally asymptomatic due to disrupted afferent innervation of cardiac muscle.

The role of physical activity/exercise in reducing morbidity and mortality from CVD and increasing the quality of life among Canadians has been well documented (Glaser, 1994; Gordon & Scott, 1991;Hooker & Wells, 1989). However, according to the Health and Activity Limitation Survey (HALS) (Statistics Canada, 1991), physical inability to be more active is the obstacle most frequently reported by disabled adults who are dissatisfied with their participation in physical activity. Exploring the factors that may influence a sedentary lifestyle in this population is needed because inactivity is a serious problem and little research has been conducted on health promotion among the spinal cord injured population. For exampie, sedentary patterns may have developed over time from issues such as pain, restriction on activity, and need for reassurance (McColl, 1995), indicating the importance of social and environmental influences.

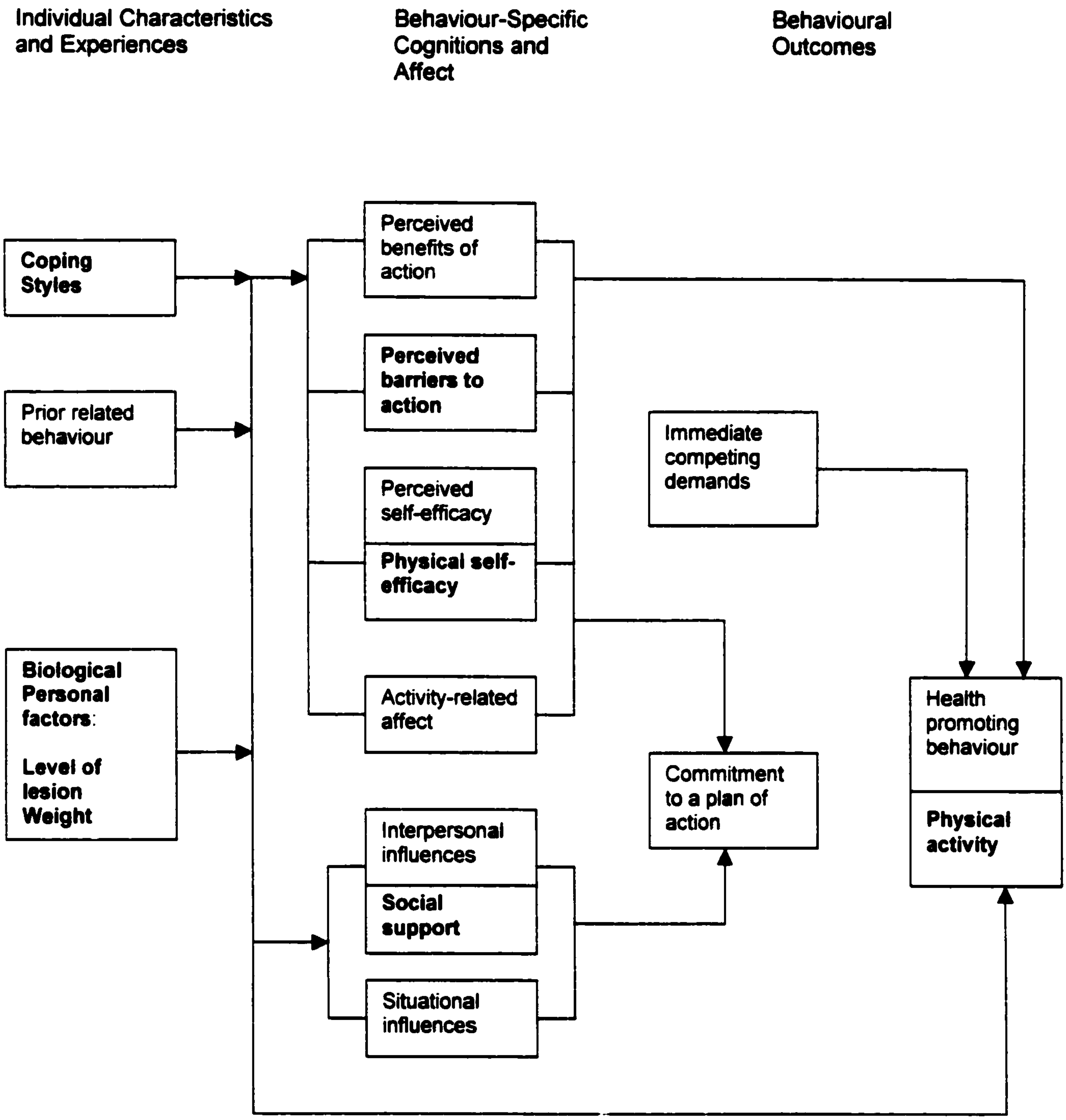
A good conceptual framework for investigating health-promoting behaviours is provided by Pender (1996). Her revised Health Promotion Model (HPM) illustrates how two categories of influence: individual characteristics and experiences and behaviour-specific cognitions and affect, interact (when mediated by competing demands and commitment to action) to produce the behavioural outcome of leisure time physical activity (see Figure 1). This model has been used successfully with cardiac post-rehabilitation program participants, ambulatory cancer patients and older adults (Pender, 1996). It appears to be particularly applicable for use with people with disabilities because of the inclusion of personal biological factors such as age, weight, aerobic capacity and strength and personal psychological factors such as perceived health status and definition of health. These variables along with prior related behaviour are proposed as having direct and indirect effects on health-promoting behaviour. In

Pender's model behaviour-specific cognitions and affect are postulated to be major motivational mechanisms. This category of variables includes perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences and situational influences.

For this study, a number of adaptations have been made in order to better fit the model to the population being studied and to match the model to the scope of the investigation (Dubras, 2001). These changes are illustrated in Figure 1 by the highlighted blue text. For example, in SCI, the level and completeness of the spinal injury results in a variety of physiological and functional behaviours. To accommodate this fact the lesion level is included as a personal biological factor influencing physical activity. In addition, one new factor, coping style has been included under individual characteristics whereas, prior related behaviour will not be directly measured. In the category, behaviour specific cognitions and affect, the adapted model will define self-efficacy as perceived physical self-efficacy (PSE) which includes two subscales, physical self presentation confidence (PSPC) and perceived physical ability (PPA). In addition, perceived benefits of action, activity-related affect, and situational influences will not be examined.

Figure 1

Adapted Health Promotion Model



Adapted from "Health Promotion in Nursing Practice," (p.67) by N.J. Pender, (1996). Connecticut: Appleton & Lange. With permission from author (Dubras, 2001).

Statement of the Problem

The goal of this research was to predict the physical activity behaviour among individuals with spinal cord injuries by exploring the relationships of personal factors, coping strategies, social support, barriers to exercise, and physical self-efficacy.

Significance of the Study

Research on health promotion among people with disabilities has contributed to a better awareness of the relationships of attitudinal, demographic, and personal factors on health-promoting behaviour. This study will be among the first to examine the variables in the revised health promotion model and their interrelationships in a spinal cord population. The multiple regression analysis of the above measures may provide indicators of leisure time physical activity to rehabilitation professionals who are most often the source of health promoting services for people with SCI. Even though the study sample is small, it is drawn from two provinces in Canada with a similar SCI profile. It is noted that Nova Scotia has the fourth highest proportion of disabled persons aged 15 and over who do not participate in any physical activity (50.6%) and Ontario the sixth highest at (49.3%) (Statistics Canada, 1991). It is also noted that, in a similar trend, 29% participate in physical activities three or more times per week or more in Ontario, compared to 26.7% in Nova Scotia. By comparing the perceptions of health status with reported level of physical activity the need for better self management practices in the SCI population may be emphasized.

The loss of autonomy is a major adjustment faced by many individuals with an acquired disability (Godin, Colantonia, Davis, Shephard, & Simard, 1986). The adoption of a positive lifestyle management outlook is important due to the prevalence of sedentary living in individuals with spinal cord injuries. The impact of sedentary living may have the effect of exacerbating medical complications already existing with people with spinal paralysis. The concept of health promotion emphasizes the enhancement of well-being through self-care and promotion of autonomy. The HPM is an important competence-oriented construct (Pender, 1996) for the study of adults with spinal cord injuries. Health-promotion strategies which include increased physical activity are critical in reducing secondary complications, stress levels, heart disease, and improving quality of life (Stuifbergen & Becker, 1994).

Definitions

Physical activity is defined as, prolonged leisure activity designed to improve or maintain a level of fitness and quality of life by performing muscular work (Shephard, 1990).

Exercise is defined as, a form of leisure-time physical activity that is planned, structured and repetitive (Canadian Physical Activity, Fitness and Lifestyle Appraisal, 1996; p.1-3).

Health is defined as, the actualization of inherent and acquired human potential through goal-directed behaviour, competent self-care, and satisfying relationships with others while adjustments are made as needed to maintain structural integrity and harmony with the relevant environments (Pender, 1996; p. 22).

Health promotion is defined as, increasing the level of well-being and self-actualization of a given individual or group. Health promotion focuses on efforts to approach or move toward a positively valenced state of high-level health and well-being

(Pender, 1996; p. 34).

Disability is defined as, a loss or reduction of functional ability and/or activity (World Health Organization, 1986).

Social Support is defined as, the experience of intimacy, being valued and respected, nurtured, and able to count on others should the need arise (McColl, 1995).

Self-efficacy is defined as, the belief that one can successfully execute the behaviour required to produce the outcomes (Bandura, 1977).

Outcome expectancy is defined as, the belief that a given behaviour will lead to certain outcomes (Bandura, 1977).

Hypotheses

It was hypothesized that:

1. A positive relationship exists between physical self-efficacy (PSE) and physical activity. Perceived physical self-efficacy is operationalized by the PSE scale and consists of two subscales, perceived physical ability (PPA) and physical self-presentation confidence (PSPC). Physical activity is measured by the Leisure Time Exercise Questionnaire (LTEQ).

2. An inverse relationship exists between the personal factor of weight and physical activity. In addition, level of lesion will have a significant effect on participation in physical activity; that is paraplegics will be more active than quadriplegics. Weight is measured in kilograms and level of spinal cord lesion is defined by the condition of paraplegia or quadriplegia.

3. An inverse relationship exists between perceived barriers to action and intensity of physical activity. Perceived barriers to action is operationalized by Exercise Benefits

Barriers Scale (EBBS). Intensity of physical activity is measured by the LTEQ.

4. A positive relationship exists between social support and physical activity. Social support is operationalized by the Personal Resource Questionnaire (PRQ-85).

5. Affective-oriented coping is inversely related to intensity of physical activity. Use of affective-oriented coping is operationalized by the Jalowiec Coping Scale (JCS) which consists of two subscales, affective-oriented and problem-oriented coping styles. Physical activity is measured by LTEQ.

Finally, the strength of the above factors will be investigated in predicting physical activity as measured by LTEQ, using multiple regression analysis.

Review of Literature

The central nervous system (CNS) consists of the brain and spinal cord. The spinal cord extends inferiorly from the position of the foramen magnum of the occipital bone to the level of the first lumbar vertebra (Van De Graaff & Fox, 1989). There are 31 pairs of spinal nerves which arise from segments of the spinal cord and 12 pairs of cranial nerves which originate from the brain and are distributed throughout the rest of the body as part of the peripheral nervous system. The peripheral nervous system includes afferent nerves that relay sensory information toward the brain and efferent nerves that transmit information away from the brain (McArdle, Katch, & Katch, 1994). The autonomic nervous system (ANS) is a functional subdivision of the entire nervous system that maintains homeostasis within the body (Van De Graaff & Fox, 1989). The ANS functions independently and the nerve portions are subdivided into the sympathetic and parasympathetic divisions (Van De Graaff & Fox, 1989).

Spinal paralysis is a broad term for a condition caused by disease or lesion to the spinal cord and/or spinal nerves (Sherrill, 1993). The level of the lesion on the spinal cord is inversely related to the degree of body function. The severity of spinal paralysis depends on the level of the lesion and whether it is complete or incomplete (Sherrill, 1993). Persons with quadriplegia have cervical cord dysfunction which may affect breathing, upper arm, forearm and hand function (Sherrill, 1993). Clinical disorders known to arise from a disturbed sympathetic nervous system include autonomic dysreflexia, low resting blood pressure, limited cardiovascular response to exercise and cardiac arrest (Teasell et al., 1996).

Persons with paraplegia may have damage to any of the twelve thoracic nerves, five lumbar nerves and two sacral nerves which involve the legs and trunk (Rimmer,1994). When the spinal cord is injured, sympathetic nervous system dysfunction in the thoracic region may affect balance and cardio-pulmonary function; lumbar cord lesion affects leg and foot movements; sacral cord lesion affects bladder, bowel, and sexual function (Sherrill, 1993).

During exercise for able-bodied individuals, a redistribution of blood takes place in order to augment stroke volume and to increase cardiac output (Hopman, 1994). Exercising muscles will be supplied with oxygenated blood and among its many functions the blood will assist in dissipating metabolic heat to regulate temperature. In individuals with high-lesion paraplegia and quadriplegia however, the redistribution of blood is disrupted due to a lack of sympathetic innervation below the level of the spinal lesion and the inability to use the leg muscle pump (Hopman, 1994; Hopman, Oeseburg, & Binkhorst, 1993). This impaired hemodynamic response to exercise may result in a lower end-diastolic volume and a lower stroke volume. In addition, the heart rate will increase to compensate for the lower stroke volume (Hopman et al., 1993). Cardiovascular training for persons with paraplegia would increase the capacity to be active and as a result reduce fatigue and deterioration of cardiac function (Figoni, 1984). Moreover, moderate activity levels are needed because normal ADLs have been cited as not sufficient for maintaining cardiovascular fitness (Davis & Shephard, 1990; Hjeltnes & Vokac, 1979); cited by Janssen et al., (1993). Although individuals with paraplegia are faced with a dramatic change in their functional musculature they are quite capable of sustaining heavy exercise workloads and trained athletes can exhibit similar cardiovascular responses to exercise as able-bodied athletes. Wicks, Oldridge, Campbell and Jones (1994) found that male athletes with quadriplegia using arm cranking and wheelchair ergometry were assessed with higher maximal oxygen uptake and ventilatory capacity than high-level SCI athletes with limited physical training. There is convincing evidence that adults with SCI who participate in endurance and strength training are able to improve cardiorespiratory reserve, have higher exercise capacity as well as activity-related affect.

Associated with these physiological changes to the body the individual with SCI must adjust mentally to the enormous changes to the physical self. This adjustment requires time (French & Phillips, 1991). Studies have been conducted to investigate depression in the hospital setting for patients with SCI after the onset of the injury (Mac Donald, Nielson, & Cameron, 1987). Depression can cause considerable impact on function and the time to rebuild a body image is unspecified (Tate, Forcheimer, Maynard, & Dijkers, 1994). Perception of one's physical being has long been considered to be an important aspect of self-care (Sonstroem & Morgan, 1989). Therefore, physical activity may improve physical work capacity, providing positive psychological benefits in terms of perceptions of self-worth and body image (Davis, Shephard, & Jackson, 1981). However, for individuals with spinal cord injuries the intention to give up health-damaging behaviours (Pender, 1996) such as sedentary living or eating high cholesterol foods may be more difficult and more complex than for able-bodied individuals.

Risk Profile

In Ontario, cardiovascular disease is the leading cause of death and accounted for 35% of all deaths in 1990 (Ontario Heart Health Survey, 1992). Similarily, in the province of Nova Scotia cardiovascular disease accounted for 35% of all deaths in 1999 (D.Newark, personal communication, March 9, 2001).

Cardiovascular disease is a leading cause of death among people with spinal paralysis and it appears that this population is under-investigated, under-represented and may be under diagnosed. In addition, they may be insufficiently informed about their endangered hearts and how to protect them.

Prior to the 1940s, survival following spinal cord injury was relatively rare (Whiteneck, Charlifue, Frankel, Fraser, Gardner, Gerhart, Krishnan, Mentor, Nuseibeh, Short, & Silver, 1992). Cushing (1927) cited by Ditunno and Formal (1994) reported that 80 percent of soldiers in the First World War experiencing SCI died in the first weeks due to infections from bed sores, renal failure, and other related urinary tract complications. Today, the numbers have completely reversed with long-term prognosis being improved with better nursing and medical care (Shephard, 1990). However, with the increased life expectancy the mortality rate due to cardiovascular disease appears to be more frequent with aging. Whiteneck et al. (1992) investigated the mortality, morbidity, and psychosocial outcomes of 834 persons with SCI at Stoke Mandeville Hospital and the Regional Spinal Injuries Centre, U.K. The study indicated that cardiovascular disease was the most frequent cause of death among individuals more than 30 years post injury. Another important observation from this study of older adults with SCI, was that illnesses which were indicative with wheelchair users, such as renal failure are now experiencing morbidity patterns common to those seen in an aging general population. However, the findings indicate that the causes of illnesses that may lead to death are occurring at younger ages than one would expect within the able-bodied population. Walker, McColl, Wilkens, Corey, and Stirling (1993) studied the survival profile of 2,795 individuals with SCI who were treated at Lyndhurst Hospital in Ontario. Walker and colleagues indicate that survival is influenced by both the severity and extent of one's injury, the time at which one was injured and treated, and that both mortality and morbidity are influenced by gender.

Despite morbidity issues, particularly skin breakdown and septicemia, a person with SCI has the capacity to lower the risk for developing CHD as does the sedentary able-bodied individual. Increased physical activity appears to be associated with a higher life expectancy (Glaser, 1994; Weyerer & Kupfer, 1994). Connor (1991) reports that exercise and training using arm exercise can improve maximum oxygen uptake and maximum heart rate; lower values were recorded for both high lesion paraplegics and quadriplegics and older individuals aged 50 to 90 years.

According to Bergman, Yarkony, and Steins (1997), persons with SCI are at increased risk for coronary artery disease because of reduced cardiac output, increased body fat percentage, potential for silent ischemia due to altered sensation and reduced exercise tolerance, and ineffective distribution of blood due to pooling of blood in the extremities. Important indicators of an elevated risk of heart disease include smoking, high alcohol consumption, high blood pressure, diabetes, lack of physical activity, and altered lipoprotein levels.

A number of studies have examined the lipoprotein levels among individuals with SCI and are in agreement that lower concentration of high-density lipoproteins (HDL) are found in sedentary individuals when compared with a group after training (Brenes et al., 1986; Dallmeijer, Hopman & van der Woude, 1997; Dearwater, LaPorte, Robertson, Brenes, Adams, & Becker, 1986; Hooker & Wells, 1989). These results show that the low concentrations of HDL-C can be enhanced by involvement in exercise programs which in turn improve the lipoprotein profile and thus decrease the risk of CHD.

Krum et al.(1992) assessed 102 participants with SCI and found a direct correlation between level of physical activity and HDL level. According to Brenes et al. (1986), there was a correlation between the onset of spinal injury and HDL cholesterol. Increases in total cholesterol and HDL-C were shown following 52 weeks of convalescence. Exercise/physical activity during the rehabilitation process is the most likely explanation for these findings, but no clear indication of the activity levels was documented.

Hooker and Wells (1989), in their study of 4 male and 4 female individuals with SCI who had not been involved in any endurance exercise for at least one year, found the moderate-intensity group exhibited significant increases in HDL-C and decreases in low-density lipoproteins (LDL-C). Despite the small sample size, the positive results after an 8-week wheelchair ergometry program suggest that upper body exercise may foster an improved lipoprotein profile. Bostom, Toner, McArdle, Montelione, Brown, and Stein (1991) studied aerobic power in 9 men with SCI using an arm crank ergometer and found a significant relationship between aerobic power and HDL-C.

Cardus, Ribas-Cardus, and McTaggart (1992) studied 96 men with SCI and 96 able-bodied men to discover if respondents were at an increased risk of CHD. They reported that the risk of coronary heart disease is similar to non-trained, age-matched, able-bodied individuals. However, they did not reveal the training/activity history of the study group nor the lipoprotein profile of the participants. Several studies are in agreement that confounding variables such as anthropometric factors (body mass index, adipose tissue) and activity levels are important parameters for predicting risk profiles (Dallmeijer et al., 1997; Janssen, van Oers, van Kamp, TenVoorde, van der Woude, & Hollander, 1997).

Information on the number of physically active adults with SCI is unknown. For the proportion of adults who are wheelchair dependent and participate in exercise programs there is a marked difference in the levels of HDL-C, LDL-C and total cholesterol. Sorg (1993) documented the positive effects of a long term (6-year) swimming program in a male with paraplegia. An additional 21 mg of HDL-cholesterol (84% increase) was observed in this individual who swam 2.5 hours/ week for 72 months. Brenes (1986) demonstrated a 6% increase in total HDL following 4 to 5 months of training. McLean and Skinner (1995) conducted an aerobic training study (10-week) on effect of body training position on 14 individuals with quadriplegia. The results indicate that training improved endurance, promoted loss of body fat, and increased peak power output. Furthermore, Curtis, McClanahan, Hall, Dillion, and Brown (1986) reported that athletes with SCI exhibited fewer medical complications such as decubitus ulcers resulting in less reliance on the medical system for management of common problems.

Persons with SCI may evoke stereotypical images of illness and disease. The clinical model, which understands health as the absence of illness, is implicit in most medical practices (Stuifbergen, Becker, Ingalsbe, & Sands, 1990). According to Becker and Schaller (1995), health professionals may focus on the disability and may contribute to people with disabilities thinking of themselves as passive participants, rather than agents of self-actualization.

The three categories of the HPM proposed as influencing health-promoting behaviours are: individual characteristics, behaviour-specific cognitions, and behavioural outcomes. The underpinning goal of this holistic approach to health is that the decision maker's perceptions and cognitions largely determine a more independent and healthy life. The health risks from which people with SCI may suffer, the injury-related risks, and the nature of adjustment strategies all make the population useful as a model for research to understand the mechanisms that affect participation in physical activity. The cognitive/perceptual factors as presented by Pender may be a revealing source of information on action strategies taken by individuals with SCI.

Social Cognitive Theory

The process of adjusting to a spinal cord injury begins at the moment of the event and is lifelong. The constructs of self-efficacy and outcome expectations from Bandura's Social Cognitive Theory (SCT) may apply to the learning of behaviours (Wassem,1987) which allow adjustment to a spinal cord injury. Self-efficacy is defined as the belief that one can successfully perform a specific behaviour and is measured by the confidence the person has in performing the behaviour (Bandura, 1986). As self-efficacy increases for a behaviour, the likelihood of the individual performing a specific behaviour increases (Wassem, 1987).

Bandura (1986) postulates that as individuals engage in activities, they make a cognitive appraisal of their environment. Bandura states that this assessment is often two-fold, involving a conviction that one can successfully execute the behaviour required to produce the outcome, and second, that a given behaviour will lead to certain outcomes. According to Bandura's SCT, decision making is best understood in terms of interaction among environmental, cognitive, and behavioural influences (Bandura, 1986). The cognitive appraisal of information is achieved through modelling and observation in which threats are manageable due to recalling same or similiar outcomes (Wassem, 1987).

Motivation for performing a given behaviour is also a key construct of Bandura's SCT (Wassem, 1987). The capacity to represent future consequences in thought provides a cognitive-based source of motivating referred to as self-inducement (Bandura, 1977). According to McSweeney (1993), self-motivation represents a cognitive type of "facilitator" that involves a conscious decision to develop a favourable attitude toward behaviour changes. Using "self-talk" reinforces the belief that behaviour change is effective in promoting health. This strategy of positive self-talk is one method of modifying low levels of self-efficacy found in people in the early stages of an activity program (Canadian Physical Activity, Fitness and Lifestyle Appraisal, 1996).

Self-Efficacy and Adults with Disabilities

Bandura's social cognitive theory and specifically the concept of self-efficacy has a central role in the study of health promotion behaviours such as smoking cessation, pressure sore prevention, and sport participation. Individuals with acquired and congenital disabilities have also been investigated in relation to their perceptions of self-efficacy, self-concept, and self-esteem. However, studies using the constructs of self-efficacy on persons with SCI are limited.

Pressure Sore Prevention and Self-Efficacy

Basta (1994) studied 40 male and female participants with SCI to determine effectiveness of self-efficacy in performing pressure sore prevention behaviours on decreasing skin damage. Instruments used in this study included: the Pressure Sore Prevention Beliefs Scale (PSPBS) (Alpha = .89 and .88 for the two subscales) which assessed perceptions of abilities and the Barthel Index (Alpha = .89) to determine subjects' level of functional capability. She reported that older individuals tended to have higher outcome expectations than younger individuals. Interestingly, married couples were more likely to have higher outcome expectations for pressure sore prevention behaviours than were single individuals. This behaviour may be the result of the married participants perceiving fewer barriers to good health practices. Basta found that individuals with paraplegia engaging in health-promoting behaviours such as eating a balanced diet, drinking sufficient amounts of water and smoking cessation were found to have higher self-efficacy.

Physical Activity and Self-Efficacy

Currently, there is little information on the effects of physical self-efficacy on lesiure time physical activity in persons with spinal cord injuries. However, findings from one study noted that wheelchair mobile individuals participating in tennis may be more efficacious than wheelchair mobile nonparticipants. Greenwood, Dzewaltowski, and French (1990) studied 77 male and 10 female wheelchair tennis participants from the 1987 Southwest National Wheelchair Tennis Championships to determine the importance of self-efficacy as a mediator of psychological well-being. The wheelchair tennis nonparticipants (32 males, 8 females) were not actively involved in competitive sport. Instruments used in this study included: the Tennis Self-efficacy Scale (coefficient alpha =.92) to assess the subjects self-efficacy expectations toward playing tennis and the Daily Wheelchair Mobility Task Scale (coefficient alpha =.76) representing domains of function rather than specific tasks and the Profile of Mood States (POMS) (Alpha =.65 to .74) for assessment of individuals' psychological well-being. The authors concluded that wheelchair tennis participants may be more positive about performing tennis skills and general mobility tasks than are wheelchair mobile nonparticipants. Greenwood and colleagues (1990) found the stronger an individual's self-efficacy for physical tasks the greater the perception of the individual's well-being.

Crocker and Bouffard (1992) studied 39 males and 19 females with disabilities (25 spinal cord injuries) to examine the relationship between appraisal and affect during challenging physical activity. The findings indicated that pleasurable engagement in challenging activities is due to positive appraisals of health and fitness, skill learning, demonstrating competence, and seeking social approval.

Campbell and Jones (1994) in their study of 93 wheelchair sport participants (72 males, 21 females), found that participants who competed at national and international events showed significantly greater levels of mastery, lower levels of anxiety, higher levels of self-esteem, and more positive perceptions of their health and well-being.

Bradley and Harvey (1993) examined the psychological effects of functional electrical stimulation on 10 male and female SCI participants. They found that participation in functional electrical stimulation exercise led to both physiological and improved psycho-social adjustments. In addition, the increased independence and confidence of the participants appeared to be influenced by a setting which allowed for a sharing of knowledge, experiences and problems.

Self-Efficacy and Congenital/Acquired Disabilities

Findings from studies indicate a relationship between health-promoting behaviours and self-efficacy among adults with a range of disabilities. Becker and Schaller (1995) conducted a study to understand perceptions of self-efficacy and health attitudes among 28 people with cerebral palsy. They found that self-efficacy is related to financial, educational, and functional status. Interestingly, those participants who required mechanical assistance had the highest self-efficacy ratings compared to those individuals who needed personal assistance. According to their observations, independence and a positive environment are integral components of health promotion.

Stuifbergen (1995) studied 61 participants with multiple sclerosis to examine the relationship between the practice of health promoting behaviours and perceived quality of life. She reported that participants generally have positive perceptions of their health despite living with a chronic condition. In an earlier study Stuifbergen (1992), reported that individuals with multiple sclerosis described exercise as the most frequent strategy for adjusting to the physical demands of illness.

Summary of Self-Efficacy Studies in Health Promotion

Results from studies have clearly demonstrated self-efficacy as an influence in promoting health behaviour. As well, the personal factors and attitudinal factors may serve as critical influences in the engagement of physical activity.

Stuifbergen and Becker (1994) showed that self-rated abilities to participate in exercise programs were influenced by the perceived personal ability and the expected successful outcomes of participation. Campbell and Jones (1994) suggest that participating in sport, whatever the competition level, causes a more positive sense of well-being and perception of health.

Individuals with disabilities with low self-efficacy appear to be those with increased difficulty of motor function, and lower financial, educational and social status (Stuifbergen, 1995). Studies have indicated an intimate social network may provide for higher outcome expectations and may reduce complaints of pain, hospital stays and re-visitations to the hospital. According to Wassem (1987) who examined 180 adults with chronic illnesses, individuals who had an increased self-efficacy required less medication and tolerated pain longer before asking for pain medications. Studies suggest that there is an interaction effect between attitudinal and demographic factors, knowledge of health practices, and action of engaging in health-promoting behaviours (Stuifbergen & Becker, 1994).

Personal Factors Influencing Physical Participation

Demographic and personal factors have been reported to influence physical activity among persons with spinal cord injuries (Stuifbergen & Becker, 1994). Factors explored include the diagnosis, severity of injury, age, weight, and social influence.

Diagnosis

The type of illness affects the manner in which an individual adjusts to the disability (Wassem, 1987). Understanding the nature of the disability is critical in influencing exercise behaviour (Godin, Colantonio, Davis, Shephard, & Simard, 1986). In addition, the time of injury and the progression of the illness may have implications in the coping methods used by the individual (Wheeler et al. 1996). Godin et al. (1986)

state the suddenness of the SCI injury may preclude this population formulating cognitive decisions to exercise. However, Frank and Elliott (1987) studied 53 spinal cord injured patients on their adjustment to their injury and found that adjustment is unrelated to time since injury.

Severity

Reduced functional ability may result from the spinal impairment intrinsic to the level of the injury or amount of self-care management of the condition (Wassem, 1987; Wheeler et al.,1996). The accumulation of extra weight has important implications for future health, as excess body fat is commonly associated with hypertension and atherosclerotic disease of the major blood vessels (Shephard, 1990). Coronary heart disease is a leading cause of death among persons with SCI (Kocina, 1997; Noreau & Shephard, 1995). Bauman et al. (1994) conducted cardiac stress testing on 20 participants with SCI and found 13 had evidence of ischemia. The low activity levels and decreased physical capacity have also been associated with secondary medical complications that may lead to an even more sedentary lifestyle (Hopman, 1994).

Pain is an important cause of disability and is a concern due to its high prevalence. Levi, Hultling, Nash, and Seiger (1995) reported that 64% of respondents indicated significant pain and 29% of individuals reported pain to be the primary problem. Ragnarsson (1997) states that reduced activity is associated with greater perception of pain, whereas increased physical activity is often related to fewer complaints.

Spinal cord injured persons are also at high risk for developing pressure sores (Basta, 1994). Depressed persons, individuals experiencing secondary factors (i.e., advanced age, poor nutrition, obesity, decreased mobility), and those prone to self-neglect may develop pressure ulcers due to lack of follow through on self care needs (Yarkony, 1994; Gosnell, 1988). However, awareness and/or availability of informational, emotional, and material support may decrease the effects of the severity of one's injury.

Age

Indivduals who have experienced a spinal cord injury are at elevated risk of lifestyle problems as they age. A number of studies have examined the incidence of CVD in SCI patients (Bauman et al., 1994; Bauman et al., 1993; DeVivo et al., 1993; Brenes et al., 1986). Results suggest that individuals with SCI appear to be at greater risk as age increases. Walker et al. (1993) states that the literature does not agree on the long-term survival of people with a spinal cord injury.

Weight

McColl and Skinner (1992) contend the difficulty of weight control for aging adults with SCI underscores the importance for physical activity. People are considered medically obese if they are 20 percent or more above their "ideal" weight as stated on standard weight/height tables. More accurately, obesity is measured by the body mass index (BMI) which is the weight in kilograms divided by the height in metres squared ("Anything New in the Obesity Battle," 1988). A BMI of 19 to 26 is within healthy limits, but BMIs over 27 begin to threaten health ("Anything New in the Obesity Battle").

McColl and Skinner (1992) reported in their study of 78 individuals with SCI using the LCHRA assessment tool that the average BMI for the sample was 23.52 (± 5.33), with a range from 15.97 to 41.37. Twenty-two percent (17) felt they were underweight, while 31% (24) felt they were overweight. Excess body fat may increase risks of heart disease and may also predispose individuals with SCI to pressure sores (Kocina, 1997) and in a hot environment, additional layers of body fat impede the elimination of body heat (Shephard, 1990).

Social Influence

The Health Promotion Survey on coping and caring in Canada showed that among people with long-term activity limitations, more than 3 out of 4 (79%) described the support of family and friends as crucial (Statistics Canada, 1990). Support groups may increase socialization and provide emotional support to individuals with acquired physical disabilities. However, social support is only effective when the type of social support given matches the type of support needed (Sarason et al. 1990).

McColl and Skinner (1992) studied potential risks associated with disabilities in 78 individuals from Lyndhurst Hospital from 1990 to 1991. They found 41% of respondents felt that they seldom had support or informational feedback on how they were handling their problems. In addition, 28% felt they required someone with whom to share private worries and concerns. Spinal cord injury is a significant stressor on the entire family. For most people, members of their nuclear and extended families are key sources of support (Rintala, Young, Spencer & Bates, 1996).

Frank and Elliott (1987) investigated life stress and psychologic adjustment following SCI on 53 male and female participants. They reported that individuals in the high life stress group indicated that injury, change in recreation, change in financial status, change in sleeping and eating patterns affected their well-being.

It appears that not all aspects of social relationships are positive and satisfying

(Rintala et al., 1996; Elliott, Herrick, Pattl, Witt, Godshall & Spruell, 1991). Receiving support may place the individual with SCI at a disadvantage or may reduce the recipient's self-esteem (Rintala et al., 1996). As well, the family members may be taxed emotionally with the increased responsibilty of caring for the injured member (Frank & Elliott, 1987). Tate et al. (1994) conducted a study on predicting depression and psychological distress on 163 participants with SCI. The findings suggest that social support and beliefs of control over one's life are significant predictors of adjustment post-SCI.

Zoerink (1992) explored whether differences existed in sport socialization settings between 61 male and female athletes with congenital orthopaedic disabilities and those with acquired orthopaedic disabilities. The data collected show athletes with acquired disabilities selected themselves (24%), current athletes with disabilities (17%), therapeutic recreation specialists (15%), and physical therapists (11%) as persons most influential in their involvement.

Summary of Influences on Exercise Participation

The personal factors of age, weight, lesion level which includes severity of disability, time of injury and social influence impact on the perception of the disability and subsequent health-promoting behaviours. Adjustment appears to be related to the perspective of one's status in the social network, and view of one's self and one's abilities (Koehler, 1989).

Physical Benefits of Active Living

During World War II the first specialized rehabilitation centre for the treatment of patients with SCI was established in Canada by the Department of Veterans Affairs.

Lyndhurst Centre recognized the importance of exercise in its interdisciplinary approach to patient care and has introduced the use of functional electrical stimulation for restoring gait in persons with SCI, acupuncture in the management of pain, and is developing a fitness protocol for use in the early rehabilitation of quadriplegics (Lyndhurst Spinal Cord Centre, 1993).

The increasing awareness of the need for physical activity which began in the 1940's, emphasizes the strong link between exercise and health status. It is understood that physical activity is a great coping mechanism for the demands and challenges of everyday life. Moreover, the amount of physical activity can significantly affect the prospect of illness, disease and even longevity (Wankel, 1994). The evidence is clear that a sedentary lifestyle places individuals of all abilities at higher risk of complications and early death (Heart and Stroke Foundation of Ontario, 1998); whereas, an active lifestyle leads to well documented health benefits (Davis & Shephard, 1990; Francis, 1996; Gass & Camp, 1984; Gass & Camp, 1987; Hooker, Greenwood, Hatae, Husson, Matthiesen, & Waters, 1993;).

The long-term health benefits of physical activity are especially important for people with chronic SCI who are wheelchair-dependent. Exercising programs are of direct benefit in reducing the extent of secondary complications in people with spinal cord injuries (Noreau & Shephard, 1995).

Health Promotion Model

Although there appears to be a growing collection of epidemiological, clinical, and laboratory studies on a wide range of topics in the field of spinal cord research, the literature on health promoting behaviours of individuals with SCI and the analysis of attitudinal variables in explaining physical activity appears to be limited (Stuifbergen & Becker, 1994). Understanding the influences that regulate health promoting-behaviour is critical for the development of effective interventions that health professionals can use to improve the risk profile that exists with people with spinal paralysis (Pender, 1996).

Much of the early research of explaining why and under what conditions people will take preventive actions was done within the framework of the health belief model (HBM) (Nemcek, 1990). The HBM is widely used in research and traditionally, the focus has been on the perceptions of individuals contracting illness and disease. Hallal (1982) describes several conditions that are important to this model. First there must be a perceived vulnerability to the disease which results in readiness for action. Second, the disease must have serious consequences (perceived severity) prompting an attitude change that may be effective in reducing the threat. The critical issue is what the individual expects and believes. Both the HBM and the HPM explore intentions to exercise at the level of individual decision-making and both models share the concept of expectations about outcomes and anticipated benefits of action (Godin & Shephard, 1990). However, since the HBM is concerned with perceptions of disease (Godin & Shephard, 1990) the multidimensional nature of the HPM which integrates the social cognitive theory within an individualized perspective toward self-care (Becker & Schaller, 1995) may be more appropriate for the study of physical activity among people with SCI. An adaptation of the HPM to depict the proposed predictions on physical activity among individuals with SCI appears in Figure 1.

Within Pender's (1996) model, the general background factors proposed as influencing physical activity include prior related behaviour and personal factors. In this study of predictors of physical activity among individuals with SCI particular emphasis has been placed on the personal biological factors of lesion level and weight. These personal factors are proposed as having direct and indirect effects on physical activity. Although the level of physical fitness is a positive factor in the psychosocial and biological characteristics of disabled individuals (Noreau & Shephard, 1992) the highest ranked barrier among this population is the physical inability to participate. Conditions of personal or situational stress can affect the quality of decision-making performances. Therefore, coping needs to be examined to gauge the effectiveness of methods individuals with SCI use to deal with the severity of personal losses and resources.

Some individuals use a number of coping strategies while others use only a few when confronted with stress and tension. In the adapted HPM, coping has been positioned as having direct and indirect influences on physical activity. Wheeler et al. (1996) examined personal styles and ways of coping in wheelchair users and found that patients with spinal paralysis have a cautious and traditional way of dealing with problems and stressors. Due to the impact of their impairment emphasis may be placed on other ways of adjusting to their disability such as returning to school (Stuifbergen & Becker, 1994) or returning to work (Noreau & Shephard, 1992). The role of re-entering the workforce as a coping strategy depends on the interactions between the physical requirement of the job and the disability (McDonough, Bradley & Tennant, 1995). Although this may be a purposeful step as a coping strategy the reality is that the majority of SCI is unemployed.

Previous experience is proposed as having both direct and indirect effects on the likelihood of engaging in health-promoting behaviours (Pender, 1996). In this study prior related experience will only be viewed as an influence on physical activity through the results of the physical self-efficacy, barriers to action and social support scales (see Figure 1).

The attitudinal factors of perceived barriers to action were found to predict exercise for adults with disabilities (Becker, Stuibergen, Ingalsbe & Sands, 1989). When self perceived barriers to health promotion were investigated among 135 adults with disabilities, barriers were significant predictors for lifestyle, self-actualization, and stress management. Also, the barrier variable was only marginally significant as a predictor for exercise. However, respondents indicated that "keeping active" would improve or maintain their health. The plan to engage in physical activity often is based on the anticipated benefits of the action (Pender, 1996). For example, extrinsic benefits of physical activity may include positive emotional effects from social interactions with other participants. Interpersonal skills such as social support may play a critical role in health-promoting behaviours among people with spinal cord injuries. Sarason, Sarason, and Pierce (1990) indicated strong association between social support and sport-related cognitions such as self-confidence and satisfaction. However, McColl (1995) cited several investigations describing networks of people with disabilities as being smaller and less complex than those of able-bodied individuals.

The influences of social support on individuals' feelings of confidence when sport skills are displayed in a group setting can play a significant role. Ryckman, Robbins, Thornton and Cantrell (1982) designed an instrument with two subscales to measure the perceived physical ability and confidence in the presentation of physical skills. These somewhat independent subscales measure overall physical self-efficacy. Becker and colleagues (1989) reported that global measures of self-efficacy were a significant predictor on a self-report measure of health-promoting behaviours for people with disabilities.

In light of the evidence given in the review of literature, it is clear that a study of the relevant individual characteristics and psycho social predictors of physical activity among persons with SCI would provide valuable information for health promotion in this population. The implication of studies on health promotion suggest that rehabilitative programs and services relating to physical activity be supplemented with nursing and other therapy interventions that focus on the individual, the development of physical self-efficacy, and enhancement of sense of self with the goal of motivating individuals to engage in health promoting behaviours.

Method

This chapter is divided into the following sections: a) sample selection b) treatment of data c) instrumentation and d) analyses employed in examining each hypothesis.

Sample Selection

Source

The sample population was selected from 3 groups: outpatients from St. Joseph's Care Group, Thunder Bay, Ontario; residents of Nova Scotia registered with the Canadian Paraplegic Association (CPA); and outpatients from the Queen Elizabeth Health Science Centre (QE2), Halifax, Nova Scotia.

Selection Criteria

In order to clearly define the population selected for study, certain criteria were established. It was agreed that all individuals should have received their spinal cord injury as the result of a traumatic injury. When the spinal cord is traumatized there is major neurological dysfunction that severely compromises the physiological and psychosocial response to exercise. The adjustment to exercise after a life changing event will yield perceptions that would be different than with a long-term chronic disability. Individuals with SCI were to be wheelchair dependent for at least one year. This time frame following the rehabilitation phase may permit a reasonable opportunity to begin the active process of reintegration into one's social network and community.

Selection Procedures

The majority of participants in the study came from two groups: outpatients of St. Joseph's Hospital and members of Canadian Paraplegic Association (CPA). A few additional participants came from Queen Elizabeth Health Science Centre (QE2). Due to confidentiality and privacy of the individual, outpatients of the two provincial hospitals were invited to join the study by either a phone call, mail-out, or personal contact by the staff within the facility. If interest was shown and the consent form was completed an information package was provided (see Appendix A). For members of CPA, a routine mail-out containing information requesting volunteers for the study was sent to approximately 700 persons in their registry of whom 90% have spinal cord injuries. Interested participants replied back with a signed consent form and within 2-3 weeks an information package including 5 questionnaires was mailed out. The completed questionnaires were in turn mailed back by the participants.

Response Rate

The data for this study were initially gathered from Thunder Bay in February 1998. Since there was a low return rate of 18% additional participants were sought by a mail-out to the membership of CPA. Five more participants resulted from contacting outpatients from QE2. Follow up by e-mail was successful in four cases.

As shown in Table 1 the overall response of mailed questionnaires was 36 out of 120 sent. Three of the returned packages were rejected due to missing data and a respondent who failed to meet the selection criteria. The total number of completed questionnaires received by mail, e-mail, and telephone was 33 (27.5%).

Table 1

Record of Data Collection and Response

	St. Joseph's	CPA	QE2
Mailed Questionnaire	55	63	2
Response	10	20 (-3)	2
e-mail/phone	0	1	3
Total response	10	18	5

Note: 3 questionnaires were rejected from the CPA due to incomplete information and improper classification.

The 27.5% response rate is within the expected average return of mailed surveys in research (Wassem, 1987). The length of the surveys may have had a detrimental effect on respondents successfully completing the request. The sample of 33 respondents used in this research is a very small representation of the SCI population as a whole, however the sample of 29 males (88%) and 4 females (12%), 14 paraplegics (40.6%) and 19 quadriplegics (59.4%) in this study is similar to the demographic breakdown found in the total spinal cord injured population (Rimmer, 1994).

Treatment of Data

The majority of the questionnaires consisted of closed-ended questions. Some minor additions of open-ended questions were employed for assembling a participant and activity profile. The majority of open-ended questions related to general information about the respondent, level of injury, and time since injury (see Appendix B). In addition two open-ended questions pertaining to activity patterns were asked. The first question ascertained the respondent's main physical activity prior to spinal injury and the second question obtained the number and type of activities (i.e work/school, household, self-care) which, when performed over 15 minutes in length, caused strain. All demographic-based questions, previous activity, lesion level, and time since injury responses were re-coded. Re-coding of the activities assisted in statistical treatment of data and allowed for general interpretations to be made.

The closed questions regarding perception of health risk factors and current state of health were re-coded to determine the degree to which respondents felt they were vulnerable to develop or experience health problems.

Instrumentation

All of the five instruments used have been tested frequently over the years for internal consistency, validity, and test re-test reliability. The instruments have been employed in both social/health science and sport science disciplines. The instruments utilized included: The Exercise Benefits/Barriers Scale (EBBS), the Physical Self-efficacy Scale (PSE), Personal Resource Questionnaire (PRQ-85 Part 2), Jalowiec Coping Scale (JCS), and the Leisure Time Exercise Questionnaire (LTEQ).

Exercise Benefits Barriers Scale

The EBBS was developed by Sechrist, Walker, and Pender (1987) to measure perceived benefits of and perceived barriers to exercise. When the 14-item barriers scale is used alone, scores range between 14 and 56 and do not need to be reverse scored. In this instance, the higher the score, the greater the perception of barriers to exercise (Appendix C).The Cronbach alpha was found to be .76 on the Barriers Scale. Table 2 provides information on the mean, standard deviation (SD), and internal consistency reliability for each scale used in the study.

Table 2

Reliability Levels for Questionnaires

Factors	N of cases	Test	Mean (SD)	N of items	R
Social Structure	32	PRQ	143.93 (18.42)	25	.9184
Perceived Physical Abilities	31	PPA	26.96 (5.36)	10	.7876
Physical Self-Presentation Confidence	28	PSPC	34.53 (5.04)	12	.7442
Barrier Subscale	26	EBBS	28.30 (5.08)	14	.7644
Coping (problem)	23	JCS	42.26 (7.16)	15	.7683
Coping (affective)	23	JCS	51.09 (9.98)	25	.7723

Physical Self-Efficacy Scale

The PSE was developed by Ryckman, Robbins, Thornton, and Cantrell (1982). The PSE scale is a 22-item Likert summated rating scale consisting of a 10-item perceived physical ability (PPA) subscale and a 12-item physical self presentation confidence subscale (PSPC). The PPA component assesses individuals' perceptions of their physical abilities (e.g., strength, endurance, agility), while the PSPC component reflects their confidence in the presentation of their physical skills in the presence of others. When the instrument is used with both subscales the format will yield an overall PSE score. Higher scores on the PSE reflect a stronger sense of physical self-efficacy. One question in the PPA subscale was adapted to make it appear more situation specific to the audience. The question was "I can't run fast" which was altered to "I can't run/wheel fast" (Appendix D). A test of the Cronbach alpha coefficients yielded for the PPA .78 and .74 for the PSPC subscale (see Table 2).

Personal Resource Questionnaire

The PRQ-85 was developed by Brandt and Weinert (1987). The PRQ is a 25-item summated Likert scale ranging from 7 "strongly agree" to 1 "strongly disagree". The purpose of this instrument is to assess the social support in the individual's environment that contributes to health promotion. Higher scores indicate higher levels of perceived social support (Appendix E). A test of the alpha coefficient of the second part of the PRQ was .91 (see Table 2).

Jalowiec Coping Scale

The JCS was developed by Jalowiec (1979). The 1979 version used 40 coping strategies which were classified into two coping styles as either problem-oriented or affective-oriented. Respondents rated each coping behaviour on a 5-point scale with 1 "never" and 5 indicating "almost always". Mean scores for each coping style was obtained to compare the degree of use of the coping styles. Higher adjusted scores indicate greater use of a particular coping style (Appendix F). The Cronbach alpha coefficient yielded for problem-oriented style was .76, and for affective-oriented style was .77 (see Table 2).

Leisure Time Exercise Questionnaire

The LTEQ developed by Godin and Shephard (1985) is divided into four exercise variables: strenuous, moderate, mild, and sweat-inducing exercise. Participants were asked to report both the number of activities performed for 15 minutes each week and the number of times over a 7-day period they worked up a sweat. The leisure score

(LTEQ) was calculated by multiplying the times per week of self-reported exercise by the met value (3 Mets × mild, 5 Mets × moderate and 9 Mets × strenuous). The number of exercise behaviours were then summed to form the total score (Appendix G). To yield scores that were reflective of the sample the list of activities for each intensity level were adapted to fit the physical activity spectrum for individuals with both paraplegia and quadriplegia. To detect the perceptual differences in leisure time physical activity reporting, participants were asked to indicate important areas of physical activity that might cause strain including self-care, household chores, wheelchair transfers, and occupational activity.

The only instruments used with this population before were the PRQ-85 and Barriers Scale which had been conducted on individuals with both chronic and acquired disabilities. Alpha reliability coefficients for all measures except for PPA were equivalent based on the results of four earlier studies (Jalowiec, 1979; Sechrist et al.,1987; Weinert, 1987). Reliability coefficients for PPA subscale scores ranged from .79 to .85 (Ryckman et al.,1982; Ryckman, Robbins, Thornton, Gold, & Kuehnel, 1982).

Examination of Hypotheses

The hypotheses were examined using Pearson correlations to assess the relationships of coping strategies, weight, physical self-efficacy and subscales, social structure, and barriers to exercise to reported patterns of physical activity. Level of lesion and patterns of physical activity was examined by a t-test comparison. These interpersonal, personal and coping factors, as well as physical fitness indices and cognitions are reported to have direct and indirect effects on physical activity. To determine what indicators were representative of the concepts in the HPM, the above variables were put in a stepwise regression analysis to help explain or predict physical activity during leisure time. Significance was measured for all hypotheses at an alpha level of $p<.05$. Exploratory analyses were conducted using t-tests, correlations, and Chi square test to provide background information on the effects of respondent's attitudinal factors and characteristics relating to exercise behaviour.

Hypothesis 1

Hypothesis 1 stated that there would be a positive relationship between physical self-efficacy (PSE) and physical activity. The relationship between PSE with its subscales PPA and PSPC, sweat-inducing variable and LTEQ score were examined using Pearson correlations.

Hypothesis 2

Hypothesis 2 stated that there would be an inverse relationship between the personal factor of individual weight and physical activity. In addition, level of lesion would have a significant effect on participation in physical activity. In order to test hypothesis 2 the relationship between weight and total LTEQ score with its three intensity patterns was examined using correlations, whereas t-tests were conducted on mean differences in LTEQ scores for individuals with paraplegia and quadriplegia.

Exploratory analyses were run to measure the mean differences between LTEQ scores and perception of obesity and overweight as a risk factor. In order to determine whether weight gain had an effect on exercise behaviour two groups were created: concerned individuals always/sometimes at risk to become overweight or obese and others who rarely/never experience the condition. Additionally, analyses were conducted examining the mean differences between PSE and PRQ scores and perceived risk of experiencing or developing obesity and being overweight.

Hypothesis 3

Hypothesis 3 stated that an inverse relationship exists between perceived barriers to action and intensity of physical activity. To determine the relationship of perceived barriers to exercise among individuals with SCI and physical activity, correlations were conducted.

Exploratory analyses were also run to determine any differences due to level of lesion of individuals with SCI. Initially, correlations between physical self-efficacy with its subscales and perception of barriers were examined. T-tests were then run to observe the mean differences between LTEQ scores between quadriplegics and paraplegics and scores on the barriers scale.

In addition, to determine if mood disturbances were common among the study group, two groups were created: Individuals concerned of always/sometimes experiencing depression and rarely/never experiencing the condition. A t-test was conducted to measure the mean difference between LTEQ and three intensity patterns of behaviour and the perceptions of the re-coded groups.

Hypothesis 4

Hypothesis 4 stated that there would be a positive relationship between social support and physical activity. In order to test hypothesis four the relationships between LTEQ score and the three intensity patterns, self-rating of sweat-inducing exercise score and PRQ scores were examined using correlations.

Exploratory analyses were run to measure the mean differences between LTEQ score and the three intensity patterns, PSE, risk factors and self-reported living conditions. In order to determine whether reported living conditions had an effect on exercise behaviour two groups were created: individuals living on their own and living with a significant other.

Hypothesis 5

Hypothesis 5 stated that affective-oriented coping would be inversely related to intensity levels of physical activity. In order to test hypothesis 5 the relationships between LTEQ score, exercise intensity patterns, sweat-inducing exercise scores and affective-oriented coping style were examined using correlations.

Further exploratory analysis was conducted using correlations to compare the linear relationships between PSE and affective-oriented coping method and problem-oriented coping method.

Finally, in order to determine the main hypotheses, selected individual factors were then tested by conducting a stepwise multiple regression to measure the relationship and independence of the variables proposed to influence exercise behaviour.

Results and Discussion

The presentation of the research findings begins with a profile of the respondents. More specifically age, gender, time since injury, employment and living arrangements of the population were examined, as well as previous experience, perceived risk factors, and self-reported regular activities. Following the demographic information and discussion, the statistical results of the six hypotheses are presented.

Respondent Profile

Age and Gender

Of the 33 participants in the study 29 (88%) were male and 4 (12%) were female. This finding was in relative accordance with the gender breakdown in the general SCI population (Rimmer, 1994). Table 3 provides a breakdown of the time since injury for both individuals with paraplegia and quadriplegia.

Table 3

Cross Tabulation of Time Since Injury by Lesion Level

Lesion Level	n	Time Since Injury (years) 1-5	6-10	11-15	16-20	21-25	26-30	31-35
Paraplegia	14	1(7.1%)	4(28.6%)	4(28.6%)		1(7.1%)	4(28.6%)	
Quadriplegia	19*	3(17%)	2(11%)	3(17%)	6(33%)	2(11%)		2(11%)
Total	33							

* One individual with SCI did not indicate TSI

Forty six percent of the sample population have been wheelchair dependent from between 16 and 35 years. Their ages range from 19 to 60 with a mean of 40.5 years. The mean age for individuals with quadriplegia was 39.2 years and paraplegics slightly older at 42.4 years. The average age at which the sample population received their spinal injury was 24 years.

Employment and Living Arrangements

The respondents' employment status indicated that 12(36.4%) were not employed and 21(63.6%) were employed either part-time or full-time. Nine individuals (27.3%) lived alone and 24 (72.7%) individuals lived either with a spouse or partner or family/friends.

In examining the activity counts in Table 4 the majority of both groups were active in multiple recreation and sports of all types and levels before injury. Twenty seven respondents (81.8%) indicated they were involved in physical activity prior to their spinal injury with one individual with paraplegia indicating no physical activity and five respondents with quadriplegia leaving the question unanswered.

Table 4

Number of Different Activities Pursued by Individuals Before Spinal Cord Injury

	Number of Different Activities Selected		
Activity Type	n=27	Paraplegics (n=13)	Quadriplegics (n=14)
General team sport		14	18
Work		1	2
Relaxation		1	0
Outdoor Activities		8	2
General Sports		5	7
Weightlifting		1	1

Table 5 shows the perceived health risk factors of individuals with paraplegia and quadriplegia. It appears that individuals with high lesions feel they are at risk to develop or experience specific risk factors and secondary problems associated with wheelchair dependence. Persons with quadriplegia are vulnerable to medical complications, particularly due to increased body fat and inactivity. Other conditions expressed were lack of strength, stiffness and soreness, and arthritis which may be associated with reduced exercise tolerance. Also, the prevalence of skin breakdown (i.e. pressure sores) and chronic conditions of pain suggest that this population experiences undesirable health risks.

Table 5

Tabulation of Perception of Risk Factors by Level of Lesion

Cross tabulation of Risk Factors by Lesion and Perception of Vulnerability						
Risk Factors	Paraplegics			Quadriplegics		
	1	2	3	1	2	3
Depression		2	12		9	10
Obesity		1	12	3	6	10
High blood pressure		2	12	1	4	14
Heart attack		3	11	1	2	15
Bouts of anxiety		2	11		10	8
Skin breakdown		10	4		9	10
Osteoporosis	1	4	8	3	6	8
Inactivity	1	6	7	5	5	9
Arthritis	2	7	5	3	6	10
Stiffness and soreness	5	6	3	3	15	1
Lack of strength		4	9	5	10	4
Being overweight	1	4	9	4	6	9
Muscle pain	2	9	3	2	14	3

Note: 1=always/usually 2=sometimes 3=rarely/never

In addition, in a response to a direct question rating their current health status, twenty (66.7%) indicated their health was good or excellent and 10 (33.3%) stated health was average. It appears from the results in Table 5 rating of current health is overestimated.

Results for Table 6 reveal that individuals with quadriplegia classified habitual activity such as, self-care, household chores and wheeling as stressful more often than individuals with paraplegia did. The difference between the two groups is reflective of the amount of effort and time required to complete tasks. For individuals with paraplegia some activities of daily living are incidental events that require little time and may not be perceived as a health-promoting behaviour.

Table 6

Number of Daily Types of Activities Involving Physical Strain

Type	Number of Activities Paraplegics (n=14)	 Quadriplegics (n=19)
Self care (dressing, showering, toilet use)	4	8
Household chores (cooking, vacuum, picking up things)	2	5
Making transfers	3	3
Wheeling (walking, driving chair)	7	13
Weight training (passive ROM, arm-ergometry, Regys)	7	8
Hobbies (woodworking, guitar, reading, Internet, T.V)	4	3
Social nights (cards, dancing, billiards, theatre)	1	5
Outdoor activities (hunting, snowmobiling, camping, fishing)	2	0
Shopping	0	1
Gardening	3	1
Indoor activities (swimming, basketball)	4	1
School	1	2
Work (including volunteer)	6	2
Competitive sports (basketball, rugby)	2	3

Hypotheses Testing

Effect of Physical Self-Efficacy and Subscales on Leisure Time Physical Activity

It was stated that there would be a positive relationship between physical self-efficacy and physical activity among individuals with SCI.

Table 7 illustrates the relationships of the scores of physical self-efficacy, perceived physical ability, physical self-presentation confidence and LTEQ measures. Ratings of perceived exercise intensities and PPA were moderately correlated with strenuous exercise and overall leisure score (r = .62 and r = .64, respectively) and with moderate exercise intensity (r = .54). Further observation showed a moderate negative relationship between PPA and self-reported sweat-inducing exercise (r = -.74). In this instance, ratings of perceived sweat-inducing exertion and PPA have a positive meaning because a low score represented individuals who "often" engaged in activities long enough to work up a sweat. Sweat-inducing exercise was unrelated to PSPC scores, however (r =-.31). Finally, mild intensity exercise was unrelated to both PPA (r =.22) and PSPC (r =.22) subscales.

Table 7

Correlations Between Patterns of Exercise Behaviour and PSE, PPA and PSPC

LTEQ Measures	PPA	PSPC	PSE
Mild	.218	.216	.244
Moderate	.543***	.193	.422*
Strenuous	.618***	.328	.538***
LTEQ	.639***	.330	.552***
Sweat	-.741***	-.305	-.595***

*$p<.05$ **$p<.01$ ***$p<.001$

Findings from the physical self-efficacy measure supported the hypothesis that perceived physical self-efficacy would have a positive relationship to leisure time physical activity. These results corroborate Greenwood et al's. (1990) work with wheelchair tennis participants and Stuifbergen and Becker's (1994) study of adults with a variety of disabling conditions.

The results show that participants who have higher PPA participate in moderate, strenuous and sweat-inducing exercise more frequently. The respondents demonstrated a significantly higher perceived physical ability relative to the PSPC scale which reflects confidence in the presentation of physical skills. Analysis of correlation results showed that PSPC scores were unrelated to exercise behaviour, a finding consistent with previous research (Ryckman et al.1982). This lack of relationship may be due to fewer opportunities and resources to exhibit skills at higher levels of involvement. Respondents with strong perceived physical skills may associate their physical capabilities with previous activities pursued before the spinal cord injury. Twenty-seven respondents out of 33 (81.8%) indicated they were involved in physical activity. This supports the findings of Ryckman et al. (1982) who suggest that people with strong perceived physical skills reported greater participation and involvement in sports.

Effect of Weight on Leisure Time Physical Activity and Physical Self Efficacy

This hypothesis stated that there would be an inverse relationship between weight and physical activity. To test this hypothesis correlations were run comparing weight and LTEQ scores and exercise behaviours. None of the correlations between participant's reported weight and their LTEQ score (r = -.16), and the three intensity levels (strenuous r = -.23), (moderate r = -.08) and (mild r = .04) were significant (see Table 8).

Table 8

Correlations Between Weight and LTEQ Scores and Exercise Behaviours

LTEQ Measures	n	Weight
Mild	32	.039
Moderate	32	-.082
Strenuous	32	-.232
LTEQ	32	-.163
Sweat	31	.138

To further investigate the issue of perception of weight and reported weight, BMI was calculated. Table 9 indicates the calculation of the Body Mass Index [BMI;(weight in kg.)/(height in m)^2], which shows respondents' weight at the time the questionnaire was completed. The average BMI for the sample was 25.2, with a range from 17.8 to 36.7. Although the average BMI was within the healthy limits (19-26), the low activity levels and reduced physical capacity of individuals with SCI suggest their health is already at risk. About half the sample were within an acceptable weight range (McColl & Skinner, 1992). Thirteen percent (n=4) were possibly overweight, while 37% (n=11) were definitely overweight.

Table 9

Tabulation of Body Mass Index for Respondents with SCI

Weight Profile	n	BMI	Percent (%)
Underweight	3	(< 20)	10
Acceptable weight	12	(20 - 24.9)	40
Possibly overweight	4	(25 - 26.9)	13
Definitely overweight	11	(>27)	37

Note. Total number of respondents = 30

T-tests were conducted to compare the means from reported exercise behaviour scores between those who felt vulnerable to weight change (i.e. overweight) and those who did not. There were no differences in exercise behaviours based on perceptions of vulnerability to weight change (see Appendix H). When the same comparisons were made between those who did and did not identify obesity as an issue no differences were seen in exercise behaviour (see Appendix H).

Further exploratory analyses using t-tests compared mean differences between PSE scores and those participants who sometimes/always experienced concerns for weight change and those who never/rarely had concerns about their weight. Findings revealed observable differences between individuals' PSE scores and not experiencing or developing obesity (t (29)= -.2.044, p <.05). However, no significant mean differences were seen between PSE scores and concerns about becoming over weight (t (30)= -1.580, p >.05) (see Appendix I). No differences were detected between overweight and obesity levels with PPA and PSPC scores. However, PPA scores were marginally related with the perception of never developing or experiencing obesity (t 29) = -1.907, p =.067). Although the relationship between current state of health and being over weight was not significant (X^2 (1, 30)= -1.781, p >.05), 50% of people who perceived themselves at risk still indicated their health as good to excellent (see Appendix J). Interestingly, among individuals with SCI there was a significant difference in the means between PRQ scores and overweight and obesity levels. Individuals who were never/rarely concerned about being over weight had higher PRQ scores (t (31)= -3.762, p <.01) and similarly with concerns of obesity (t (30)= -3.470, p <.01). (See Appendix K).

The influence of the level of lesion revealed significant differences in patterns of exercise behaviour between individuals with paraplegia and quadriplegia. An examination of the effects of lesion level on exercise showed, as expected, that individuals with paraplegia participated more frequently in strenuous exercise (t (31)= 2.206, p <.05) (see Table 10). Further exploratory analyses were conducted on lesion level and physical self-efficacy. A significant difference was also found between individuals with paraplegia and quadriplegia in perceived physical ability and skill (t (30)= 4.302, p <.001) and confidence in presentation of skills (t (30)= 3.716, p <.001). By contrast, perception of sweat-inducing exercise behaviour was marginally related to participants with quadriplegia (t (30)= -1.846, p =.075). With regard to exertion causing sweat, CNS disruption interferes with the ability of individuals with SCI to stimulate sweat glands which helps cool the body. On a practical note, this finding suggests that regular activity for some individuals is perceived to be long enough to work up a sweat. Objectively, due to diminished upper body musculature and a disrupted sympathetic nervous system local muscle fatigue may occur before the cardiovascular system is stressed and fitness is improved. No other comparisons in exercise patterns were significant.

Table 10

Mean Differences Between Paraplegics and Quadriplegics on Self Reports of Exercise Behaviour, Physical Self-Efficacy and Barriers.

Variables	n	Means Paraplegics	n	Quadriplegics	t
Mild	14	3.83	19	3.53	.293
Moderate	14	2.50	19	1.95	.626
Strenuous	14	3.51	19	1.71	2.206*
LTEQ	14	55.57	19	35.71	1.654
Sweat	14	1.86	18	2.33	-1.846
PSE	13	104.00	19	79.95	4.860***
PPA	13	45.69	19	32.58	4.302***
PSPC	13	58.31	19	47.37	3.716***
Barriers	14	26.00	19	30.74	-3.194**

*$p<.05$ **$p<.01$ ***$p<.001$

Individuals with SCI have been shown to be more prone to medical complications than the able-bodied population. In this study higher incidences/frequencies of perceived risk of depression, high blood pressure, bouts of anxiety, being over weight and obese were seen with individuals with quadriplegia. No mean difference was shown between self-reported exercise behaviours and overweight and obesity levels. This study found differences on specific items related to developing obesity, self-efficacy and social support. Specifically, participants higher in perceived self-efficacy attached less concern to the prospect of developing or experiencing obesity. Individuals higher in PPA may attach more importance to their "athletic body build" rating their skills higher to reflect their ability to maintain or manage their weight. Interestingly, the dimension of social influences may have had an importance in reducing the feelings of vulnerability and susceptibility to the risk of weight gain. The type of support system (peer group, natural support, organised support) and the degree a system predominates in one's life will have an effect on one's behaviour. Further studies could examine this finding. The majority of the participants (66.7%) rated their current state of health as good to excellent. Satisfying relationships with others may have been valuable in altering their perceived health status. However, due to the nature of self-reported questionnaires individuals may inaccurately distinguish between their perceived and true state of health. The sample population, specifically, individuals with quadriplegia may be redefining their personal concept of leisure time physical activity and put greater emphasis on the functional, adaptive and self-actualizing aspects of health (Becker, Stuifbergen, Ingalsbe, & Sands, 1989). Focussing on strengthening perceived physical self-efficacy should encourage greater effort when people are facing obstacles or conflict (Bandura, 1986).

It was indicated in this study that persons with paraplegia reported participating more frequently in strenuous exercise behaviours than individuals with quadriplegia. These findings are associated with significantly higher PPA scores for persons with lower lesion levels. Also, Bandura (1986) emphasized that successful performance is very important for high self-efficacy. For individuals with a higher lesion level, the tendency to have positive perceptions of their physical skills may be partly due to how they view themselves and their abilities during their leisure time (Koehler, 1989).

Individuals may be evaluating their physical ability relative to carrying out activities of daily living involving physical strain (see Table 6). The results suggest that participating in sweat-inducing physical activity, whatever the intensity level, causes the individual to perceive growth, mastery and a sense of control. An interesting question, which this study cannot answer, is how individuals with a limited activity repertoire acquire a high physical efficacy. Have they learned control/competency/efficacy prior to spinal injury, or is it a decision-making process born out of having the freedom of choice that increases perceived competence?

Further, participation in regular routine activities with the use of locomotor devices, electrical aids and the internet may increase participants' motivation to overcome barriers and increase psychological well-being.

Effect of Barriers on Leisure Time Physical Activity

This hypothesis stated that an inverse relationship exists between perceived barriers to action and intensity of physical activity. To test this hypothesis relationships between LTEQ scores and self reported barrier scores were determined by Pearson correlations (see Table 11).

Table 11

Correlations Based on Self-Reports of Exercise Behaviour and Barrier Scores.

Exercise Categories	n	Barriers
Mild	33	-.359*
Moderate	33	-.168
Strenuous	33	-.388*
LTEQ	33	-.394*

*$p < .05$

As anticipated, there was a barrier-related decline in strenuous exercise (r = -.39), mild exercise (r = -.36) and overall LTEQ score (r = -.39). Although, the relationship between moderate exercise and barriers was inverse, the correlation was not significant (r= -.17). It is likely that those participants who perceived fewer barriers to exercise have an increased potential for experiencing positive leisure time physical activity, however the correlations are too weak to support this.

An examination of Table 12 for the PSE effect revealed, as expected, that participants high in perceived physical ability and having confidence in the presentation of physical skills attached less importance to barriers to exercise. This provides some support for Bandura's SCT (1986) that successfully executing specific behaviours is measured by the amount of self-reported confidence within the person.

Table 12

Correlations Between PSE Subscales and Perception of Barriers

Subscale	n	Barriers
PPA	32	-.500**
PSPC	32	-.614***
PSE	33	-.623***

**p<.01 ***p<.001

T-tests were conducted to determine the extent of differences in the perception of barriers to exercise among paraplegics and quadriplegics. Table 10 shows that the higher the lesion the greater the impact of barriers to physical activity (t (31)= -3.194, p <.01).

A further t-test was conducted comparing mean differences between participant's barrier scores and two groups who always/sometimes experienced depression and participants who never/rarely felt they were depressed. Individuals who always/sometimes experienced depression perceived more barriers to exercise (t (31)= 3.506, p <.01) (see Appendix L).

Findings indicated participants involved in strenuous and mild intensity levels during leisure time perceived fewer barriers. This corroborates the observations of Stuifbergen, Becker, Ingalsbe, and Sands (1990) who noted that the barriers scale was negatively related to measures of health status, perceived self-efficacy and exercise. Findings show that the moderate intensity pattern was not related to barriers to exercise. A possible explanation for the discrepancy may be the categorization of activities among the levels of intensity of the LTEQ measure which may not reflect adequately performance of light or moderate activity. Similar activities were listed for strenuous and moderate intensity pattern causing an overlapping of dimensions. Also, activities attached to the moderate intensity category may have been seen as required activities which may not be present across the different regions, age and socio-economic levels.

Participants high in PPA and PSPC attached less importance to perceived barriers to exercise. This finding is consistent with the work of Stuifbergen et al. (1990) on barriers to health promotion, and those of Becker et al. (1989) among persons with disabilities. Stuifbergen and colleagues described the scores on the barriers scale as being significantly correlated with five other attitudinal measures: including perceived health status, perceived self-efficacy, and likelihood of engaging in health-promoting behaviours. This kind of competence-oriented reinforcement could have a positive impact on participation of individuals with SCI.

Effect of Social Support on Leisure Time Physical Activity

Hypothesis 4 stated that there would be a positive relationship between social support and physical activity among individuals with paralysis. To test this hypothesis correlations were run examining LTEQ scores, exercise behaviours and PRQ scores. The correlation between total leisure score (r=.33) and PRQ was not significant (see Table 13).

Table 13

Correlations Between Social Support (PRQ) and LTEQ Scores

Exercise Categories	n	PRQ
Mild	33	.263
Moderate	33	.272
Strenuous	33	.269
LTEQ	33	.332
Sweat	32	-.294

Table 13 indicates the correlations between the three intensity levels of LTEQ and PRQ scores were not significant at $p<.05$. The leisure score (total of three intensity levels multiplied by corresponding MET value) was marginally correlated with PRQ which may suggest that routine activities like household chores may be seen in a social context as leisure time physical activity.

The comparisons of mean scores on the LTEQ and the three intensities of physical activity between people living alone and with significant others were not significant.

As shown in Table 14 there was an observable difference in the means between PSE and PSPC scores and reported living arrangements. In this result, the variable "living with other" would be expected to be significant with both living with a spouse/partner and family or friends. Further secondary analyses conducted on PRQ scores of persons with SCI revealed that participants who had high social support attached less importance to muscle pain ($t\,(31)= -2.047$, $p<.05$) and developing anxiety

(t (29)=.-2.232, p <.05) which may result in reduced secondary health care (see Appendix M).

Table 14

Mean Differences of Scores on Living Arrangements, LTEQ Measures and Physical Self-Efficacy

		Living Arrangements			
LTEQ Measures	N	On Your Own	N	Living with Other	t-value
Mild	9	3.22	24	3.82	-.517
Moderate	9	1.00	24	2.63	-1.727
Strenuous	9	1.44	24	2.86	-1.506
LTEQ	9	27.67	24	50.31	-1.703
PSE	8	77.00	24	93.96	-2.481*
PPA	8	31.88	24	39.92	-1.941
PSPC	8	45.13	24	54.04	-2.415*
PRQ	8	135.78	24	146.75	-1.583

*p<.05

The results do not support the hypothesis that participation in physical activity would be positively related to evidence of social support. Although one might expect support of family, spouse, friends/partner to make a difference, there were no significant differences in intensity patterns of leisure time based on the sample's living arrangements. It is suggested that participants who have high social support may still meet the physical demands of the situation without becoming immobilized by muscle pain (Wassem, 1987). Increased social structure may be linked to better control of acute and chronic pain. The question of the relationship between social structure and pain management has not been resolved. Availability of positive social influences may also be meaningful in regard to perceptions of weight for the spinal cord injured population, however there is no evidence for this conclusion in the present study.

Effect of Coping on Leisure Time Physical Activity

Hypothesis 5 stated that affective-oriented coping would be inversely related to intensity of physical activity among people with SCI. In order to test hypothesis 5 correlations were run examining LTEQ scores, exercise intensity patterns, sweat, and affective-oriented coping style scores (see Table 15).

Table 15

Correlations Between Coping Strategies, PSE, PRQ and LTEQ scores

Exercise Categories	n	Affective-oriented Coping Style	Problem-oriented Coping Style
Mild	31	.008	.207
Moderate	31	.047	.048
Strenuous	31	-.221	.080
LTEQ	31	-.121	.120
Sweat	30	-.080	-.089
PSE	30	-.422*	.212
PPA	30	-.329	.126
PSPC	30	-.428*	.258
PRQ	31	-.146	.386*

*$p<.05$

Table 15 indicates that affective coping and strenuous exercise, LTEQ, and sweat-inducing exercise were inversely related, but not significant at $p<.05$. There was an affective-oriented coping method decline in overall PSE and in PSPC ($r = -.43$ and ($r = -.42$), respectively). Use of an affective-oriented coping method and PPA were unrelated ($r = -.33$). The relationship between problem-oriented coping method and social structure (PRQ) did show a positive but weak correlation ($r = .39$, $p < .05$).

There was no apparent relationship between LTEQ scores and intensity patterns and use of affective-oriented coping style as had been expected. A possible explanation for this unanticipated outcome may be found in the basis for comparison of leisure time physical activity between quadriplegics and paraplegics. Large standard deviations suggest within-person variation. In addition, missing data could be a factor since ten people did not complete this questionnaire. Variation could have been caused by the survey addressing perceptions of performance on only mild, moderate and strenuous activity. Important areas of occupational activity and household chores may have produced MET values on the questionnaire for individuals with varying physical activity habits. Further research is necessary to evaluate this possibility. The findings of higher PSE and a declining use of affective-oriented coping style suggest that a coping behaviour of constructive problem-solving may predominate. The effect might then be that less time is spent on inappropriate coping behaviours that may ease the stress, without directly taking care of the problem (Jalowiec, 1979).

Predictors of Physical Activity with the Adapted Health Promotion Model

Stepwise multiple regression was used to test what predictors of the Adapted Health Promotion Model (Dubras, 2001) account for the greatest variance among exercise behaviour patterns in a sample of individuals with SCI. Overall, fourteen health risks, seven personal factors and five behaviour-specific cognitions were considered as possible predictors, based on the conceptual schema of Pender's HPM and the adaptations made by the author. The following variables were included: fourteen health risks (see Appendix B); weight, time since injury (TSI), height, age, employment, living arrangement, pre-injury exercise behaviour; and coping style, PPA, PSPC, barriers, and PRQ. These variables were used in four regression analyses to determine which factors provided a unique prediction for each of four activity levels: total activity (LTEQ), mild, moderate, and strenuous. The variables that best predict total activity (LTEQ) are represented in the following equation:

$$Y= -31.8+1.646X_1 - 1.369X_2 + 29.284X_3$$

where:

X_1 = PPA

X_2 = TSI and

X_3 = Stiffness and soreness

As shown in the F statistic presented in Table 16, the multiple correlation coefficient, (R=.74) for the above regression was significantly different from zero, with 55% of LTEQ being explained by the three predictors. Perceived physical ability was the strongest predictor explaining 35% of variability of the overall leisure score. The next important predictor was TSI which explained 11% of variation after PPA had been accounted for and stiffness and soreness explained 8% of variability of the equation.

Table 16

Stepwise Multiple Regression to Predict Total Leisure Score

Subscale	Variables	B	Std.Error	t	Sig	R^2	Partial R^2
LTEQ	Constant	-31.800	31.513	-1.009			
	PPA	1.646	.687	2.395	.028	.350	.350
	TSI	-1.369	.694	-1.973	.065	.463	.113
	Stiffness & Soreness	29.284	16.077	1.821	.086	.551	.088

$F(3, 17) = 6.94$, $p < .003$, standard error = 26.70

The variables which best predict strenuous activity are shown in the following equation:

$$Y=29.069 + .129X_1 - .161X_2 - .10X_3$$

where:

X_1 =PPA

X_2 =Height and

X_3 =Age

As shown in the F statistic presented in Table 17, the multiple correlation coefficient (R=.82) for the above regression was significantly different from zero, with 67% of strenuous physical activity being explained by the three predictors PPA, height and age. As was the case for LTEQ, PPA accounted for the greatest variability, or 38%. After accounting for variance of PPA the next important predictor was height explaining 15% of variability, with the added predictive accuracy of age explaining 14% of variability in the equation.

Table 17

Stepwise Multiple Regression to Predict Strenuous Exercise

Subscale	Variables	B	Std.Error	t	Sig	R^2	Partial R^2
Strenuous	Constant	29.069	8.909	3.263			
	PPA	.129	.038	3.405	.003	.384	.384
	Height	-.161	.045	-3.564	.002	.531	.147
	Age	-.09	.037	-2.702	.015	.672	.141

$F(3, 17) = 11.609$, $p < .000$, standard error = 1.54

The variables which best predict moderate physical activity are shown in the following equation:

$$Y = .940 - .167X_1 - .108X_2$$

where:

X_1 =TSI and

X_2 =PPA

As shown in the F statistic presented in Table 18, the multiple correlation coefficient (R=.69) for the above regression was significantly different from zero, with 48% of moderate physical activity being explained by the two predictors TSI and PPA. TSI was the strongest predictor explaining 34% of variability. The next important predictor was PPA explaining 13% of the variation after accounting for variance due to TSI.

Table 18

Stepwise Multiple Regression to Predict Moderate Exercise

Subscale	Variables	B	Std.Error	t	Sig	R^2	Partial R^2
Moderate	Constant	.940	2.347	.401			
	TSI	-.167	.054	-3.090	.006	.341	.341
	PPA	.108	.050	2.170	.044	.478	.137

$F(2, 18) = 8.229$, $p < .003$, standard error = 2.08

The variables which best predict mild physical activity are shown in the following equation:

$Y = .820 - .224X_1 - .132X_2$.

where:

X_1 = TSI and

X_2 = PSPC

As shown in the F statistic presented in Table 19, the multiple correlation coefficient (R=.71) for the above regression was significantly different from zero, with 51% of mild physical activity being explained by the two predictors TSI and PSPC. TSI was the strongest predictor explaining 36% of variability and after accounting for variance of TSI the addition of PSPC accounted for 15% of variation.

Table 19

Stepwise Multiple Regression to Predict Mild Exercise

Subscale	Variables	B	Std.Error	t	Sig	R^2	Partial R^2
Mild	Constant	.820	2.989	.274			
	TSI	-.224	.056	-3.990	.001	.360	.360
	PSPC	.132	.057	2.342	.031	.510	.150

$F(2, 18) = 9.357$, $p < .002$, standard error = 2.15

According to this investigation, behaviour-specific cognitions and affect, namely physical self-efficacy, is considered the primary influence on health-promoting behaviour, or physical activity. A total of 35% of the variance in the total leisure score was explained by PPA. The PPA subscale is the judgement of personal capabilities and those people who participated in physical activity perceived themselves as predominantly high in PPA. A total of 67% of the variance in the dependent variable of strenuous exercise was explained by one behaviour-specific cognition factor and two personal biological factors. As shown in Table 17, 38% of the variance was explained by PPA and an additional 28% of the variance was explained by personal factors of age and height. Thus adults with SCI were more likely to engage in strenuous exercise if they had higher physical abilities, smaller body size, and younger age. These results are supported by the work of Krause and Crewe (1991) who reported a downward trend in the overall activity index with increasing age of spinal cord injured.

Time since injury was the primary predictor of both moderate and mild exercise behaviour. The shorter the time since injury the greater the involvement in these two levels of physical activity. The relationship of age and TSI is interesting. More youthful respondents may have the physical capacity to be more active, however, it has been suggested by Krause and Crewe (1991) that TSI may be associated with an enhanced sense of wellness. As TSI increases, individuals with SCI may attach more importance to satisfaction with living arrangements (Krause & Crewe), employment pursuits, and less interest in participating in leisure time activity. In other words, as time goes on people adjust to a life that is less physically taxing but still pleasing.

The other variable related to PSE that deserves note is PSPC. It seems that having confidence in how one presents oneself physically and socially to others is important to those engaged in mild exercise. It could be argued that the views of others are particularly important here, and in order for a person to engage in more strenuous activity he or she must be more personally committed or believe in his or her own abilities (PPA). As shown in Table 19, the results of the regression equation indicate that 15% of the variance in mild exercise was the effect of PSPC. It is plausible that high PSPC scores are related to increased number of opportunities found in mild intensity exercise patterns and a sense of competence and accomplishment that exists with evaluation by significant others.

The Adapted Health Promotion Model

Results of the present study provide some support for the application of the adapted model of health promotion to explain physical activity patterns of people with SCI. A moderate relationship exists between participation in physical activity and perceived physical self efficacy. A clear but weaker relationship was also shown between perceived barriers to participation and involvement in mild, strenuous and overall physical activity. In addition, severity of impairment or comparison of activity by lesion level indicated that paraplegics were more involved in strenuous activity than quadriplegics. No relationships were found between level of social support or affective coping style and physical activity.

When using regression to devise the best predictive model for physical activity, a combination of perceived physical ability, physical self presentation confidence, time since injury, height, age and degree of soreness predicted between 48 and 67 percent of specific activity levels. Although these figures may seem low, compared to other investigations, often conducted with much larger sample sizes, where predicted values ranged from 5 to 26 percent, the results of this study appear to be more robust (Dzewaltowski, Noble & Shaw, 1990; Fishbein & Ajzen, 1975; O'Brien Cousins, 1998). As a consequence of this analysis, a revised model of health promotion is presented in Figure 2. The following equation illustrates the prediction of total leisure score using the model diagrammed:

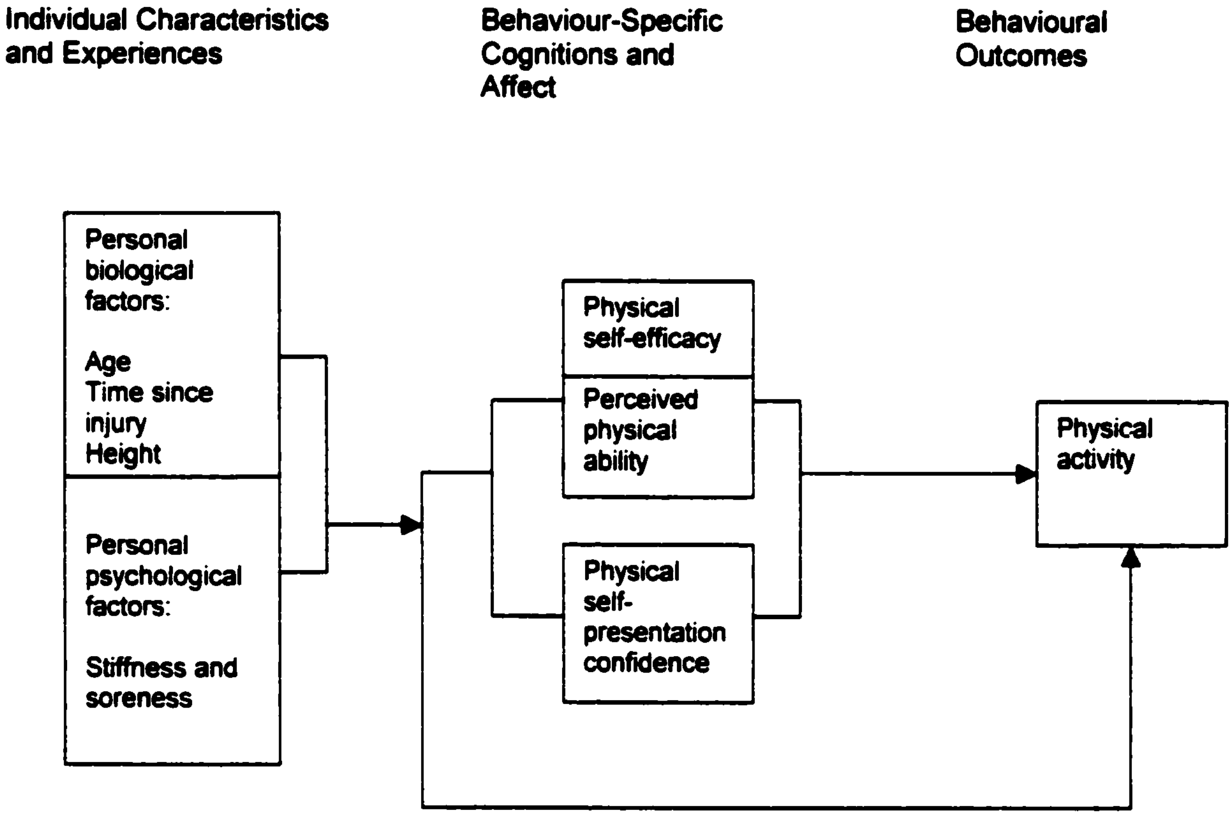
LTEQ = 31.8+1.646 PPA - 1.369 TSI+29.284 stiffness and soreness.

Even though predicting physical activity patterns from questionnaires is limited by the information which is reported and may not be as accurate as direct observation, it has been a useful method of inquiry in this study. Investigation of this sample, which could be described as relatively active and middle aged, has added to the literature on what motivates people with SCI to engage in physical activity.

Research has shown that sedentary living is a risk factor that may lead to further

Figure 2

Proposed Model for Predictors of Physical Activity for Individuals with SCI



secondary medical complications among persons with SCI. The findings of the present study suggest that these are a concern, however they did not play a role in the model in predicting physical activity. This particular sample is quite active and the surprising weak, inverse relationship between barriers and physical activity might be due to the lack of questions on architectural barriers and other physical barriers. Sixty-eight percent of the sample population have been wheelchair dependent over 10 years and their enhanced perception of health may be related to time since injury (satisfaction with activities of daily living, employment and living arrangements). The importance of perceived health status and attitudes toward developing or experiencing health risk conditions is that they may directly or indirectly influence committing to a plan of action (Pender, 1996) or actual involvement in exercise. In the revised HPM (Pender, 1996) personal factors have been categorized as biological, sociocultural and psychological. Personal psychological factors include perceived health status and definition of health. The findings suggest that as time since injury increases there is a decrease in participant activity at moderate and mild exercise levels. This trend of reduced physical activity as individuals increase in age is reflective of the nondisabled population. The model may be effective in suggesting education interventions throughout the recovery process both directly through exercise programs and indirectly by targeting the self-determination domain in such areas as, social work conducted therapy/self-talk classes and participatory/community research applications.

Although analysis of recent studies (Nieves, Charter, & Aspinall, 1991; Wheeler et al., 1996; Wineman, Durand, & Steiner, 1996) suggest that coping style should be added to the HPM and positioned to have direct and indirect effects on exercise behaviour, there is little evidence from this investigation of its use in predicting physical activity. Placing the above variable under the category of individual characteristics and experiences could mirror the complex nature of managing spinal cord trauma and the importance that individual experiences have in the determination of behaviour. To explore coping effectiveness at various life stages it would be interesting to use Jalowiec's 1987 version (60 items) which assesses the use and perceived effectiveness of eight different coping styles to create a coping style profile among individuals with spinal cord injuries.

An analysis of the studies reported indicates that perceived self-efficacy is a key psychologic determinant in predicting exercise (see Figure 2). Greenwood and colleagues (1990) suggested that self-efficacy can be viewed as a situation-specific self-confidence. Thus, it seems important to have a related measure that focusses on a specific or particular self-efficacy scale (Stuifbergen and Becker, 1994). In the HPM, PPA emerged as one of the more powerful variables in this study as it explained significantly more of the variance than other modifying variables. Physical self-efficacy was a significant predictor in 3 of the 4 categories of exercise. Although relatively large proportions of the variance (35% to 38%) in total leisure and strenuous exercise scores were explained by PPA, cognitive-perceptual factors appear to contribute far less to the explanation of the variance of moderate and mild exercise behaviour. Physical self presentation competence (PSPC) which has been found in previous research to be unrelated to activity was found to have small effects (15%) on mild exercise behaviour. The strength of the direct and indirect paths of Pender's Model would suggest that situation-specific interventions be focussed to enhance an individual's physical abilities and confidence in displaying them in the presence of others.

Summary/Conclusion

The purpose of this research was to examine the effect of selected individual characteristics and experiences and behaviour-specific cognitions in explaining the leisure time physical activity among participants with paraplegia and quadriplegia. The sample was collected from address lists provided by the St. Joseph's Hospital, Queen Elizabeth Health Science Centre, and the Canadian Paraplegic Association, Nova Scotia Branch. One hundred twenty spinal cord injured persons who resided in the provinces of Ontario and Nova Scotia were contacted by mailed questionnaires. The total response from the questionnaires sent resulted in a sample population of 33 persons, who had either quadriplegia (19) or paraplegia (14). There were 29 males and 4 females with a mean age of 40.5 years and a mean age of injury of 24 years.

The questionnaires were designed to address five hypotheses. Thus they obtained information on personal factors, social influences, perceived physical self-efficacy, barriers, coping strategies and assessed the influence these factors had on the respondent's leisure time physical activity. It was hypothesized that high physical self efficacy, few barriers to action and high social support would be positively related to involvement in physical activity, and conversely, that high lesion level (quadriplegia), overweight and use of an affective coping style would relate to low involvement in physical activity.

Results of the present study provide some support for applying the adapted model of health promotion to the physical activity patterns of people with SCI. Participation in moderate, strenuous, sweat inducing and total weekly activity was moderately correlated to high levels of both PPA and PSE. A clear but weaker relationship was also shown between perceived barriers to participation and involvement in mild, strenuous and total weekly physical activity. In addition, severity of impairment or comparison of activity level to lesion level indicated that paraplegics were more involved in strenuous activity than quadriplegics. No relationship was found between level of social support or affective coping style and physical activity.

The strongest predictors of physical activity were high PPA and short time since injury. Sixty-seven percent of the variance in participation in strenuous activity was accounted for by PPA (38%), height (15%), and age (14%). Fifty-four percent of the variance in total weekly activity (LTEQ) was explained by PPA (35%), TSI (11%) and stiffness and soreness (8%). Participation in moderate activity was explained by TSI (34%) and PPA (14%). Fifty-one percent of the variance in mild activity was explained by TSI (36%) and PSPC (15%). The revised model of health promotion which was presented suggests that those people with SCI who adopt an active approach to health promotion are young, recently injured and have a high PPA.

The strength of perceived physical abilities and time since injury have important implications for researchers, families of individuals with SCI, and persons with SCI themselves. Krause and Crewe (1991) reported that activity among individuals with SCI dropped in a steady decline to a low among persons in the oldest cohort. Since physical ability is a significant determinant to self-reports of exercise behaviour patterns a more situation-specific learning environment at the rehabilitative setting must be established. Also, both hospital staff in collaboration with families, community groups, agencies, and businesses must develop a partnership to provide services and opportunities with the goal of empowerment. Finally, more research on the decision-making process needs to be undertaken to better understand the determinants in adopting a given behaviour and the external variables that may also influence individuals to exercise.

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Appendices

Appendix A:

Consent Form

L A K E H E A D U N I V E R S I T Y
955 Oliver Road, Thunder Bay, Ontario, Canada P7B 5E1
School of Kinesiology
Telephone (807) 343-8544
Fax (807) 343-8944

DO NOT DISCARD BEFORE READING

Dear Sir/Madam:

I am a graduate student and had lived in Northwestern Ontario for the past ten years. During these years I have enjoyed many memorable moments at the Lakehead. During those cold winter months in Thunder Bay I founded and operated a ski program for people with disabilities. This program provided a volunteer resource service to people of all ages and abilities. However, the one puzzling thing was the lack of participation of individuals with spinal cord injuries. This is the main reason why I am very interested in identifying the factors that may influence participation in physical activity.

The purpose of this study is to provide information concerning the individual characteristics and attitudes of individuals who are wheelchair users. The information gained from this study may provide important views on social support, physical activity and rehabilitation. This data, at present is unavailable from any sources.

In order to assess your perceptions, you will be asked to complete 5 questionnaires that will take approximately 50 minutes of your time.

Questions include, but are not limited to the following: exercise benefits and barriers, social support as well as type of physical activities and coping strategies. An envelope with return postage will be included with the package of questionnaires.

PLEASE MAIL YOUR SIGNED CONSENT TODAY. In approximately 2 weeks following the receipt of your consent, the questionnaires will be mailed to you. All answers are accepted and are completely anonymous. No individual will be identified in any report of the results.

CONSENT FORM

My signature on this sheet indicates I agree to participate in a study by Paul Dubras, on **PREDICTORS OF PHYSICAL ACTIVITY AMONG INDIVIDUALS WITH SPINAL CORD INJURIES** and it also indicates that I understand the following:

1. I am a volunteer and can withdraw at any time from the study.
2. There is no risk of physical or psychological harm and I can choose not to answer all the questions.
3. The data I provide will be confidential.
4. I will receive a summary of the project, upon request, following the completion of the project.

I have read the explanation about the nature of the study and hereby consent to take part in this project.

____

Signature of Participant **Date**

Appendix B:

Participant Profile

PARTICIPANT PROFILE

1) Age (in years) ________

2) Are you? Male Female

3) Weight (kg) or (lbs)______

4) Height (cm) or (inches)______

5) Do you live...

O On your own? O With a spouse or partner O With family or friends

6) Are you currently employed?

O No O Yes (part-time) O Yes (full-time)

7) Previous physical activity/exercise before injury? O Yes O No If Yes, indicate main activity____

8) What level of lesion and completeness of spinal cord lesion are you? ____________________

9) How long have you been a wheelchair user? ________________

10) Below are a list of perceived health risk factors. Please indicate the degree to which you feel that you are at risk to develop or experience the following conditions. Please circle AU for always/usually, S for sometimes and RN for rarely/never.

A. Depression	AU S RN	H. Inactivity	AU S RN
B. Obesity	AU S RN	I. Arthritis	AU S RN
C. High blood pressure	AU S RN	J. Stiffness and soreness	AU S RN
D. Heart Attack	AU S RN	K. Lack of strength	AU S RN
E. Bouts of anxiety	AU S RN	L. Being overweight	AU S RN
F. Skin breakdown	AU S RN	M. Muscle pain	AU S RN
G. Osteoporosis	AU S RN		

11) In general, how would you describe your current state of health?

O Excellent O Poor
O Good O Very poor

Appendix C:

Exercise Benefits Barriers Scale

O Average

EXERCISE BARRIERS AND BENEFITS SCALE

Directions: Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by circling SA for strongly agree, A for agree, D for disagree and SD for strongly disagree.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. I enjoy exercise	SA	A	D	SD
2. Exercise decreases feelings of stress and tension for me	SA	A	D	SD
3. Exercise improves my mental health	SA	A	D	SD
4. Exercising takes too much of my time	SA	A	D	SD
5. I will prevent heart attacks by exercising	SA	A	D	SD
6. Exercise tires me	SA	A	D	SD
7. Exercise increases my muscle strength	SA	A	D	SD
8. Exercise gives me a sense of personal accomplishment	SA	A	D	SD
9. Places for me to exercise are too far away	SA	A	D	SD
10. Exercising makes me feel relaxed	SA	A	D	SD
11. Exercising lets me have contact with friends and persons I enjoy	SA	A	D	SD
12. I am too embarrassed to exercise	SA	A	D	SD
13. Exercising will keep me from having high blood pressure	SA	A	D	SD
14. It costs too much money to exercise	SA	A	D	SD
15. Exercising increases my level of physical fitness	SA	A	D	SD
16. Exercise facilities do not have convenient schedules for me	SA	A	D	SD
17. My muscle tone is improved with exercise	SA	A	D	SD

	Strongly Agree	Agree	Disagree	Strongly Disagree
18. Exercising improves functioning of my cardiovascular system	SA	A	D	SD
19. I am fatigued by exercise	SA	A	D	SD
20. I have improved feelings of well being from exercise	SA	A	D	SD
21. My spouse (or significant other) does not encourage exercising	SA	A	D	SD
22. Exercise increases my stamina	SA	A	D	SD
23. Exercise improves my flexibility	SA	A	D	SD
24. Exercise takes too much time from family relationships	SA	A	D	SD
25. My disposition is improved by exercise	SA	A	D	SD
26. Exercising helps me sleep better at night	SA	A	D	SD
27. I will live longer if I exercise	SA	A	D	SD
28. I think people in exercise clothes look funny	SA	A	D	SD
29. Exercise helps me decrease fatigue	SA	A	D	SD
30. Exercising is a good way for me to meet new people	SA	A	D	SD
31. My physical endurance is improved by exercising	SA	A	D	SD
32. Exercising improves my self-concept	SA	A	D	SD
33. My family members do not encourage me to exercise	SA	A	D	SD
34. Exercising increases my mental alertness	SA	A	D	SD
35. Exercise allows me to carry out normal activities without becoming tired	SA	A	D	SD
36. Exercise improves the quality of my work	SA	A	D	SD

	Strongly Agree	Agree	Disagree	Strongly Disagree
37. Exercise takes too much time from my family responsibilities	SA	A	D	SD
38. Exercise is good entertainment for me	SA	A	D	SD
39. Exercising increases my acceptance by others	SA	A	D	SD
40. Exercise is hard work for me	SA	A	D	SD
41. Exercise improves overall body fuctioning for me	SA	A	D	SD
42. There are too few places for me to exercise	SA	A	D	SD
43. Exercise improves the way my body looks	SA	A	D	SD

Appendix D:

Physical Self-efficacy Scale

PHYSICAL SELF-EFFICACY SCALE

Individuals adjust in many ways to the experience of acquiring a physical disability. I am interested in finding out about your perceptions of your ACTIVE LIFE. Please affirm your evaluations by picking one number for each item.

	Agree Strongly	Agree Somewhat	Agree Slightly	Disagree Slightly	Disagree Somewhat	Disagree Strongly
1. I have excellent reflexes	AS	AS	AS	DA	DS	DS
2. I am not agile and graceful	AS	AS	AS	DA	DS	DS
3. I am rarely embarrassed by my voice	AS	AS	AS	DA	DS	DS
4. My physique is rather strong	AS	AS	AS	DA	DS	DS
5. Sometimes I don't hold up well under stress	AS	AS	AS	DA	DS	DS
6. I can't run/wheel fast	AS	AS	AS	DA	DS	DS
7. I have physical defects that sometimes bother me	AS	AS	AS	DA	DS	DS
8. I don't feel in control when I take tests involving physical dexterity	AS	AS	AS	DA	DS	DS
9. I am never intimidated by the thought of a sexual encounter	AS	AS	SA	DA	DS	DS
10. People think negative things about me because of my posture	AS	AS	AS	DA	DS	DS
11. I am not hesitant about disagreeing with people bigger than me	AS	AS	AS	DA	DS	DS

	Agree Strongly	Agree Somewhat	Agree Slightly	Disagree Slightly	Disagree Somewhat	Disagree Strongly
12. I have poor muscle tone	AS	AS	AS	DA	DS	DS
13. I take little pride in my ability in sports	AS	AS	AS	DA	DS	DS
14. Athletic people usually do not receive more attention than me	AS	AS	AS	DA	DS	DS
15. I am sometimes envious of those better looking than myself	AS	AS	AS	DA	DS	DS
16. Sometimes my laugh embarrasses me	AS	AS	AS	DA	DS	DS
17. I am not concerned with the impression my physique makes on others	AS	AS	AS	DA	DS	DS
18. Sometimes I feel uncomfortable shaking hands because my hands are clammy	AS	AS	AS	DA	DS	DS
19. My speed has helped me out of some tight spots	AS	AS	AS	DA	DS	DS
20. I find that I am not accident prone	AS	AS	AS	DA	DS	DS
21. I have a strong grip	AS	AS	AS	DA	DS	DS
22. Because of my ability, I have been able to do things which many others could not do	AS	AS	AS	DA	DS	DS

Appendix E:

Personal Resource Questionnaire

PRQ - 85 PERSONAL RESOURCE QUESTIONNAIRE

I am interested in finding out to what extent you agree or disagree with the following perceptions on social support. Please read each item and circle the response most appropriate for you. There is no right or wrong answer. (7) Strongly Agree; (6) Agree; (5) Somewhat Agree; (4) Neutral; (3) Somewhat Disagree; (2) Disagree; (1) Strongly Disagree.

	SA	A	SA	N	SD	D	SD
1. There is someone I feel close to who makes me feel secure	7	6	5	4	3	2	1
2. I belong to a group in which I feel important	7	6	5	4	3	2	1
3. People let me know that I do well at my work (job, homemaking)	7	6	5	4	3	2	1
4. I can't count on my relatives and friends to help me with problems	7	6	5	4	3	2	1
5. I have enough contact with the person who makes me feel special	7	6	5	4	3	2	1
6. I spend time with others who have the same interests that I do	7	6	5	4	3	2	1
7. There is little opportunity in my life to be giving and caring to another person	7	6	5	4	3	2	1
8. Others let me know that they enjoy working with me (job, committees, projects)	7	6	5	4	3	2	1
9. There are people who are available if I need help over an extended period of time	7	6	5	4	3	2	1
10. There is no one to talk to about how I am feeling	7	6	5	4	3	2	1
11. Among my group of friends we do favours for each other	7	6	5	4	3	2	1
12. I have the opportunity to encourage others to develop their interests and skills	7	6	5	4	3	2	1
13. My family lets me know that I am important for keeping the family running	7	6	5	4	3	2	1
14. I have relatives or friends who will help me out even if I can't pay them back.	7	6	5	4	3	2	1

	SA	A	SA	N	SD	D	SD
15. When I am upset, there is someone I can be with who lets me be myself	7	6	5	4	3	2	1
16. I feel no one has the same problems as I	7	6	5	4	3	2	1
17. I enjoy doing little "extra" things that make another person's life more pleasant	7	6	5	4	3	2	1
18. I know that others appreciate me as a person	7	6	5	4	3	2	1
19. There is someone who loves and cares about me	7	6	5	4	3	2	1
20. I have people to share social events and fun activities with	7	6	5	4	3	2	1
21. I am responsible for helping provide for another person's needs	7	6	5	4	3	2	1
22. If I need advice there is someone who would assist me to work out a plan for dealing with the situation	7	6	5	4	3	2	1
23. I have a sense of being needed by another person	7	6	5	4	3	2	1
24. People think that I'm not as good a friend as I should be	7	6	5	4	3	2	1
25. If a got sick there is someone to give me advice about caring for myself	7	6	5	4	3	2	1

Appendix F:

Jalowiec Coping Scale

JALOWIEC COPING SCALE

People react in many ways to stress and tension. Some people use one way to handle stress; others use many coping methods. I am interested in finding out what things people do when faced with stressful situations. Please estimate how often you use the following ways to cope with stress by picking one number for each item.

Coping Method	Never	Occasionally	About half the time	Often	Almost always
1. Worry	1	2	3	4	5
2. Cry	1	2	3	4	5
3. Work off tension with physical activity or exercise	1	2	3	4	5
4. Hope that things will get better	1	2	3	4	5
5. Laugh it off, figuring that things could be worse	1	2	3	4	5
6. Think through different ways to solve the problem or handle the situation	1	2	3	4	5
7. Smoke cigarettes	1	2	3	4	5
8. Drink alcoholic beverages	1	2	3	4	5
9. Take drugs	1	2	3	4	5
10.Try to put the problem out of your mind and think of something else	1	2	3	4	5
11. Let someone else solve the problem or handle the situation	1	2	3	4	5
12. Daydream; fantasize	1	2	3	4	5
13. Do anything just to do something, even if you're not sure it will work	1	2	3	4	5

Coping Method	Never	Occasionally	About half the time	Often	Almost always
14. Talk the problem over with someone who has been in the same type of situation	1	2	3	4	5
15. Get prepared to expect the worse	1	2	3	4	5
16.Get mad; curse; swear	1	2	3	4	5
17.Accept the situation as it is	1	2	3	4	5
18. Try to look at the problem objectively and see all sides	1	2	3	4	5
19.Try to maintain some control over the situation	1	2	3	4	5
20. Try to find purpose or meaning in the situation	1	2	3	4	5
21. Pray; put your trust in God	1	2	3	4	5
22. Get nervous	1	2	3	4	5
23. Withdraw from the situation	1	2	3	4	5
24. Blame someone else for your problems or the situation you're in	1	2	3	4	5
25. Actively try to change the situation	1	2	3	4	5
26. Take out your tensions on someone else or something else	1	2	3	4	5
27. Take off by yourself; want to be alone	1	2	3	4	5
28. Resign yourself to the situation because things look hopeless	1	2	3	4	5
29. Do nothing in the hope that the situation will improve or that the problem will take care of itself	1	2	3	4	5

Coping Method	Never	Occasionally	About half the time	Often	Almost always
30. Seek comfort or help from family or friends	1	2	3	4	5
31. Meditate; use yoga, biofeedback, or "mind over matter"	1	2	3	4	5
32. Try to find out more about the situation so you can handle it better	1	2	3	4	5
33. Try out different ways of solving the problem to see which works the best	1	2	3	4	5
34. Resign yourself to the situation that it's your fate	1	2	3	4	5
35. Try to draw on past experiences to help you handle the situation	1	2	3	4	5
36. Try to break the problem down into "smaller pieces" so you can handle it better	1	2	3	4	5
37. Go to sleep, figuring things will look better in the morning	1	2	3	4	5
38. Set specific goals to help you solve the problem	1	2	3	4	5
39. "Don't worry about it, everything will probably work out fine"	1	2	3	4	5
40. Settled for the next best thing to what you really wanted	1	2	3	4	5

Appendix G:

Leisure Time Exercise Questionnaire

LEISURE TIME EXERCISE QUESTIONNAIRE

Considering a 7-day period (a week), how many times on the average do you do the following kinds of exercise/physical activity for more than 15 minutes during your free time (write in each circle the appropriate number)

a) **STRENUOUS ACTIVITY** **TIMES PER**
(BREATHLESSNESS)
WEEK
Circle item(s) that you engage in...
(i.e. wheeling, basketball, arm-cranking exercise, swimming, wheelchair ergometer, weight training) other__________________

b) **MODERATE ACTIVITY**
(RAPID BREATHING)
Circle item(s) that you engage in...
(i.e. wheeling, table tennis, tennis, easy swimming, dancing, alpine skiing, weight training) other__________________

c) **MILD ACTIVITY**
(LITTLE OR NO CHANGE IN BREATHING)
Circle item(s) that you engage in...
(i.e.wheeling for pleasure, playing cards, snooker, video games, gardening) other________________

2. Considering a 7 day period (a week), during your leisure-time, how often do you engage in any regular activity long enough to work up a sweat (heavy breathing)? Please circle the appropriate number.

OFTEN	SOMETIMES	NEVER/RARELY
1.	2.	3.

3. Please list the **daily types of activities** that you perform that are over 15 minutes in length that cause you strain.

Type (i.e. work/school, household chores, self-care duties)	# of Minutes/Day	# of Days/Week	# of Weeks/Year
____________	____	____	____
____________	____	____	____
____________	____	____	____
____________	____	____	____
____________	____	____	____
____________	____	____	____
____________	____	____	____
____________	____	____	____
____________	____	____	____

Appendix H

Comparison of LTEQ Measures and Perceived Risk for Obesity

Comparison of Mean LTEQ Measures and Perceived Risk for Obesity

		Risk To Develop or Experience Obesity		
LTEQ Measures	n	Always/Sometimes	n	Rarely/Never
Mild	10	2.80	22	4.08
Moderate	10	1.65	22	2.52
Strenuous	10	2.10	22	2.53
Sweat	10	2.30	21	2.05
Barriers	10	29.70	22	27.91
PSE	10	81.40	21	94.76*
PPA	10	33.00	21	40.52
PSPC	10	48.40	21	54.24
PRQ	10	130.50	22	150.86**

* $p<.05$ ** $p<.01$

Appendix I

Comparison of Mean PSE Scores and Perceived Risk for Overweight

Comparison of Mean PSE Scores and Perceived Risk for Overweight

LTEQ Measure	n	Risk of Experiencing Being Overweight Always/Sometimes	n	Rarely/Never
PSE	15	84.47	17	94.35

*p<.05

Appendix J:

Chi-square Comparison of Perceived

Current State of Health and Perceived Risk for Overweight

Chi-square Comparison of Perceived Current State of Health and Perceived Risk for Overweight

	Current State of Health		
Being Overweight	Good/Excellent	Average/Poor	Total
"Always/Sometimes"			
Count	7	7	14
Expected Count	9.3	4.7	14.0
% within Risk	50.0%	50.0%	100%
% within State of Health	35.0%	70.0%	46.7%
"Rarely/Never"			
Count	13	3	16
Expected Count	10.7	5.3	16.0
% within Risk	81.3%	18.8%	100%
% within State of Health	65.0%	30.0%	53.3%
Total			
Count	20	10	30
Expected Count	20.0	10.0	30.0
% within Risk	66.7%	33.3%	100.0%
% within State of Health	100.0%	100.0%	100.0%

Chi-square	Value	DF	Significance
Fisher's Exact Test			.122
Number of Valid Cases	30		

*Standardized statistic is -1.781

Appendix K:
Comparison of Mean PRQ Scores
and Perceptions of Feeling Overweight and Obese

Comparison on Mean of PRQ Scores and Perceptions of Feeling Overweight and Obese.

	Risk to Develop or Experience Being Overweight and Obese			
LTEQ Measure	n	Always/Sometimes	n	Rarely/Never
PRQ (Overweight)	15	132.80	18	152.89***
PRQ (Obesity)	10	130.50	22	150.86**

**p<.01 ***p<.001

Appendix L:

Comparison of Mean Barrier Scores

and Perceived Risk for Depression

Comparison of Mean Barriers Scores and Perceived Risk for Depression

		Risk to Develop or Experience Depression		
LTEQ Measure	n	Always/Sometimes	n	Rarely/Never
Barriers	11	32.27	22	26.95***

*** $p < .001$

Appendix M:

Comparison of Mean PRQ Scores

and Risk for Muscle Pain and Bouts of Anxiety

Comparison of Mean PRQ Scores and Perceived Risk for Muscle Pain

		Risk to Develop or Experience Muscle Pain		
LTEQ Measure	n	Always/Sometimes	n	Rarely/Never
PRQ	27	140.85	6	156.83*

*$p<.05$

Comparison of Mean of PRQ Scores and Perceived Risk for Bouts of Anxiety

		Risk to Develop or Experience Anxiety		
LTEQ Measure	n	Always/Sometimes	n	Rarely/Never
PRQ	12	135.92	19	150.00*

*$p<.05$