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School of Occupational Therapy

A Study of Males with Spinal Cord Injuries in Thailand

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ABSTRACT

The numbers of people with spinal cord injuries (SCI) in Thailand are increasing. Thai rehabilitation care focuses treatment on acute care with little attention to the lives of clients after discharge from institutions. To date, there has been no research on rehabilitation outcomes and factors relevant to these issues for people with SCI at home and in the community in Thailand.

The purpose of this study was to identify and compare the outcomes of functional status, depression, anxiety and stress, and health status of people with SCI, both at discharge and at three months post-discharge from hospital. One hundred twenty-one participants with SCI were recruited from ten major hospitals in Thailand. Data was collected at 48 hours pre-discharge and again at three months post-discharge using the Functional Independence Measure (FIM), the Depression, Anxiety, and Stress Scale (DASS), and the SF-36 Health Survey. The results demonstrated that mean scores of functional status at discharge were significantly higher than at three months post-discharge. Depression and anxiety scores at discharge were significantly lower than depression and anxiety scores at three months post-discharge. Stress score had not significantly changed from discharge to post-discharge. Health status scores at discharge were also higher than at three months post-discharge on eight subscales.

Factors relevant to or predicting functional status were marital status, attendant care, number of architectural barriers, fulfilled occupational therapy (OT) needs, and number of different services required but not received. Factors predicting depression, anxiety and stress were marital and economic status, age at onset, education level, duration of disability, fulfilled OT needs, number of different services received, and numbers of different service required but not received. Factors predicting health status were marital status, economic status, age at onset, education level, duration of disability, attendant care, number of architectural barriers, fulfilled OT needs, number of different services received, and number of different services required but not received. Some predictive factors are culture-specific,

but on others, rehabilitation professionals could ease the transition from hospital to home for people with SCI.

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DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

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CHAPTER1: BACKGROUND OF STUDY

1.1 Changing Patterns of Health and Disability

Health care in the modern world has changed, with a shift in predominance from treatment of acute medical problems to one of management of chronic disease (DeJong, 1987; Jackson, 1993). Individuals with chronic conditions who are admitted to hospitals are spending less time in acute care and are discharged earlier to their homes and community environments (Hall, Cohen, Wright, Call, & Werner, 1999). Such change is indicative of the ability of medical science to restore and prolong human life (Badley, 1993). This circumstance is also a result of political pressure to control spiralling health care costs in a highly competitive environment, thus creating a challenge for health professionals to focus on expedient patterns of services. Efficiency equates often with keeping the length of hospitalisation to a minimum, and discharging people from hospital as soon as possible (Clark, Steinberg, & Bischoff, 1997; Kautzmann, 1993). The combined effect of medical advancements and economic realities, then, has resulted in an increasing number of people with disabilities, who previously might not have even survived, leaving hospitals much sooner than before, to live in their community.

In the past, specialised medical units from specialised medical fields were the main providers of care to persons who had sustained a disabling injury such as a spinal cord injury (SCI). With increasingly successful intervention in the acute traumatic stage of the injury, life expectancy following SCI is approaching that of the general population in both developed and developing countries. As a result, health professionals, are experiencing greater responsibilities, and opportunities, to provide appropriate services. Following stabilisation and treatment in spinal cord units, people with SCI may be discharged to a rehabilitation unit, but more likely, they are discharged to the care of their family and community to provide for their future needs.

1.1.1 Issues of Function and Reintegration of People with Disability

Rehabilitation professionals assist people with disability to reintegrate into their homes and communities following discharge from acute care settings. Reintegration can be viewed as the ultimate goal for people who have acquired a permanent disability. Rehabilitation support involves assisting clients to re-organize physical, psychological, and social characteristics so that they can resume meaningful occupational roles following incapacitating illness or trauma (Wood-Dauphinee, Opzoomer, Williams, Marchand, & Spitzer, 1988). The role of rehabilitation practitioners is to support people with disability to resume living within the constraints of their disease or the aftermath of trauma. A comprehensive assessment of physical function, and psychosocial and vocational factors has become the norm (Dittmar & Gresham, 1997), with quality of life considered to be the aggregate of all functions.

Functional status, perceived health problems, and emotional status are important issues for rehabilitation team members involved with providing services to people with SCI.

Support by rehabilitation specialists involves attention to specific functions. For people with chronic disabilities of the severity of SCI, performing activities independently can be difficult. This influences their ability to resume meaningful occupational roles. A related construct relevant to medical rehabilitation is that of human performance, which is the ability to perform activities of everyday life (WHO, 1980). The most common set of indicators in rehabilitation are those that measure functional status in self-care routines such as feeding, dressing, toileting, transferring, and moving (Wood-Dauphinee et al., 1988). Collectively, these are frequently referred to as activities of daily living (ADL). One of the key interests shared by members of the rehabilitation team is, therefore, in the education, training, and support they are able to provide to people with disability to assist them to achieve maximum independence in ADL.

Whiteneck expanded the WHO classification of impairment, disability and handicap (1980) to include secondary impairment, secondary disability, and secondary handicap, all of which influence perceived health, perceived activity limitation, and perceived role limitation (Whiteneck, 1994). The American National Institute of Health recommended the measurement of people's perceptions of specific impairments and more global perceptions of perceived health as appropriate outcome measures in clinical trials (Furberg & Schuttinga, 1990). The matter of health status, then, appears to be an important issue for health professionals to consider for people with disability, including people with SCI.

Research further indicates that people with SCI and other chronic disabilities pass through several stages of anxiety, denial, and depression while adjusting to their disabilities (Elliott & Frank, 1996). At least one study postulated that 100% of people with SCI suffer from depression and anxiety (Kennedy & Rogers, 2000). Social isolation, depression, and anxiety, in addition to physical function, are also common experiences (Murphy, 1995). As a result, people with disability may have difficulties in adjusting to life with that disability, impairing potential for independent living (Becker, 1993).

Other factors relevant to achievement are environmental conditions; for example, access, space, and inappropriate height levels. Important considerations such as family and community attitudes also affect the lives of people with disability (DeJong & Hughes, 1982). Health professionals and consumer groups have joined together to draw attention to these potential barriers for both people with disability and their carers as they adjust to living with a disability (Clark et al., 1997).

1.2 Disability in Thailand

Many health practitioners in Thailand follow a medical model in developing interventions for people with disability. The medical model emphasises the physical components of disabling conditions, self-care skills and mobility while ignoring what may be more complex and meaningful psychosocial and occupational issues (Hammell, 1995). Thailand is a developing country influenced by technological advances from overseas, especially in the medical field. Currently, the health system puts more emphasis on using technologies to alleviate impairment than on rehabilitation. Medical doctors aim to save the life of the client with little attention to rehabilitation. Clients who need long-term care are routinely discharged from hospitals without referral to rehabilitation professionals. An added dimension is that medical and rehabilitation services are usually concentrated in large cities in institutional settings that are not readily accessible. Even when people are able to access rehabilitation services, families and community members have little involvement (Viboolpholprasert, Pradubmuk, Reawpaibool, & Rhujakom, 1997).

The disabilities as defined by the Ministry of Public Health of Thailand were visual impairment, hearing difficulty, physical and movement disabilities, and psychiatric and learning disorders (Viboonpholprasert, 1997). In 1986, 0.74% of the population of Thailand was classified as having a disability (Thailand, 1986) and this increased to 1.25% in 1991 (Thailand, 1991). A survey conducted by the Thai Public Health Foundation in 1992 found that 6.3% of the population had a disability (Institution, 1992). However, researchers considered that there were still many people with disabilities who were not included in this survey because they lived in distant rural areas and through lack of literacy and other social factors were unable to be identified (Pitakmahagate, 1994). It was estimated that of the total disabled population, 23% lived in the northern part of Thailand (Thailand, 1996). In addition, the majority of disabilities were paralysis and paresis of the limbs, including disabilities that occurred as a result of SCI (Thailand, 1996).

1.2.1 Spinal cord injury in Thailand

The incidence of SCI has increased in Thailand due in part to economic growth but also to social change (Pajareya, 2000). A five year retrospective study of people with SCI at Maharaj Nakorn Chiang Mai Hospital, the largest hospital in the northern part of Thailand, found that the number of people admitted with SCI dramatically increased, from 41 in 1977 to 62 in 1981, a 51% increase in only one hospital (Kovindha, 1985). People sustaining SCI were primarily young, between 15 and 29 years old. In Thailand, this cohort represents a large proportion of the labour force.

1.3 Aim of Study

Spinal cord injury is a traumatic life event, which has profound effects involving not only the physical domain, but also the social, emotional and spiritual domains (Somers, 1992). Advances in modern medicine have decreased the mortality associated with SCI, resulting in an increased number of people who survive and must learn to live with the consequences of their injury (Whiteneck, 1987). Medical management has shifted from an emphasis on survival to the more complex issue of health for persons with SCI (DeJong, Branch, & Corcoran, 1984). This shift parallels the development of rehabilitation services that focus on independent living, both in acute care settings and community environments. Currently, psychological considerations and health-related quality of life issues have become increasingly important in meeting the rehabilitation needs of people with SCI. Evidence also suggests that environmental factors are critical to the well being of people with disability in general, and persons with SCI in particular. These include timely assistance with home needs, appropriate housing, and accessible transportation (DeJong et al., 1984).

The present study examines the extent to which environmental factors, as well as individual factors, medical factors and functional limitations, affect the ability of persons with SCI to live independently. It also identifies which of these factors most strongly affect emotional status and which factors most strongly affect perceptions of health status following discharge from medical rehabilitation in Thailand. This is the first large, comprehensive study of Thailand that investigates variables affecting the lives of people with SCI at home and in their communities.

CHAPTER 2: LITERATURE REVIEW

2.1 Spinal Cord Injury (SCI)

Spinal Cord Injury (SCI) is a traumatic insult to the spinal cord that can result in alterations and disruptions of normal motor, sensory, and autonomic function (Staas, Formal, Freedman, Fried, & Schmidt Read, 1998). Injury to the spinal cord results in paralysis of the muscles of the limbs and the autonomic nervous system, usually manifested below the level of the lesion (Spencer, 1993). SCI is a complex, multi-system injury, which can affect virtually every body system. The effects can range from slight to profound, and from temporary to permanent (Pajareya, 2000)

Mechanisms of injury to the spinal cord are contusion, concussion, compression, laceration, and ischemia (Kovindha, 1990). A contusion or bruising of the cord can occur if a hard object (vertebra or disk) strikes the cord. This may result in small petechial haemorrhages and demyelination within cord tissue. A concussion may be caused if the cord is struck or stretched and electrochemical disruption occurs without any morphological changes in the cord. Compression occurs when fractured or dislocated bones, displaced ligaments, extruded disk materials, or haematomas produce pressure on the cord. Laceration of the cord can occur particularly with knife or gunshot injuries. Ischaemia occurs if blood flow to the cord is interrupted by compression or laceration (Kovindha, 1990).

2.1.1 The Aetiology of SCI

Damage to the spinal cord can result from either traumatic or non-traumatic causes (Parsons & Lammertse, 1991; Somers, 1992). Non-traumatic injuries are associated with genetic malformation or compromised blood supply secondary to other pathologies in the individual. Non-traumatic causes such as tumour, vascular impairment, arteriovenous malformation, or other neurological diseases such as multiple sclerosis may result in SCI, while traumatic causes could be accidents such as falls or motor vehicle crashes, or deliberate physical violence such as gunshots.

Most often spinal injury occurs as a result of a combination of forces; such as either flexion or extension together with compression, shearing or distraction (Donovan, 1994; Schneider, 1990). Damage to the spinal cord is delineated according to the direction of the forceful impact, being either flexion, extension, rotation, shear, distraction, or compression (Kovindha, 1990). Bony injury to the spinal column may present as a fracture, a dislocation, or a fracture dislocation, of which only 10% to12% will result in damage to the spinal cord (Schneider, 1990). The extent of damage to the spinal cord is dependent upon the type of fracture. Waters, Sie, Adkins, and Yakura (1995) found that 86% of fracture dislocations resulted in complete injuries, while burst and compression fractures resulted in less complete injuries.

2.1.2 Causes of Spinal Cord Injury

The causes of spinal cord injury vary from country to country as well as regionally within countries. In South Africa, for example, Cock (1989) found that 66 % of SCI was caused by acts of violence such as stabbing and gun shot wounds. India and Singapore reported 66% and 24% of people respectively sustained SCI by falling from a height between 1984 and 1987 (Hammell, 1995). A five-year retrospective study (1981-1985) of 577 Thai people with SCI at Maharaj Nakorn Chiang Mai Hospital, the largest hospital in the northern part of Thailand, found that the major causes of injury were falling from a height (42.8%), and motor vehicle accidents (28.4 %) (Kovindha, 1985). Kovindha (1985) further explained that people with SCI in rural areas were primarily farmers who had fallen out of trees e.g. when picking coconuts, longan, and mangoes. However, in more recent years the economic growth in Thailand has resulted in a transition from an agricultural to an industrial economy. As a result, the proportion of SCI injuries caused by motor vehicle accidents has now become larger than falling from a height (Kovindha, 1993). This is the case in urban areas of Thailand and other Asian countries, while people who live in rural areas are still most often injured by falling from a height (Pajareya, 2000).

Motor vehicle accidents accounted for the largest single cause of traumatic SCI in developed countries in the early to mid 1990s (Go, De Vivo, & Richards, 1995; Somers, 1992). In the United Kingdom, approximately 39% of spinal injuries were caused by traffic accidents in 1992 (Hammell, 1995). In Canada and the United States, approximately 35% and 47.7% of spinal injuries respectively resulted from traffic accidents in the year 1991(Hammell, 1995). Hammell also reported that 47.7% of SCI between 1973 and 1985 in the United States of America were as the result of motor vehicle accidents. Other causes of SCI in these countries were falls, sport injuries, industrial accidents and acts of violence. Traumatic injuries caused by gun shot wounds, stab wounds, falls, automobile accidents, and sport accidents accounted for approximately 50% of spinal cord injuries in the United States in the year 1991 (Parsons & Lammertse, 1991; Somers, 1992; Staas et al., 1998).

2.1.3 The Demographics of Traumatic SCI

The world incidence of SCI has been calculated to be 30 to 32 cases per million (Parsons & Lammertse, 1991). America's national annual incidence of cases of SCI involving hospitalisation is 30 to 40 persons per million per year (Staas et al., 1998). Likewise, Japan has reported the incidence of SCI at 40.2 persons per million per year (Pajareya, 2000). It is estimated that the majority of people with SCI in developing countries die within two years of their injuries due to a lack of adequate treatment (Hammell, 1995). Despite this, there has been a dramatic increase in the number of people with SCI in Thailand in the last 20 years with many of these people living in the northern part of the country (Thailand, 1996). The increase may be due to the economic growth and industrial development in this region (Kovindha & Yawila, 1998; Thailand, 1996). People who used to live on farms have moved to urban environments for better employment opportunities. There are increasing numbers of people who commute to work by car, bus, train, and motorcycle. Increased emigration from the rural areas, therefore, has corresponded with increased incidence of SCI in Thailand (Kovindha, 1993; Viboolpholprasert et al., 1997).

SCI is primarily a young male adult's injury in the United States, with more than 50% of injuries occurring in persons 16 to 30 years of age. Males account for about 80% of cases (Go et al., 1995; Somers, 1992). De Vivo and colleagues studied incidence trends amongst persons with SCI in the United States from 1973 to 1986 (De Vivo, Rutt, Black, Go, & Stover, 1992). The study reported that the mean age of persons with injuries increased from 28 to 31.2 years and the percentage of men increased from 81.9 to 84.5% over the 13-

year period. Other studies have reported similar findings for age and gender distributions while investigating smaller sample sizes (Parsons & Lammertse, 1991; Schneider, 1990). A retrospective study of SCI in Thailand at Maharaj Nakorn Chiang Mai hospital, conducted between 1985 and 1991, found that there was an average of 57 people with SCI admitted to the hospital per year (Kovindha, 1993). More than one third of this group (36.0 %) were in the age range of 15 to 30 years. The male to female ratio was 11 to 1 (Kovindha, 1993). Pajareya (2000) recorded a ratio of 5.6:1 for males and females with SCI in Bangkok, Thailand.

There has been approximately the same incidence of quadriplegia and paraplegia reported in the Thailand literature. Yarkony et al. (1987) study of 711 persons with SCI found that 55 % of the sample had quadriplegia while 45 % had paraplegia. The most common levels of injury at the time of admission were at the level of cervical vertebrae 4, 5 and 6. For those with paraplegia, the most common levels were in the area of the thoracolumbar junction (Go et al., 1995). Kovindha (1993) found in her study of 398 people with SCI in Thailand that the majority (73 %) were farmers and labourers, and were often in a low socio-economic group.

2.1.4 Physical Considerations of SCI

The initial physical symptom of SCI is spinal shock. Spinal shock occurs immediately after the injury and results from sudden withdrawal of descending excitatory influences from higher nerve centres, along with continuous inhibition caudal to the injury (Pajareya, 2000). Clinical manifestations include: 1) flaccid paralysis below the level of injury, 2) absence of cutaneous and proprioceptive sensation, 3) hypotension and bradycardia, 4) absence of reflex activity below the level of injury, and 5) loss of temperature control, vasodilatation, and inability to shiver (Pajareya, 2000). Spinal shock may last a few days or as long as several months. The bulbocavernosus reflex, the first reflex to return following trauma, is usually used to indicate the end of the spinal shock phase (Kovindha, 1990; Pajareya, 2000).

According to the *Frankel Functional Classification* (Buchanan & Nawoczenski, 1987), there are five levels of injuries:

A-Complete: No preservation of motor and sensory function
B-Incomplete: Preservation of any sensation below the level of injury, except phantom sensations
C-Incomplete: Preserved motor function without useful purpose; sensory function may or may not be preserved
D-Incomplete: Preserved functional voluntary motor function that is functionally useful
E-Complete recovery: Return of all motor and sensory function;, may still have abnormal reflexes

The motor and sensory outline in the Frankel Functional Classification provides a means of assessing the neurological status of people with SCI. It serves as a guide for the expected functional potential of the individual and cannot be considered as entirely predictive of actual functional accomplishment (Hammell, 1995), because it is difficult to predict what a person with a certain level of SCI will achieve in terms of actual functional ability. The designated neurological level of the spinal cord lesion only serves as an indicator of potential function.

Descriptions of SCI include reference to whether paraplegia or quadriplegia is sustained; the level of the injury; and the degree of completeness (Schneider, 1990).

Injury to the cervical cord between the third and eighth thoracic vertebrae results in quadriplegia or tetraplegia. Quadriplegia refers to loss of movement and sensation to all extremities and the trunk as a result of damage to the cervical cord (Ditunno, Young, Donovan, & Creasy, 1994). Injury to the spinal cord at or below the thoracic level potentially can result in paraplegia (Staas et al., 1998). Paraplegia refers to loss of movement and / or sensation to the lower limbs of the body as a result of damage to the thoracic, lumbar, or sacral segments of the spinal cord (Ditunno et al., 1994).

The level of injury may involve either the neurological, sensory or bony level. The neurological level of the lesion is defined as the most inferior part of the spinal cord with both normal motor and sensory functions on both sides of the body (Ditunno et al., 1994). The sensory level is defined as the most inferior part of the spinal cord with normal sensory function, and the bony or skeletal level refers to the vertebral level with the greatest amount of damage on radiological examination (Ditunno et al., 1994).

The degree of completeness delineates the extent of damage to spinal cord function. An incomplete SCI is one in which there is some preservation of spinal function (motor and/or sensory) below the neurological level of the lesion, including the last sacral segment. A spinal cord lesion is considered to be complete when there is "an absence of sensory and/or motor function in the last sacral segment" (Ditunno et al., 1994). A complete lesion may be caused by a complete severing of the spinal cord, by nerve fibre breakage due to stretching of the cord or ischaemia (Hammell, 1995).

SCI may produce damage to upper motor neurones, lower motor neurones or to both. Upper motor neurones originate in the brain and are located within the spinal cord. An upper motor neurone injury will be located at or above the twelfth thoracic vertebrae. The symptoms produced by upper motor neurone lesion include spasticity of limbs below the level of lesion, increased muscle tone and spasticity of bowel and bladder functioning. Lower motor neurones originate within the spinal cord where they receive nerve impulses from the upper motor neurones. They may be damaged at the level of the upper motor neurone lesion but are more normally identified when occurring at or below the twelfth thoracic vertebra. Lower motor neurone lesions produce flaccid paralysis of muscles below the nerve supply region, decreased muscle tone at rest, loss of reflexes and atonicity of bladder and bowel (Hammell, 1995). Damage to the central nervous system is irreversible as the nerves within the brain and spinal cord are unable to regenerate (Mange, Ditunno, Herbison, & Jaweed, 1990).

2.1.5 Recovery from SCI

The greatest recovery occurs in the first three months post injury followed by a slowing improvement throughout the next twelve months (Waters, Adkins, Yarkura, & Sie, 1994). Initial improvement is thought to be due to a resolution of swelling around the cord. Hypotheses propose that improvement occurs because of the possible re-myelination of previously demyelinated nerve fibres, the presence of a number of undamaged neurons within the spinal cord, and / or the possibility of the hypertrophy of muscle fibres (Mange et al., 1990; Waters et al., 1994). Waters and colleagues (1994) reported that 90% of people with quadriplegia who had complete injuries according to the Frankel Functional

Classification had no recovery. Furthermore, Ditunno, Cohen, Formal, and Whiteneck (1995) found that 94% of people with SCI who were admitted twenty-four hours after injury and had a Frankel complete injury score remained complete at discharge.

Many people with SCI recover some neurological function before discharge from hospital, but rarely is the recovery enough for function to be rated normal on the Frankel scale (Saboe, Darrah, Pain, & Guthrie, 1997). However, due to advancements in medical technology, life expectancy for people with SCI has increased in recent years (Pajareya, 2000). In developed countries, people with quadriplegia have an estimated life expectancy as high as 70% of the whole population and people with paraplegia have an estimated life expectancy as high as 84% of the normal population (Yeo et al., 1998). In developing countries such as Thailand, many people still die within the first two years post-injury because of urinary tract infection and pressure sores due to poor health care (Kovindha & Yawila, 1998). A study of 52 people with SCI after their leaving the rehabilitation unit at Maharaj Nakorn Chiang Mai hospital found that 47% developed urinary tract infections, 45% had pressure sores, and 55% had muscular spasms (Kovindha & Yawila, 1998). In addition, 61% of these clients did not have the opportunity to be re-admitted for further treatment (Kovindha & Yawila, 1998).

2.1.6 Psychological Considerations of SCI

An injury to the spinal cord, especially if it is traumatic, presents a sudden, overwhelming threat to an individual's safety. Individuals with SCI may have all or some of the following responses to their crisis: short-term uncharacteristic behaviour, amnesia sleep disturbances, muscle tension, pain, anxiety and depression, anger, shame, and guilt (Parry, 1990). The emotional adjustments are often the most difficult (Martin & Gandy, 1990). The injury often exacerbates these difficulties if the person has had emotional or personality difficulties prior to the injury. Personal characteristics such as personality, age, cognitive style, values, attitudes, and psychological health prior to the injury influence the manner in which an individual handles the losses engendered by SCI (Frank, Elliott, Buckelew, & Haut, 1988; Trieschmann, 1988).

The emotional pattern that usually occurs after SCI would initially involve shock, confusion, and denial, then anger, and later depression and anxiety (Martin & Gandy, 1990; Somers, 1992). Suicide attempts are also a risk in the early stages (Martin & Gandy, 1990). Health providers such as counsellors, social workers, clinical psychologists, and psychiatrists have a critical role at this time (Martin & Gandy, 1990).

During acute hospitalisation and rehabilitation, people with spinal cord injury are likely to experience separation from loved ones especially family members, relatives, and their peer group. Following discharge, there may be a diminishing of friendship networks. Family relationships are likely to be changed. The injury constitutes a crisis event for family members and friends as well (Hammell, 1995). The family may be in need of services to support social and emotional adjustment. Roles may be altered within the family and society, and patterns of communication and levels of intimacy are likely to change (McGowan & Roth, 1987; Urey & Henggeler, 1987).

Definitions of depression, anxiety, and stress may differ, but the manifestation of symptoms may be difficult to discriminate (Lovibond & Lovibond, 1996). In addition, common causes such as neuroticism, negative affectivity and environmental factors can directly affect all three states (Lovibond & Lovibond, 1996). It is not clear if any one factor affects depression alone without interfering with anxiety, and stress. Depression appears to be principally a state whereby there is loss of self-esteem and incentive associated with a very low perceived probability of attaining personal life goals of significance to the individual (Lovibond & Lovibond, 1996). Even 'minor' and 'moderate' levels of depression have been found to have a major impact on health, activities of daily living, and interpersonal relationships among non-disabled populations (Judd, Paullus, Wells, & Rapaport, 1996). It would seem reasonable to suggest that they would have an equal or greater effect on people with SCI. Krueger (1984) proposed that, if depression does not occur, even transiently after disability, this indicates that the reality of the loss has not been realised. Identifying depression as a natural and necessary part of the process of adjustment to traumatic injury is common in early literature on the subject. According to authors, some period of depression is necessary for a healthy adjustment to SCI. Conversely, an individual who does not display depression is avoiding dealing with important aspects of reality and thus will not become adjusted (Hammell, 1995).

More recent empirical studies have failed to provide evidence to demonstrate a major role for depression as part of the adjustment process for people with SCI (Buchanan & Nawoczenski, 1987; Kennedy & Rogers, 2000). Trieschmann (1986) proposed that those people who exhibit the least signs of depression after injury tend to function best during rehabilitation and following discharge. Depressive symptoms have been associated with increased stays in hospital, fewer functional improvements in SCI rehabilitation (Hay, Wells, Sherbourne, Rogers, & Spritzer, 1995; Kennedy & Rogers, 2000), and increased mortality and morbidity (Zimmerman et al., 1994). Krause, Coker, Charlifue, and Whiteneck (1999) reported in their descriptive study of depression and subjective well-being among 97 people with SCI, that participants had high levels of depression and diminished subjective well-being, which endured for at least 1 year post injury. A longitudinal study of anxiety and depression after SCI conducted during the acute stages of hospitalisation to two years post-discharge with 104 people with traumatic SCI in the United Kingdom (Kennedy & Rogers, 2000) revealed that anxiety and depression increased between week 24 and week 48 while people were hospitalised. The factor most influencing depression and anxiety was the length of hospitalisation; the longer people remained in hospital, the more depressed and anxious they became.

There is some evidence that people with SCI decrease their anxiety and depression significantly after six months post-discharge but study results are conflicting. Follow-up studies of psychological impact associated with SCI have demonstrated that depression and anxiety are identifiable after the injuries (Kennedy & Rogers, 2000; Krause, Kemp, & Coker, 2000) and that there is a greater incidence of depression, anxiety, and stress in individuals who have sustained a SCI than in individuals in the general population. Hancock, Craig, Dickson, Chang and Martin (1993) reported in their longitudinal study of affective reactions that there were significantly higher levels of depression and anxiety in an SCI group than in a matched control group, but no significant differences were found across time for either anxiety or depression, suggesting that people with SCI remained at a higher level of anxiety and depression than the matched control (Craig, Hancock, &

Dickson, 1994). A cross-sectional study by Kennedy, Lowe, Grey, and Short (1995) to examine psychological problems of 104 people with traumatic SCI at six weeks following injury, and then again at four and seven years post-injury, found that there was no significant difference between the groups for scores of depression, anxiety, and distress. They concluded that depression is not an inevitable reaction to injury, nor is it a necessary facet of rehabilitation. Clarification of the longer-term levels of depression, anxiety and stress would seem to be an appropriate goal, to investigate affective reactions in a group of people newly diagnosed with SCI, and to examine the prevalence of these variables over time.

Anxiety and stress also accompany depression after SCI (Elliott & Frank, 1996; Kennedy & Rogers, 2000). Anxiety involves long term anticipation of negative events and may occur as a consequence of continuing physical threat (Lovibond & Lovibond, 1996). The symptoms of anxiety are primarily related to physical arousal, panic attacks, and fear (Antony, Bieling, Cox, Enns, & Swinson, 1998). Manifestations of anxiety symptoms may include trembling, faintness, and breathing difficulty (Antony et al., 1998). Manifestations of stress responses can be divided into four categories including physical, emotional, behavioural, and cognitive symptoms (Benson & Stuart, 1992). The pathophysiology of SCI such as pain, spasticity, or neurogenic bowel and bladder problems may create ongoing physical stressors (Butt & Lanig, 1996). Physical symptoms may include headaches, facial or jaw pains, dry mouth or throat, indigestion, sleep disturbance, fatigue and excessive sweating. Emotional symptoms such as irritability, moodiness, depression, unusual aggressiveness, crying, and loss of concentration have also been reported. Behavioural symptoms, such as grinding of teeth, increased smoking and alcohol consumption, and compulsive dieting as well as cognitive symptoms such as forgetfulness, lack of creativity, and inability to make decisions are also symptoms of anxiety and stress (Benson & Stuart, 1992).

2.1.7 SCI and Quality of Life

Research has provided evidence that differences in levels of injuries in people with SCI do not cause differences in the individual's perception of health status and quality of life

(Hammell, 1995; Richards et al., 1999). Indeed, in the presence of a supportive environment, a study in Sweden with 56 people with SCI found no difference in perceived quality of life among people with quadriplegia, paraplegia and a control group (Siosteen, Lundqvist, & Blomstrand, 1990). A cross-sectional study of predictors of health status and life satisfaction in 318 people with SCI found that the seriousness of injury is also not a good predictor of life satisfaction (Post, de Witte, van Asbeck, van Dijk, & Schrijvers, 1998). Other studies have indicated that even those with lesions above the fourth cervical vertebrae reported that they were glad to be alive (Post et al., 1998; Siosteen et al., 1990). In the USA, a study of the relationship of life satisfaction to impairment, disability, and handicap among 140 people with SCI found no correlation between level of injury and perceived quality of life (Fuhrer, Rintara, & Hart, 1992). Rather, life satisfaction was positively correlated with perceived control, social support, social integration, occupation and mobility (Fuhrer et al., 1992). In general, rehabilitation staff frequently adhere to the belief that psychological disturbance will be greater with higher lesions, and that people with paraplegia or incomplete lesions will suffer less depression in comparison with their peers with quadriplegia (Hammell, 1995). This is not supported by research studies, which have found that there is no relationship between either level of spinal cord injury or physical dependency and depression (Fuhrer, Rintara, & Hart, 1993).

2.1.8 Social Impact of Spinal Cord Injury

People with disabilities are often undervalued in society (Somers, 1992). Discrimination against people with disabilities manifests itself in many ways such as less opportunity to gain employment, lack of appropriate education, and difficulty in accessing transportation.

"Architectural and transportation barriers serve to handicap those with mobility impairments" (Somers, 1992, p. 52). A person with a disability is likely to be confronted with discriminatory treatment when looking for education, employment, medical insurance, and housing (Stubbins, 1988; Viboolpholprasert et al., 1997). People with disabilities are also subjected to discrimination in their interpersonal relationships. For example, when seeing someone with a disability, an able-bodied person's perception of the individual may be dominated by the physical disability. The able-bodied person may focus on the disabling characteristics rather than on the person's other qualities (Somers, 1992). Able-bodied people could be uncomfortable talking with people with disabilities and be inclined to avoid contact (Fichten, 1988). As a result, social isolation is common following spinal cord injury. It is important for this group to regain self-esteem, and gain confidence in their abilities rather than identifying themselves as a group of people with a functional loss (Martin & Gandy, 1990).

The nature of social support provided by family members, loved ones, health professionals, and other service providers has a strong influence on adaptation following spinal cord injury (Somers, 1992; Trieschmann, 1988). Factors such as financial security, education, employment, and access to transportation also impact on adjustment (Trieschmann, 1988). Social support is generally defined in terms of the availability of people whom individuals trust, on whom they can rely and who make them feel cared for and valued (Hammell, 1995). The presence of social support has been related to the reduction of levels of distress and depression (Hammell, 1995). Schulz and Decker (1985) interviewed 100 people up to an average of 20 years after sustaining SCI. The participants lived in non-institutional community settings in the United States. The authors concluded that people who had high levels of social support, who were satisfied with their social contacts and who felt they had high levels of control over their lives also reported high levels of well-being.

The researchers also noted that 41% of respondents named only one support person, usually a female spouse. Hammell (1991) suggested that partners of people with disabilities should be included throughout the rehabilitation process. From the earliest stage of treatment, efforts should be made to assist both partners in strengthening social support, by involvement of close family and friends in therapy sessions, social activities and decision-making. People with SCI who reported they had a high level of social support, were found to have significantly fewer health problems and hospital admissions than those who reported low availability and adequacy of social support networks (Hammell, 1991). Morgan and Jongbloed (1990) noted that the attitudes and behaviours of family members and friends were a vital part of an individual's environment, and exerted a strong influence on how the individual viewed the disability and on how social relationships, roles and activities were maintained or altered. The conclusions of these authors confirm the importance of social networks in the lives of people with disabilities including people with SCI.

Contrary to common assumptions, the level of injury is not a significant factor in adaptation for people with SCI; people with quadriplegia adjust as successfully as those with paraplegia (Somers, 1992). Adjustment to living with SCI does not end at the day of discharge from hospital but, rather, is a long process of adjustment and reintegration. During rehabilitation, knowledge and skills are developed by clients to enable community living. Upon returning home, however, the person with SCI faces the challenging task of applying new knowledge and skills to home and community environments. Not only are routine activities at home important but so too are vocational activities for income generation. A large number of people with SCI never become employed after their trauma because work opportunities are limited for them (Martin & Gandy, 1990).

2.1.9 Cultural and Religious Implications for People with SCI

Culture generally refers to the learned behaviours, values, norms, and symbols that are passed from generation to generation within a society (Lovelland, 1999). Culture is a way of distinguishing the beliefs, values and customs of an interacting group within its own environment (Hammell, 1995). People learn what is appropriate, compatible, and acceptable within their own culture, normalise that behaviour, and may come to view their way of doing things as the only correct way. When older generations teach younger generations how to behave, this becomes the way of life for people in that society. Culture influences both the personal and social responses to injury. Many authors (Landrine & Klonoff, 1992; Mechanic, 1992) view health and illness as being culturally defined, with learned beliefs and behaviours determining personal responses to an impairment. To confound the discussion, health systems have been characterised as having their own culture as well as being influenced by the culture of the society within which they are located (Hoeman, 1989).

Culture may be divided into two components; one is material culture, and the other is non-material culture (Lovelland, 1999). Material culture focuses more on physical aspects such as architecture, styles of dress and new technology. This type of culture can change rapidly over time and from culture to culture. On the other hand, non-material culture focuses on non-physical aspects such as attitudes toward new styles of dress, and appropriate uses of new technology. This type of culture is hard to change (Lovelland, 1999).

The awareness of differences in cultural values and beliefs can help rehabilitation therapists and other health professionals to achieve the active engagement of clients in the treatment process through avoiding activities that may have little meaning to them or may even be offensive (Hammell, 1995). Even how therapists 'actively engage' clients may differ from culture to culture. People may reject or be ambivalent toward elements of the material culture, such as a proposed medical treatment, because of the values in their non-material culture. Clients and therapists living in similar environments, wearing similar clothing, and speaking the same language may not share the same attitudes about disability, or the same beliefs about the appropriate behaviour for women and men. A client may view disability as something to be hidden, while the therapist's treatment involves reintegration of the client into society.

Strategies for success in rehabilitation programs require an understanding of the cultural norms of clients and their peer groups. Religious belief is one example of non-material culture in the rehabilitation environment (Lovelland, 1999). Religious beliefs can affect the efficacy of rehabilitation programs provided by health professionals because people tend to do what they believe (Viboolpholprasert et al., 1997). Followers of Buddhist philosophy who believe in karma may blame their disability on wrong behaviours in the past or even their previous life. The disability may have been 'given' because of some misdeed (Miles, 1999). This attitude might cause individuals with a disability to simply accept their fate and not follow treatment programs or aspire to regain independence. They see themselves as victims of fate. People in some cultures and religions believe that illness and disability are supernatural punishments for misbehaviour by themselves or by persons closely linked to them such as their family members (Dhammananda, 1988; Viboolpholprasert et al., 1997). Therefore, these people sometimes not only blame themselves but also their family and peer groups. People may also believe that powerful emotions such as jealousy and anger are to blame for misfortunes in life; these emotions could have been unleashed in the past, even before the person was born (Lovelland, 1999).

Religion may also provide a sense of meaning that can help in coping with stressful life events (Pargament, 1997). In Western cultures, research has suggested that religious beliefs and practices can have a positive effect on preventing illness, on recovery from surgery, and on coping with illness (Matthews et al. 1998).

2.1.10 Religion and Culture Considerations for People with SCI in Thailand

Religious and cultural beliefs affect people's way of life (Leavitt, 1999). In Thailand, the majority of people, who are Buddhists, base their beliefs on fate. They view disability, sickness, and even death as supernatural punishments for the misbehaviour of either themselves or a member of their family in a previous life (Dhammananda, 1988; Titathummo, 1989). These beliefs can result in feelings of low self-esteem, acceptance of a limited destiny and feelings of 'sin' (Chuenklin, 1999) for those who are disabled. These beliefs may also lead to lower levels of motivation towards overcoming disability and handicap as people simply accept their fate (Dulkasem, 2000). A qualitative study of the lived experiences of people with paraplegia (Chuenklin, 1999) reported that participants interpreted life with paraplegia in several ways: living as 'half alive' and 'half dead' ; being a 'dependent and burdensome person'; having 'no future'; and serving one's 'sin'.

Cultural norms may also affect the way people with disability are treated by others. Thai people learn that helping people with disability will bring good fortune (Viboolpholprasert et al., 1997). Helping less fortunate people is a way to show gratitude for more fortunate lives. Visible good acts towards others increase social reputation. Therefore, family, relatives and even neighbours prefer to provide assistance to people with disability rather than support their independence. This kind of response can increase dependency on the part of people with disability and contribute to a lowered self-esteem (Chuenklin, 2000; Viboolpholprasert et al., 1997).

2.2 Rehabilitation for People with SCI in Thailand

The medical rehabilitation system in Thailand focuses more on using technologies to alleviate impairment than on total capacity development of people with disability in the context of their family, community and society. The existing services are fragmented, and provide rehabilitation more for acute care than for people with chronic disabilities such as quadriplegia and paraplegia. Furthermore, services for people with disabilities are concentrated in larger urban centres, and not easily accessible for people who live in rural and remote areas (Pajareya, 2000) Rehabilitation also focuses more on institutional care than proactive community services directed at people with disability, their families, and communities.

Rehabilitation provision for people with SCI in Thailand challenges health professionals to provide services to a population who have severe functional limitations with accompanying psychosocial problems (Somers, 1992). People with SCI often experience ideal architectural environments in traditional rehabilitation settings during the acute phase of their injury and initial recovery (DeJong et al., 1984). It is usual that health professionals control treatment programs and schedules without fully involving clients in setting treatment goals. At discharge, clients and their family members are expected to resume life without the benefits of follow-up programs to assess home and community environments (DeJong, 1979). People are often unaware of the community resources that may be available to assist them to reintegrate into society. Those rehabilitation programs that do exist in Thailand do not promote problem solving and coping skills, nor do they encourage participation in decision-making so that individuals may regain control of their lives (Price & Lightbody, 1994).

All people with disabilities who have registered have the right to receive rehabilitation assistance from government and non-government organizations in Thailand (Julajarit, 1991; Kovindha, 1999). However, the small number of rehabilitation and other health care professionals can not provide the full range of services for all those who need them (Kovindha & Yawila, 1998; Reawpaibool, 2000).

Two principal barriers for people with SCI in Thailand in maximising their potential to live independently are physical barriers and attitudinal barriers (Sittikan, Autwong, Juntawong, & Khovindha, 2000). Physical barriers are environments at home and in the community that obstruct the ability to perform activities independently; such as architectural barriers, transportation barriers, and access to private and public buildings. Kovindha (2000) reported that almost all buildings and public places in Thailand did not provide suitable access for people with disabilities. For example, there were no ramps and lifts in high-rise buildings, doors were too narrow for wheelchair access, and public toilets and phones were not designed to suit the needs of people with disabilities. Kanta (1992) reported that people with paraplegia had less functional abilities in self-care at home than in a rehabilitation hospital due to domestic architectural barriers. He suggested the need for home visits by the rehabilitation team to assess environmental modifications, and to enable independence for these people. Boonserm, Kullcalchit, and Reawpaibool (2000) stated that society should provide opportunities for people with disability to participate in community and public events. A first step in achieving this goal would be to provide suitable environments to promote participation. Suitable environments may include availability of transportation, appropriate pathways for those who use wheelchairs, and appropriate structures of both public and private buildings in terms of doors, lifts, toilets, car park bays, and ramps. Instead of making people with disability dependent on welfare, resources might be better directed towards adapting physical environments to increase accessibility (Boonserm et al., 2000).

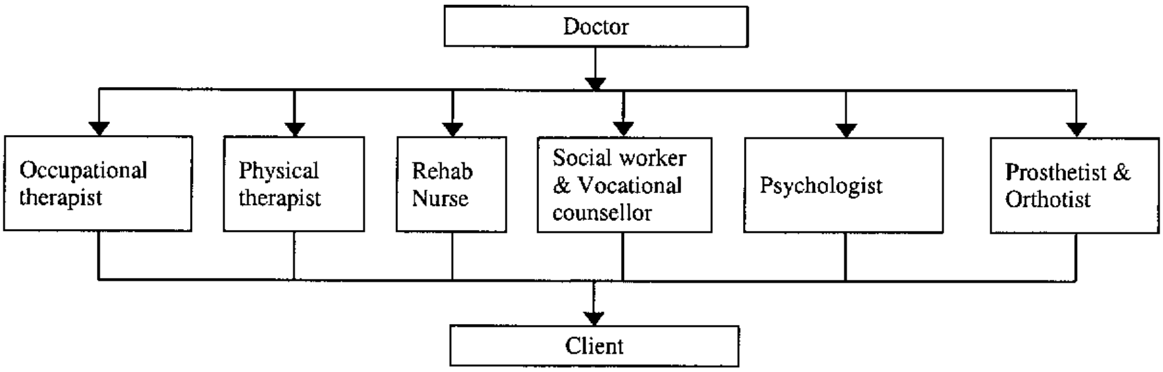
Attitudinal barriers can confront people with disability through negative attitudes of family members, relatives, friends, and neighbours. These negative feelings and attitudes may include the perception that disability is a disgrace and something to be ashamed of (Sittikan et al., 2000). Some families may hide their family members who have disabilities from being seen by their neighbours. They may also refuse medical treatment and rehabilitation services (French, 1994). People with low levels of education who live in isolated rural areas can believe that disability is brought to their family member by supernatural influences. A study of the problems and needs of 40 people with disability living in rural Thailand found that these people and their family members misunderstood the concept of disability (Viboolpholprasert et al., 1997). Disabilities were viewed as 'fate' (Musikhasung, 1992; Viboolpholprasert et al., 1997). As a result, they did not access the rehabilitation services they had a right to under government legislation (Julajarit, 1992); (Viboolpholprasert et al., 1997). These misconceptions and misunderstandings are found not only among people with disabilities and their families, but also among community leaders and local public health workers (Viboolpholprasert et al., 1997).

2.3 The Existing Model of Rehabilitation for SCI in Thailand

Thailand uses a traditional medical model approach to rehabilitation. Rehabilitation is confined to acute care settings (Viboolpholprasert et al., 1997). Clients enter a SCI unit for an examination of their physical and mental status by medical staff. Doctors are considered leaders of rehabilitation teams and make referrals to other team members. Rehabilitation services such as occupational therapy, physical therapy and vocational services are provided once clients have been assessed by physicians. In addition to the personnel already named above, the rehabilitation staff may consist of rehabilitation nurses, prosthetists, orthotists, social workers and psychologists (Pajareya, 2000). Only a few provincial hospitals have formal positions for allied health staff while there are none in the smaller local hospitals.

In Thailand there is an asymmetrical relationship between health providers and clients with SCI. The traditional rehabilitation service model and lines of responsibility are summarised in Figure 2.1.

Figure 2.1 Hierarchy of Rehabilitation Providers in Thailand[a]



[a] Sources: From "Spinal Cord Injury," by K, Pajareya, 2000, Bangkok, Mahidol University, pps. 66-67.

Physiatrists (rehabilitation medicine physicians) are the first point of contact and are responsible for evaluating physical and mental status. They usually co-ordinate the rehabilitation team (Kovindha, 1990; Pajareya, 2000). Medicine use and prostheses will be considered by the doctors, together with strategies to minimise health complications.

Occupational therapists assess occupational performance and consult on activities of daily living such as eating, bathing, dressing, and self-care activities. Occupational therapists also assess for, prescribe and recommend adaptive equipment to enhance functional performance. Pre-vocational assessment, environmental modifications and leisure activities are also addressed. Occupational therapy intervention aims to not only increase physical strength and endurance to maximise physical function but also acknowledges issues such as depression, anxiety, and stress commonly experience by people with acquired disability. People are supported in developing new interests, skills and abilities to replace those which are no longer realistic due to their disability (Kovindha, 1990; Pajareya, 2000).

Physiotherapists become involved as early as possible following medical consultation. Their main focus is in preventing contractures. Physiotherapists provide exercises for strengthening muscles, increasing range of motion, and stabilising trunk balance. Transfer training and mobility training is also provided (Kovindha, 1990; Pajareya, 2000).

Rehabilitation nurses provide information regarding personal self-care and general hygiene to people with SCI during their time on rehabilitation wards. This is aimed at preventing medical complications such as bedsores, bowel and bladder infections, and respiratory problems (Kovindha, 1990; Pajareya, 2000).

Psychologists evaluate mental status and assess the ability of people with SCI to adjust to life with a disability. They provide counselling, support and encouragement to clients on personal issues related to returning to live with their families (Kovindha, 1990; Pajareya, 2000).

Social workers evaluate the social and economic status of people with SCI and provide information on community resources and financial assistance available following discharge (Kovindha, 1990; Pajareya, 2000).

Prosthetists and orthotists provide assistive devices such as braces and hand splints to people with SCI as required (Kovindha, 1990; Pajareya, 2000).

Vocational counsellors provide information regarding paid employment opportunities, and support to retrain for work that meets with individual interests, skills and abilities (Kovindha, 1990; Pajareya, 2000).

2.3.1 Application of the Thai Rehabilitation Model for People with SCI in Thailand

Treatment for people with SCI occurs mainly in institutional settings. In this model, rehabilitation team members initiate treatment programs without involvement of clients and their family members. Clients are passive participants in the rehabilitation process and accept treatment from health professionals who are considered to be experts (Somers, 1992). Boonserm et al. (2000) stated that in the Thai rehabilitation system, only health providers make decisions relating to treatment while the opinions of people with disability are ignored in this patriarchal system. The majority of health professionals hold a view that they work for people with disability instead of working with them (Boonserm et al., 2000). In addition, many people with disability are afraid of asserting their rights to be involved in decision making or challenging the decisions of experts for fear of retribution (Dulkasem, 2000). Lack of participation in decision-making may result in passivity on behalf of clients and reduce their personal motivation to achieve rehabilitation goals, which have been decided without their input (Somers, 1992).

Rehabilitation professionals meet regularly to discuss client progress without client attendance and consultation. Treatment goals set by the medical rehabilitation team usually involve achieving stability following the lesion, independence in daily activities of self care, mobility training, and achievement of independence in bowel and bladder management (Chinchai, 2000; Punyamee, 2000). It is clear that most treatment goals focus on physical abilities with little attention to the issues of emotional status (depression, anxiety, and stress), environmental barriers, family education, vocational counselling, general health status, and reintegration and socialisation at a community level (Reawpaibool, 2000). This impacts on the ability of people with disability to adapt to living with a disability and on general quality of life outcomes (Sittikan et al., 2000).

When rehabilitation professionals agree that clients have achieved their maximum goals, clients will be discharged from hospital (Kovindha & Yawila, 1998). Therapists rarely have contact with clients in community settings following discharge (Kovindha & Yawila, 1998). There are very few services where professionals visit clients' homes prior to discharge to assess any physical or attitudinal barriers, or family issues, which may influence future quality of life for people with SCI. There is also little opportunity for follow-up after discharge because of the small numbers of rehabilitation professionals and large numbers of new clients with SCI requiring acute care services (Viboolpholprasert et al., 1997).

After leaving hospital, many people with SCI are faced with environmental barriers both at home and in their communities. It is also common for people to develop complications such as bed sores and urinary tract infections due to poor health care and lack of information on how best to look after themselves (Kovindha & Yawila, 1998). Poor economic status is also one of the barriers which limits treatment continuing, particularly in rural areas where many people do not have access to transport (Kovindha & Yawila, 1998). As a result, it is common for people with SCI to become isolated and dependent on others for care.

2.3.2 The International Classification of Impairments, Disabilities and Handicaps

In order to begin to conceptualise the consequences of disease, the World Health Organization (1980) developed the International Classification of Impairments, Disabilities, and Handicaps (ICIDH). The ICIDH is a classification, not of people but of the states or dimensions in which people may find themselves as a result of disease and injury. Each of the three parts of the classification represents deviation from the norm, either statistically or in the ideals of society and therefore, are considered to be a state of disadvantage. The classification was developed both to provide a basis for the collection of data from which research and evaluation of services could take place (Winther, 1996), and to clarify the consequences of disease (Badley, 1993). The first domain related to effects on the body (impairment); the second to influences on the person, (disability); and the third to the social situation, (handicap).

Impairment was defined as abnormality or loss of psychological, physiological or anatomical structure or function (Hammell, 1995; WHO, 1980). Impairment is objective, capable of being seen or noticed, possible to be measured and often the basis for a medical diagnosis. It occurs at an organ level. Examples of impairment include muscle paralysis, muscle spasm, joint contracture and stiffness, and absence of a limbs (Schumacher, 1999).

Disability was defined as any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being resulting from impairment. (WHO, 1980)) Disability occurs on a personal level. Examples may include inability to grasp, walk or dress oneself, inability to move from place to place, and emotional problems negatively influencing useful social interaction (Hammell, 1995; Schumacher, 1999).

Handicap is defined as the disadvantage and the limitation for each individual, resulting from an impairment and disability, that prevents the fulfillment of normal roles (depending on age, sex, and social and cultural factors); such as physical independence, social integration, occupation, and economic self-sufficiency (WHO, 1980). Handicap occurs at the societal level. Although the ICIDH originally presented handicap as an experience resulting from an impairment or disability, almost all critics describe handicap in terms of an interaction between individuals and their environments (Badley, 1993; Schumacher, 1999). Handicap causality is seen as external, not internal (Schumacher, 1999; Whiteneck, 1987). Examples more appropriate to the current interpretation of handicap include lack of accessible public transportation, negative attitudes toward persons with impairments or disabilities, and discrimination in employment (Leavitt, 1999).

2.3.3 The International Classification of Functioning, Disability and Health

More recently, the International Classification of Functioning, Disability, and Health, known as ICF (WHO, 2001) defined two domains; one of health components and the other health-related components of well-being such as education and labour. These terms or domains replace and extended the scope of the terms ‘impairment’, ‘disability’, and ‘handicap’ of the ICIDH. The ICF systematically groups different domains for a person in a given health condition; for example, what a person with a disease or disorder can or cannot do. Functioning is an umbrella term encompassing all body functions, activities and participation. Similarly, disability is an umbrella term for impairments, activity limitations or participation restriction. Examples of health domains include seeing, hearing, walking, learning, and remembering, while examples of health-related domains include transportation, education, and social interaction (WHO, 2001). The ICF has moved away from being a consequences of disease classification (WHO, 1980) to become a components of health classification. ICF also includes a list of environmental factors that describe the context in which individuals live (WHO, 2001). Environmental factors make up the physical, social and attitudinal environment in which people live and conduct their lives and are very important components of this new concept. In addition, ICF proposes that participation in personally relevant activities can enhance the life satisfaction of people with disabilities (WHO, 2001).

2.4 Application of Rehabilitation Models to Disability

Rehabilitation of people with disability, including people with SCI, generally involves elements of the medical model, the psychosocial model, and the educational model (Winther, 1996). All these models have their own strengths and benefits for people with disabilities.

2.4.1 A Medical Model of Rehabilitation

Rehabilitation services have developed from the medical or sickness model of health care delivery, in which a medical problem was identified, a diagnosis was applied and treatment prescribed and provided (Hammell, 1995). The medical model views disability as a problem of the person, directly caused by disease, trauma or other health condition, which requires medical care provided in the form of individual treatment by professionals (WHO, 2001).

In systems operating according to this model, there is a rigid hierarchy of power, with physicians at the top, other health professionals in the middle, and patients and family members at the bottom. Treatment is managed by a physician and delivered by other health care professionals such as occupational therapists, physical therapists, and rehabilitation nurses. The job of staff is to fix patients, and patients are expected to accept that treatment passively (Feaver & Creek, 1993; Somers, 1992; Trieschmann, 1988). This model is appropriate to use during the first period of illness or acute care (Hammell, 1995; Whiteneck, 1987). Whiteneck (1987) explained the medical model as treatment with the goal of minimising disability for a given degree of impairment. In SCI rehabilitation, the disability is minimised through techniques aimed at preventing deformity, increasing respiratory and cardiac function, protecting the skin, enhancing physical movement, relearning activities of daily living, and managing bladder and bowel dysfunction (Schneider, 1990; Whiteneck, 1987). In this view, pathology, and manifestations of disease are generally considered to be limited to identification of characteristics of disease, rather than function (Dittmar & Gresham, 1997). When using a medical model for approaches to care, all too often individuals with disabilities are encouraged to maintain, rather than give up, the sick role. They are frequently exempt from what are considered normal social activities and responsibilities, and are less likely to be motivated to take charge of their personal and social affairs with any degree of independence (Dittmar & Gresham, 1997). Their ability to function is often overlooked within hospital, home, and community environments.

The medical model is not likely to be the appropriate model in the management of chronic disability such as SCI because it cannot fulfil the needs of people who sustain long term illness (Hammell, 1995). There is a lack of client participation and family involvement in the treatment process. This conflicts with the need to empower individuals to be responsible for their own care. The medical model is concentrated upon intervention for individual deficits rather than upon broader, environmental intervention.

In living with a permanent acquired disability, individuals have to make major adjustments in life. They must learn to be responsible for their own health status, both physically and mentally, practice new skills, and learn to solve problems creatively. At this stage, clients can no longer be the passive recipients of care but must become active participants in the rehabilitation process. Personal independence is not attained by simply complying with the goals set by others (Hammell, 1995; Trieschmann, 1988).

2.4.2 Social Model of Rehabilitation

The development of a social model of disability has attempted to explain disability as resulting, not from impairment, but rather from social organisation (Dowling & Dolan, 2001). Disability is not an attribute of an individual, but rather a complex aggregation of conditions, many of which are produced by the social environment. The management of the problem requires social action in which the responsibility to modify and adapt the environments to facilitate the full participation of people with disabilities in all areas of social life is the responsibility of people in society (WHO, 2001). Disability, then, is considered to be located in the social processes and environmental barriers that restrict people's choices and lifestyle, not in the impairment as in the medical model (Craddock, 1996). This model views an individual, who is unable to walk, not as being disabled because of an inability to walk, but because society does not accommodate that inability to walk (Dowling & Dolan, 2001). For example, being unable to walk does not prevent an individual from visiting friends, but public transport that is inaccessible to wheelchair users does. This approach refers to a diverse range of services intended for people with chronic illness to function better in social, vocational, educational, and living situations (Lucca & Allen, 2001). In addition, it has been described as an education and counselling process designed to assist individuals in their environments to expand their opportunities to lead meaningful lives by being more concerned with handicaps from the social environment rather than disabilities or impairments (Whiteneck, 1987).

WHO (2001) classified the social model of disability separate from the medical model, and promoted a social model as a means of viewing disability as a socially created problem. It is the full integration of people with disabilities into society, which is the basis of psychosocial rehabilitation. Whiteneck (1987) suggested that a social approach to the rehabilitation needs of people with SCI would contribute to the potential for physical and social integration.

Dowling and Dolan (2001) noted in their study of social inequalities in 22 families with children with disabilities that the lives of these families were often characterised by financial hardship, stress, and anxiety as a result of social barriers, prejudices and poorly conceived service provision. In addition, Hawkins and Stewart (2002) stated in their study of the usage of a social model in a community for people with disability, that this model provides a more holistic view of the environmental barriers faced by both people with disability and their family members.

2.4.3 An Education Model of Rehabilitation - Active Participation in Rehabilitation

An educational approach to rehabilitation is described as the dynamic process that enables an individual to learn to live with an acquired disability in that person's own environment (Hammell, 1995). The individual must be an active participant in the entire rehabilitation process (Hammell, 1995; Trieschmann, 1988). Active participation in rehabilitation means that people with disability take responsibility and initiative for their own treatment, planned together with rehabilitation professionals. Individuals with disability may ask questions about the program goals, seek explanations, exchange information with others, and state their treatment preferences to the rehabilitation team. People are best able to learn when they are helped to define their own problems, decide on what to do, and evaluate the consequences of their decision (Hammell, 1995).

The ICF also defined the term, activity participation. Activity participation can be clarified as the involvement and execution of a task or action by an individual in a life situation (WHO, 2001). Activities involvement as proposed by WHO (2001) covered the full range of life areas from basic learning or watching, communication, mobility, self-care, and domestic life to composite areas such as interpersonal interactions or employment. Two negative components that should be considered in activity participation are activity limitation and participation restriction (WHO, 2001). Activity limitations are difficulties an individual may have in executing activities, and participation restrictions are problems an individual may experience in involvement in life situations (WHO, 2001).

Participation in any activity involving their lives can enhance the interests and cooperation of people with disability, and thus, heighten functional ability (WHO, 2001). In contrast, lack of participation can result in low motivation and induce disability (WHO, 2001).

An education model in rehabilitation that reinforces active participation and activity participation may be empowering model for people with disability because it addresses the needs of clients in relation to a variety of life contexts including participation in the rehabilitation process. Health professionals still tend to focus their services on treatment of the presenting medical condition rather than addressing the need for people to be reintegrated into home and community life (Viboolpholprasert et al., 1997). In an education model, health professionals and clients are partners in pursuit of mutually agree-upon goals. People with disability are best able to learn when they are able to define their own problems, clarify their needs, decide on a treatment plan and a course of action, and evaluate the consequences of their decisions. In order to maintain and regain control of their lives following SCI, people must first have an understanding of their bodies' altered functioning and of strategies for avoiding complications and promoting health (Somers, 1992). Without this understanding, people cannot participate fully in their rehabilitation program (Somers, 1992). This learning process provides strategies to solve problems creatively, to address the client's own concerns and to handle situations not encountered during the formal rehabilitation program. Gilliland and James (1988) stated that education regarding the physical sequelae of disability such as SCI is just a beginning. Education and instruction of what social problems may arise at home or in the community after discharge can better prepare a person and family for this transition. To function in society, people with disabilities also need to know about their legal rights and available resources in their community environments.

When using an education approach, health professionals treat the individuals undergoing rehabilitation, and their family members and peers with respect and equality (Somers, 1992). An educational program for clients and their family, friends, and caregivers is an essential part of the process in recognising the physical and medical complications that may occur (Kohlmeyer & Yarkony, 1994). Education can take the form of lectures, discussions, audiovisual presentations, and printed material. Family members and peers' participation can enhance their capacity to provide constructive support to people with disability during and following rehabilitation programs (Somers, 1992; Yarkony, Roth, Meyer, Lovell, & Heinemann, 1990).

In summary, it is unclear if these three approaches can be separated in practice. In fact, the interaction among team members to accomplish the goals of independent living by combining and sequencing the usage of each approach, may be essential (Winther, 1996). In the acute stage or the first phase of the treatment, the medical model may be appropriate because it is aimed at sustaining life and minimising damage caused by trauma (Ozer, 1988). Psychosocial and education models can be used simultaneously or concurrently in later stages to minimise disability and handicap by enhancing functional abilities and maintaining quality of life outside the health care system (Hammell, 1995; Ozer, 1988).

2.5 Rehabilitation Outcomes

Investigation of rehabilitation outcomes such as functional performance, perceived health status, and the emotional states of depression, anxiety and stress in people with a disability may be important for rehabilitation. The rehabilitation of persons with disability, including people with SCI, can produce remarkable outcomes (Whiteneck, 1987). The major interest in this field is the way in which people with SCI function in their daily lives despite functional limitations. This can be measured in terms of functional performance (Dittmar & Gresham, 1997); the subjective perceptions of specific impairments; and broader perceptions of perceived health status (Furberg & Schuttinga, 1990). Disability can also produce psychological disruption (Martin & Gandy, 1990). People may respond to disability through depression, anxiety, stress, sleep disturbance, anger, guilt, shame, pain, and disrupted appetite. Emotional states such as depression, anxiety and stress often occur after injury or disability (Elliott & Frank, 1996; Kennedy & Rogers, 2000; Krause et al., 2000; Martin & Gandy, 1990).

2.5.1 Functional Status

Rehabilitation for persons injured with SCI is a costly and time-consuming process and, in spite of intensive treatment, functional status can remain severely impaired (Ives & De Vivo, 1994). The way in which a person with disability functions is a major interest of rehabilitation team members. Functional ability assessment is a systematic attempt to measure objectively the level at which a person is functioning in several areas such as physical health, quality of self-maintenance, quality of role activity, intellectual status, social activity, attitude toward the world and self, and emotional status (Dittmar &

Gresham, 1997). Instruments such as the Functional Independence Measure (FIM) has been used to document changes in activities of daily living over time (Dittmar & Gresham, 1997).

2.5.2 Health Status

A major aim of care for people with chronic diseases, including people with SCI, is to maintain or improve their quality of life (Lam, Lauder, Lam, & Gandek, 1999). Health-related quality of life is a significant measure of the impact of chronic or disabling illnesses (Wilson & Cleary, 1995). Health-related quality of life has also been found to be related to prediction of mortality and service utilisation (Lam et al., 1999). Clinical trials routinely include health-related quality of life as an outcome measure (Ware, Snow, Kosinski, & Gandek, 1993).

With the holistic approach to the individual gaining prominence after World War II, a comprehensive assessment including physical, functional, psychosocial, and vocational factors became the standard. Attention was given to how individuals interacted with other people in their own environmental contexts (Dittmar & Gresham, 1997). Rehabilitation personnel looked for more all-encompassing measurements to detect problems in physical and psychosocial areas for people participating in rehabilitation programs.

Additional rehabilitation outcome measures have been considered to be a subcategory of health status indicators or quality of life measures (Whiteneck, 1994). Whiteneck (1994) discussed the need for broader health status measures to observe individuals' health over time, thus determining how successfully rehabilitation had influenced secondary impairments, disabilities, and handicaps. Pierce, Richards, Gordon, and Tate (1999) reported in their study of life satisfaction after SCI in 598 participants that perceived health status, apart from age at follow-up and ability of movement, exerted a strong correlation with life satisfaction. The authors suggested that intervention programs to improve subjective perceptions of health would influence life satisfaction, which in turn would positively influence quality of life. Hampton and Marshall (2000) reported in their comparative study of life satisfaction between Americans and Chinese people with SCI that positive life satisfaction scores were significantly related to perceived health status.

The measurement of impairment, and disability is quite straightforward and more objective than the measurement of handicap, which is more complex and hence more difficult to objectify and measure (Whiteneck, 1994). However, tools such as the Craig Handicap Assessment and Reporting Technique (CHART), and the Community Integration Questionnaire (CIQ) have been developed to measure handicap (Whiteneck, Charlifue, & Gerhart, 1992; Willer, Rosenthal, Kreutzer, Gorden, & Rempel, 1993). Whiteneck (1994) proposed that, in addition to objective measurements, individuals with a disability have subjective perceptions regarding health, activity limitations, and role limitations. Although these internal perceptions are related to the more objective measurements of impairment, disability, and handicap, these perceptions are still distinct. In addition, instruments for measuring general health such as the SF-36 Health Survey, should be able to track the cumulative impact of perceived health, perceived activity limitation, and perceived role limitation (Johnston, Maney, & Wilkerson, 1998).

2.5.3 Emotional States of Depression, Anxiety, and Stress

Clinically, depression is a disabling syndrome, which refers to a state of sadness, hopelessness, and helplessness (Elliott & Frank, 1996). *Anxiety* is most likely to occur when individuals have relatively low self-esteem (Lovibond & Lovibond, 1996). Anxiety can be conceptualised as autonomic arousal and fearfulness (Brown, Chorpita, Korotitsch, & Barlow, 1997). *Stress* may be conceived as a state of a persistent over-arousal that results in a continuing difficulty in meeting taxing life demands (Lovibond & Lovibond, 1996). Adjustment to disability following the aftermath of trauma is a highly individualised process (Martin & Gandy, 1990). The severity of disability or the perception of severity varies from person to person. Furthermore, persons who have severe disabilities will vary in their reaction(s) to those disabilities. This perception among parents, siblings, loved ones, relatives, and friends also vary substantially. Disability results in some psychological disturbance (Martin & Gandy, 1990), presenting in a variety of ways, including frustration, inconvenience, depression, anxiety and distress for those who sustain it (Kennedy & Rogers, 2000; Martin & Gandy, 1990). Krueger (1984) proposed that depression is a normal response to traumatic disability. Research on psychological outcomes among people with disability, including people with SCI, has demonstrated that it is important to address issues of depression, anxiety, and distress (Kemp & Krause, 1999; Kennedy & Rogers, 2000).

2.5.4 Loss and Stages of Grief

Psychological response following SCI may consist of denial of disability, hostility, anger, depression, withdrawal the interaction with other people, and repression or try to forget situations, which are psychological traumatic (Martin & Gandy, 1990) . Most people with SCI get to a stage of coping reaction or acceptance of disability but the duration from the onset to this stage is different from person to person (Kovindha, 1990). Individuals do not progress through a neat series of mood states in a lock-step manner but rather in their own ways (Somers, 1992).

2.6 Predictors of Outcomes in People with Spinal Cord Injuries

Outcome prediction is considerably more precise in medical rehabilitation than psychosocial rehabilitation (Whiteneck, 1987). Given a patient with a known degree of impairment (level and extent of lesion) entering an SCI rehabilitation unit, much can be predicted about the degree of disability (tasks that cannot be performed independently) likely to be remaining at discharge. In contrast, disability is not as good a predictor of handicap as impairment is of disability since the factors influencing handicap are relevant to not only clients themselves but also factors external to the client such as their physical and social environments, families and peer groups (Whiteneck, 1987).

The literature identified a wide range of predictors of rehabilitation outcomes. These, in turn, depended on the models of rehabilitation and their interpretation by health professionals. Whiteneck (1987), who used the ICIDH, stated that factors affecting disability in people with SCI were medical management, services received from the rehabilitation team, adaptive equipment, associated injuries, pre-existing conditions, inadequate funding, and poor access to service. Furthermore, factors affecting handicap were education, vocational counselling, recreational therapy, poor support networks, environmental barriers, societal discrimination, and financial disincentives. Appropriate interventions to reduce the constraints in the model would enhance independence in people with SCI. Stineman and Granger (1994) proposed that the factors influencing rehabilitation outcomes were medical and restorative therapies, adaptive equipment, ADL skill training, social support, physical, and attitudinal barriers.

Diverse conceptual models have been proposed to understand and explain disability and functioning, and as such, have identified predictors of outcomes. The medical model discussed elsewhere is based upon mechanistic principles. The human body is examined to ascertain what is functioning and predictions of rehabilitation are based on how complete or incomplete physical functioning will be after treatment. Health professionals identify a problem and administer their choices of treatments. The patient's role is to reconcile to the authority of the more knowledgeable professional figure and to follow advice and instructions without argument or discussion (Hammell, 1995). Problems, which may be faced in home and community environments, are not addressed.

A generic social model may include environmental factors affecting a person's performance. These environmental factors are external to individuals with disabilities. They can have a positive or negative effect on the individual's performance as a member of society, on the individual's capacity to execute actions or tasks, or on the individual's body function or structure (WHO, 2001).

Environmental factors may focus on two different levels:

> **Individual:** This level includes environments in which the individual lives, including the home, workplace and school. Factors included at this level are physical and material features of the environment that an individual comes face to face with; such as architectural design of home and community environments, as well as direct contact with others such as family, acquaintances, peers and strangers.
>
> **Societal:** This level includes organisations and services related to work, community activities, government agencies, communication and transportation services, and informal social networks as well as laws, regulations, rules, attitudes and ideologies (WHO, 2001).

Disability, in this view, is characterised as the outcome or result of a complex relationship between an individual's health condition and personal factors, and of the external factors that represent the circumstances in which the individual lives. Different environments may have a very different impact on the same individual with a given health condition. An environment with barriers, or without facilitators, will restrict the individual's performance; other environments that are more facilitating may increase that performance. Society may hinder an individual's performance because either it creates barriers such as inaccessible buildings or it does not provide facilitators such as assistive devices (WHO, 2001).

Apart from environmental factors, personal factors may also have an impact on the individual's performance (WHO, 2001). Personal factors include a person's particular background, and comprise features that are not part of a health condition or health state (WHO, 2001). These factors may include gender, race, age, other health conditions, fitness, lifestyle, habits, education, profession, and individual psychological assets.

A review of the literature also elicited research that attempted to show which predictors had the most influence on rehabilitation outcomes. DeVivo, Shewchuk, Stover, Black and Go (1992) investigated the influence of age on the relationship between impairment and disability, by examining the ability to live independently in 11,000 cases of SCI between 1973 and 1989. These researchers found that the ability to live independently decreased in older age groups, in spite of the injuries being less severe in this group. DeJong, et al. (1984) investigated the influences of environmental and personal factors on independent living and productivity outcomes by interviewing 111 persons with SCI. External influences included limitations in living arrangements, the presence or absence of needed in-home assistance, architectural barriers in the home, the availability of accessible transportation, work disincentives (such as high pension payments), and the unmet demand for services by clients. The study found that the most important predictors of independent living outcomes were marital status, education level, transportation barriers, economic status, and the severity of a person's disability. Drewes, Olsson, Slot, and Andreasen (1989) described the level of handicap of a group of 58 persons with SCI who had been discharged into the community four to eight years previously. The methodology was not clearly described. However, the trend showed handicap status to be highly influenced by employment outcomes, availability of accessible transportation, external assistance, and participation in recreation. A study of factors affecting powerlessness of 120 people with paraplegia in Thailand found that education level, occupation, and functional abilities exerted a strong influence on the feeling of empowerment in these participants (Musikhasung, 1992). The authors reported in their study of 69 people with traumatic SCI in Bangkok, Thailand that younger participants tended to have more severe pressure sores than older participants. There was also the lack of attention younger participants displayed in looking after their general health compared with the older group. Hampton and Marshall (2000) reported in their study of culture, gender, self-efficacy, and life satisfaction in people with SCI that gender was not consistently related to life satisfaction in this group of people.

Investigations such as these demonstrate the complexity of the rehabilitation process. A variety of factors external to the rehabilitation program may exert a powerful influence on treatment outcomes. It is incumbent upon the healthcare professional to facilitate the process of adaptation and to recognise that it is not the injury itself which is the predictor of response or outcome but the characteristics both of the person who has the injury, and their unique personal, social, cultural and economic circumstances (Hammell, 1995).

In summary, outcomes can be considered to be a complex interactional equation of many factors, compounded by factors including age, intellectual capacity, family structure, and academic background. Other factors include medical complications, medications, pain, and degree of impairment. Additionally, environmental variables such as transportation, architectural and geographical barriers, educational and vocational resources also affect rehabilitation outcomes (Hammell, 1995; WHO, 2001).

CHAPTER 3:
PREDICTORS OF REHABILITATION OUTCOMES: MODELS AND MEASUREMENT

Within the literature, three specific models have been proposed to further our understanding of the multiple factors that predict positive outcomes following spinal cord injury (SCI). These models have been proposed to increase understanding of the complex process of rehabilitation. In this Chapter, the three models are first described. Based on the three models, an adapted framework appropriate to current rehabilitation service in Thailand is proposed. Lastly, the instruments chosen to measure the proposed outcome variables and the development of a questionnaire to measure the proposed predictors of successful outcomes is described and results of pilot testing are presented.

3.1 Models to Predict Successful Outcome Following Spinal Cord Injury

Since 1984,three comprehensive models have been proposed to examine the complex interplay between multiple variables and rehabilitation outcomes following spinal cord injury. The models have been proposed by DeJong, Branch, and Corcoran, (1984), Whiteneck (1987), and Stineman and Granger (1994). Each will be described in turn.

3.1.1 Model 1 Proposed by DeJong, Branch, and Corcoran

DeJong, Branch, and Corcoran proposed a model in 1984 (Table 3.1). Three outcomes - living arrangements, productivity, and overall independent living - were defined based on theoretical considerations relevant to independent living (DeJong et al., 1984).

Table 3.1: Model of Variables Predicting Rehabilitation Outcomes in People with SCI

Outcome variables	Independent Variables			
	Socio-demographic	**Disability-related**	**Environmental**	**Interface**
• Living arrangement • Productivity • IL* outcome	• Age • Sex • Race • Education • Marital status	• Age at onset • Duration of disability • Barthel score • Communication problems • Discharge status	• Attendant care • Housing • Transportation • Disincentives • Hospitalization • Medical supervision • Services received/needed	• Unmet equipment needs

*IL = Independent living

DeJong et al (1984) tested the above model using a longitudinal design with a sample of 111 people with SCI in the United States. Results of the multivariate analysis demonstrated that factors predicting rehabilitation outcomes relevant to living independently were marital status, transportation, education, degree of medical supervision, disincentives, gender, and services received / OT needs unmet (DeJong et al., 1984).

Rehabilitation services received and OT needs unmet were added to the original research model because of their strong correlations with outcome variables. Unmet OT needs were assessed by the presence or absence of an OT service during rehabilitation (DeJong et al., 1984). No further research has been published to further test the Dejong et al model or the strength of the predictor variables.

3.1.2 Model 2 Proposed by Whiteneck

Whiteneck (1987) proposed a model of SCI rehabilitation based on the International Classification of Impairment, Disability and Handicap (ICIDH) described elsewhere (WHO, 1980). The factors that influence level of disability in people with SCI included management, number and quality of services received from the rehabilitation team, availability of adaptive equipment, associated injuries, pre-existing conditions, inadequate funding, and poor access to services. In addition to the factors that influence disability, factors affecting handicap were identified as access to education, vocational counselling, recreational therapy, quality of support networks, environmental barriers, societal discrimination, and financial disincentives. However, Whiteneck (1987) did not define clearly how to measure the influence of each factor or their relation to outcomes of treatment after SCI. In addition, there was no evidence of a standard instrument from which this model was derived.

3.1.3 Model 3 Proposed by Stineman and Granger

The model of functional assessment proposed by Stineman and Granger (1994) was also based on the concepts and terminology of disablement in the ICIDH (WHO, 1980). These authors proposed factors that influence rehabilitation outcomes at each of the three levels of impairment, disability and handicap. Firstly, pathologies or diseases at the organ level, leading to anatomical, physiological, mental, and psychological deficits resulting in impairment were believed to influence the nature of the outcomes (Stineman & Granger, 1994). Additional factors affecting impairment at the organ level were medical and restorative therapies (Stineman & Granger, 1994). Secondly, behavioral manifestations, characterized by performance deficits within the physical and social environments, were proposed to result in difficulty with tasks or disability. Factors influencing disability level were adaptive equipment, and ADL skill training. Lastly, role assignment at the societal level, resulting in environmental and societal deficits was believed to lead to handicapping situations The authors proposed that the factors that influence the severity of handicap were social support, and physical and attitudinal barriers. This model is remarkably similar to that proposed by Whiteneck (1987), not surprisingly, because both are based on the WHO model. Once again, no standardized measurement tools were offered nor was any experimental evidence from either a research or clinical setting provided to support the model.

In conclusion, the research model for predicting rehabilitation outcomes in people with SCI proposed by DeJong et al. (1984) demonstrated some potential in predicting factors related to rehabilitation outcomes following SCI. The authors also defined each variable and the measurement methods. All predictive factors in this model have been considered relevant to successful treatment and rehabilitation for people with SCI (Buchanan & Nawoczenski, 1987; Hammell, 1995). The theoretical model of SCI rehabilitation proposed by Whiteneck (1987), even though it demonstrated intervention strategies affecting rehabilitation outcomes, did not clearly identify either the intervention or the measurement methods. This was similar in the model of outcome measurement in rehabilitation proposed by Stineman and Granger (1994).

3.2 A Framework of Predictors of Successful Outcome Following SCI Appropriate for Use in Thailand

The three models previously described, together with additional available research related to prediction of successful outcomes following SCI were used to develop a framework to predict rehabilitation outcomes in the present study. The model proposed by DeJong et al. (1984) clearly defined factors affecting rehabilitation outcomes. It also demonstrated how to measure each variable. The DeJong model provided the foundation on which this research was built. However, adaptations were made in order to increase the cultural relevance and account for the rehabilitation realities that exist in Thailand. The changes to outcome variables and independent variables are explained below.

3.2.1 Outcome Variables

Outcome variables in the present study were functional status, health status and emotional states of depression, anxiety, and stress. Functional status was defined as an individual's performance in activities of daily living within his or her own environment (Dittmar & Gresham, 1997). Health status in the present study focused on health-related quality of life outcomes, those known to be most directly affected by disease and medical treatment (Ware et al., 1993). Eight dimensions of health, measured by the SF-36, included general health (GH), physical functioning (PF), role physical (RP), role emotional, (RE), social functioning (SF), bodily pain (BP), vitality (VT), and mental health (MH) (Ware et al., 1993). Emotional status in the present study focused on three states of emotion including depression, anxiety, and stress, which are considered most relevant to psychological problems in people with SCI (Kennedy et al., 1995; Kennedy & Rogers, 2000). These outcomes are different from the outcome variables proposed by DeJong et al. (1984), which were derived from the independent living movement. The concept of independent living (IL) relates to the rights of people with disability to live in the community, whether or not they perform activities by themselves or have someone to assist them (Takamine, 2000).

Outcome variables in models based on the independent living concept focus mainly on employment opportunities and productive work (DeJong et al., 1984). In Thailand the majority of people with disability lack opportunity for paid employment and very few can access public transportation (Kovindha, 2000; Reawpaibool, 2000). Therefore, outcome variables in the present study were different than those proposed by Dejong et al (1984).

In developed countries such as the United States and Japan, government schemes and health insurance often cover the expenses that arise when people require paid assistance (Takamine, 2000). The government in these countries have been forced, through the consumer movement, to take responsibility for many financial and social aspects related to independent living (IL) of people with disabilities (Takamine, 2000). However, rehabilitation in Thailand follows the medical model for treatment and focuses little attention on IL (Sittikan et al., 2000). There is no government or health care policy to support the movement of IL in this country (Tongsiri, 2000). A health care system driven largely by a medical model cannot easily incorporate the concepts of IL because the Thai's health policy remains based on the medical model. The selection of outcomes in the present study (functional status, health status, and emotional states of depression, anxiety and stress) necessitated a focus on medical rehabilitation priorities as opposed to a focus on IL.

Functional status was used as an outcome variable in the present study rather than as an independent variable, and was measured with the Functional Independence Measure (FIM) instead of the Barthel Index. In Thailand, functional assessment is concerned not only with motor function but also cognitive function (Punyamee, 2000). DeJong et al (1984) focused mainly on physical function with little attention paid to other relevant factors that might affect ability in ADL. A measurement tool appropriate for physical as well as cognitive function is the FIM (Reawpaibool, 2001). Functional status is one of the key variables at a disability level (WHO, 1980).

Health status is another important rehabilitation outcome. Whiteneck (1994) proposed the measurement of broader service outcomes following the intervention programs. Whiteneck (1994) discussed the need for health status measures to follow an individual's health over time, thus determining how successfully rehabilitation has influenced secondary impairments, disabilities, and handicaps.

Emotional status is also known to be important following physical trauma. Disability usually results in psychological disturbance (Martin & Gandy, 1990). Much research on psychological outcomes among people with disability, including people with SCI, has indicated that the emotional states of depression, anxiety, and stress are important to address (Kemp & Krause, 1999; Kennedy & Rogers, 2000).

3.2.2 Independent Variables (Predictors)

Five groups of independent variables were selected; four from the original DeJong model, plus an additional group related to service. In each of the five groups, changes were made to make the study applicable to the context of SCI rehabilitation in Thailand.

Socio-demographic variables: Age, education completed, marital status, and economic status variables from the Dejong model were retained. Race was omitted as a variable because this study collected data from Thai people only. In order to make the participants more homogeneous, people from the hill tribes and non-Thais were excluded from the study. The variable of gender was also omitted. Only male participants were included because, in Thailand, the activities, family and social expectations, and family roles are quite different for males and females. By including only males, the possibility of confusion and poor interpretation of factors predicting rehabilitation outcomes was decreased. In addition, the majority of clients treated with SCI in Thailand are males. The ratio of male to female SCI was 11 to 1 in the year 1993 (Kovindha, 1993) and 5.6 to 1 in the year 2000 (Pajareya, 2000; Thailand, 1996).

Disability-related variables: Age at onset, duration of disability, communication problems and discharge status variables were retained from the Dejong model. Communication problems were maintained in the model because many Thai people have limited education and might not fully understand information provided by health professionals during rehabilitation. This could affect outcomes. Discharge status such as living alone, with spouse, family or relatives, was maintained because it is known that discharge status affects the lives of people with chronic disabilities (Clark et al., 1997).

Environmental variables: Attendant care, housing and transportation variables were retained. Attendant care in Thailand is provided primarily by family members and relatives, not by health care workers (Viboolpholprasert et al., 1997). There are no formal follow-up rehabilitation services for people with disability in Thailand because there is an insufficient number of health care personnel (Viboolpholprasert et al., 1997). Architectural barriers are known to exist in Thailand (Kanta, 1992; Kovindha, 2000); therefore, the housing variable, called number of architectural barriers, was retained in the environmental variables. Transportation barriers, especially for those who use wheelchairs, do exist in Thailand (Kanta, 1992; Kovindha, 2000). Therefore, the transportation variable was also retained as one of the predictors of rehabilitation outcomes in the present study. The variable, work disincentive, however, was excluded because it was not relevant for Thailand. The country does not currently have any insurance for unemployed persons.

The Interface variable: Adaptive equipment can enhance the abilities of people with disabilities in their daily lives (Kohlmeyer & Yarkony, 1994), supporting the inclusion of this predictor variable. However, the variable titled 'unmet equipment needs' in the original model was renamed 'fulfillment of equipment needs' in order to make it more understandable for participants during data collection. The change from the negative to the positive did not interfere with scoring in the data analysis (Pallant, 2001). Instead, the positive statement was more understandable for the participants than the negative, and was easier to interpret in the data analysis (Pallant, 2001).

Service-related variables: A final group of independent variables was added to the original DeJong model. Length of hospitalization, degree of medical supervision, number of services received and number of service needs remaining unmet appeared in the original DeJong model under environmental variables, but they were felt to be more appropriately placed in this newly-created category, more appropriately called service-related variables. Researchers have proposed that people with SCI should receive occupational therapy services to improve their functional capacity (Kohlmeyer & Yarkony, 1994). Occupational therapy programmes for people with SCI in Thailand involve ADL training, pre-vocational evaluation, home visits, environmental modification and equipment provision, and recreational pursuits (Kovindha, 1990). It was believed that these variables were more related to rehabilitation services than merely environmental influences. The number of vocational rehabilitation services received and the presence of unmet occupational therapy needs as proposed by DeJong et al. (1984) were also included.

Recalling that many people, particularly elderly people and people who live in the rural areas in Thailand, have very low literacy skills, and based on preliminary studies, some changes in the wording of the independent variables in this group were made. In particular, changes in wording from negative questions to positive questions were felt to be important. The variable 'number of service needs remaining unmet was changed to number of services not received but required, and the variable 'presence of unmet occupational therapy needs‘ was changed to fulfilled occupational therapy needs. In addition, the term ’medical supervision’ was changed to ’health service utilizations’ because people with SCI received services not only from medical doctors but also from other members of the rehabilitation team. The research framework used in the present study is summarized in Table 3.2.

Table 3.2: Variables and Outcome Measures Studied

Outcome variables	**Independent variables**				
	Socio-demographic	**Disability-related**	**Environmental**	**Interface**	**Service-related**
Functional status Health status Emotional status	Age Education completed Economic status Marital status	Age at onset Duration of disability Communication problem Discharge status	Attendant care Number of architectural barriers Transportation	Fulfilled equipment needs	Hospitalization & health service utilization Number of services received/not received Fulfilled OT needs Number of vocational service received

3.3 Dependent Variables and Outcome Measures

The three dependent variables examined in this study were functional status, health status, and emotional status. Standardized measurement tools were selected for each outcome measure and a structured questionnaire was developed to measure the predictor variables. Measurement tools had to be prepared for use, and then pilot tested in Thailand. The three standardized outcome measures, one for each variable, were selected: the Functional Independent Measure (FIM), the Depression, Anxiety, and Stress Scale (DASS), and the SF-36 Health Survey, respectively. Discussion of each instrument and rationale for instrument selection follows.

3.3.1 The Functional Independent Measure (FIM)

The FIM is one of the most widely used methods of assessing functional status in persons with disabilities (UDSMR, 1997). The assessment was developed by a joint task force of the American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation (Marcel & Gunes, 1999). The Uniform Data System for Medical Rehabilitation, based at the State University of New York at Buffalo, serves as a data repository, and training and testing centre for rehabilitation programs using the Data Set. It is required that all clinicians who assess function using the FIM instrument undergo training and testing to establish that they understand FIM item definitions. Only those who have passed the test may assess patient function using the FIM. The researcher in this study completed the FIM Mastery Test and was formally accredited to use the instrument for either research or clinical purposes prior to the commencement of the data collection.

The FIM was designed to be used with people with any disability and can be used repeatedly at admission, discharge, and at post-discharge (Christiansen & Baum, 1997). It can be used in multiple settings including hospitals, clinics, nursing homes, or individuals' homes (Fuhrer, 1987). It is used by more than 60% of comprehensive rehabilitation programs in the United States as well as in Canada, Australia, Italy, Germany, and Hong Kong (Granger, Deutsch, & Linn, 1998).

The FIM includes 18 items, each with a maximum score of seven (7) and a minimum score of One(1). Each level of scoring is defined. For example, a score of seven defined as complete independence, a score of One(1) is defined as 'complete dependence,' and three (3) is defined as 'moderate assistance'."' (See Table 3.3 and Appendix B). The FIM clearly discriminates between independence and dependence based on the need for a helper. Summing the scores on the 18 items gives a total score ranging from 18 to 126 (Christiansen & Baum, 1997).

Table 3.3: Levels of Measurement of the Functional Independence Measure

LEVELS	**INDEPENDENT**	**NO HELPER**
	7 Complete Independence (Timely, Safely)	
	6 Modified Independence (Device)	
	DEPENDENT	**HELPER**
	Modified Dependence	
	5 Supervision	
	4 Minimal Assistance	
	3 Moderate Assistance	
	Complete Dependence	
	2 Maximal Assistance	
	1 Total Assistance	

The areas examined by the FIM include self-care, sphincter control, transfers, locomotion, communication, and social cognition. These areas are grouped into motor and cognitive domains (Granger, Hamilton, Linacre, Heinemann, & Wright, 1993). The motor domain includes items in the sub-scales of self-care, sphincter control, transfers, and locomotion. The cognitive domain includes items from the sub scales of communication and social cognition.

Extensive work has been done regarding the psychometric properties of the FIM. The intra-class correlation (ICC) value for the total FIM score is 0.96 and the ICC values for the sub-scale scores range from 0.88 to 0.93 (Hamilton, Laughlin, Fiedler, & Granger, 1994). Dahmer et al. (1993) reported that the FIM is sensitive to change in functional abilities occurring during rehabilitation. A study of characteristics of the FIM in traumatic SCI concluded that motor items of this instrument related strongly to the functional status of individuals (Hall et al., 1999). In addition, the authors concluded the cognition items could serve as a crude cognitive screening assessment in this population. Hamilton et al. (1991) studied the inter-rater agreement of the seven levels of the Functional Independence Measure (FIM) and found that the total FIM ICC was 0.97. The ICC for each domain was as follows: self-care 0.96; sphincter control 0.94; mobility (transfers) 0.96; locomotion 0.93; communication .95; and social cognition 0.94 (Hamilton et al., 1991). They also concluded that the seven level FIM appeared to have good clinical inter-rater reliability. Some researchers argued that there was some difficulty in judging and scoring the level of independence in the FIM (Shah & Cooper, 1993). However, the certification process and training in instrument use, as required by FIM authors, enhance the ability of the user to make judgments on the level of measurement. These factors contributed to the selection of the FIM as a reliable and valid instrument to measure functional status of people with SCI in this study. The researcher had completed the FIM Mastery Test and was formally accredited to use the instrument for both the research and clinical purposes prior to commencement of the study.

3.3.2 The Depression, Anxiety, and Stress Scale (DASS)

The DASS is a set of three self-report subscales designed to measure the emotional states of depression, anxiety, and stress. There are two versions of the DASS, one is a 42-item scale and the other is a 21-item scale. In this study, the 21-item form of the DASS was used in order to decrease the time required to administer the survey, and thus, the response burden. Antony et al. (1998) found in their study of psychometric properties of the 42-item and 21-item of DASS in clinical groups and a community sample that the DASS-21 performed in a comparable fashion to the DASS-42 in differentiating between different diagnostic groups. Clara et al. (2001) also revealed in their factor analysis of the DASS in depressed and anxious clients, that the 21-item version of the DASS had a good fit compared with the 42-item counterpart. These authors also noted that the tested items demonstrated a clear distinction between anxiety and depression both in the 21-item and 42-item DASS (Clara et al., 2001).

The Depression Scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The unique character of depression is a low level of positive affect (Clark & Watson, 1991). The Anxiety Scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and the subjective experience of anxiety. The Stress Scale is sensitive to levels of chronic and non-specific arousal. It assesses difficulty relaxing, nervous arousal, and being easily agitated, irritability, overactivity, and impatience(Clark & Watson, 1991).

The DASS was constructed to measure emotional states in non-clinical populations but used later for use in clinical settings (Lovibond & Lovibond, 1996). Many studies have demonstrated the ability of the DASS to distinguish among depression, anxiety and stress for non-clinical populations as well as samples derived from clinical settings (Antony et al., 1998; Brown et al., 1997; Clara et al., 2001). Lovibond and Lovibond (1996) concluded that the DASS was able to meet the requirements of both researchers and clinicians.

The DASS uses a 4-point severity/frequency scale for respondents to rate the extent to which they have experienced each state of depression, anxiety and stress during the past week. Scores are calculated by summation of the scores in each domain. There are five levels of the DASS severity rating: normal, mild, moderate, severe, and extremely severe (Lovibond & Lovibond, 1996). General guidelines for the rating of severity, based on a normative sample, are displayed in Table 3.4.

Table 3.4: DASS Severity Rating

	Z score	Percentile	Depression	Anxiety	Stress
Normal	< 0.5	0-78	0-9	0-7	0-14
Mild	0.5-1.0	78-87	10-13	8-9	15-18
Moderate	1.0-2.0	87-95	14-20	10-14	19-25
Severe	2.0-3.0	95-98	21-27	15-19	26-33
Extremely severe	> 3.0	98-100	28+	20+	34+

Data in Table 3.4 show raw DASS scores for depression, anxiety, and stress, and the corresponding level of severity for each range of raw scores. Data can be converted to Z scores, enabling comparisons to be made between the three scales and severity. For example, a raw score of 14 will be classified as moderate depression and anxiety, but does not even rate as mild stress. These correspond to Z scores of one for depression, two for anxiety, but less than 0.5 for stress. The conversion of Z scores to percentiles is not exact because the frequency distributions for the three DASS scales are not identical; in particular, the Stress scale is less skewed than the other two scales (Lovibond & Lovibond, 1996).

The scales of the DASS have been shown to have high internal consistency. The alpha values for the 21-item scales are: depression 0.81; anxiety 0.73; stress 0.81 (Lovibond & Lovibond, 1996). A study of psychometric properties of the DASS in large clinical samples (N = 437) had excellent internal consistency for each scale, with a Cronbach's alpha of 0.96, 0.89, and 0.93 for depression, anxiety, and stress, respectively (Brown et al., 1997).

Other instruments such as the Beck Depression Inventory (BDI) (Beck & Steer, 1987), and the Beck Anxiety Inventory (BAI) (Beck & Steer, 1990) also measure depression and anxiety, respectively. However, items in the BDI, which include weight loss, insomnia, somatic preoccupation and irritability fail to discriminate between depression and other affective states such as nervousness and stress (Lovibond & Lovibond, 1995). Items in the BAI were similar to the BDI. The DASS was selected for this study because of its good psychometric properties and its ability to capture emotional states of depression, anxiety, and stress, which are usually found in people with SCI after their injury occurs (Brown et al., 1997; Lovibond & Lovibond, 1995).

3.3.3 The SF-36 Health Survey

The SF-36 Health Survey is a 36-item self-administered questionnaire (Ware et al., 1993). Richard et al. (1999) used the SF-36 Health Survey in a study of access to environment and life satisfaction after SCI and concluded this instrument was highly predictive of health related quality of life in this population. The instrument has also been shown to be sensitive to a wide range of health outcomes (Rapport et al., 1993).

One SF-36 Health Survey question measures Health Transition over the period of one year. The remaining 35 items measure the following eight dimensions of health:

General Health (GH) measures self-perceived health. Respondents are asked to rate their health as excellent, good, fair or poor and how they feel their health is compared to other people whom they know.

Physical Functioning (PF) measures limitations in performances of everyday physical activities. Respondents are asked if their health limits their functional performance in activities of daily living such as walking, climbing stairs, bathing and dressing, and the extent to which these activities are limited.

Role Physical (RP) measures the extent of disability in everyday activities and work due to physical problems. The respondents are asked if their physical health problems affect their regular work, such as taking extra effort, cutting down on the amount of time spent at work, and accomplishing less than usual.

Role Emotional (RE) measures problems with work or other daily activities as a result of emotional problems. The respondents are asked if their emotional problems affect their regular daily tasks, such as limiting their productivity and spending less time at work.

Social Functioning (SF) measures limitations in social activities due to personal or emotional problems. The respondents are asked how much their physical health or emotional problems interfere with their normal social activities with family, friends, and neighbours.

Bodily Pain (BP) measures limitations in activities due to the severity of bodily pain. The respondents are asked how much pain they have, and how much it interferes with their regular work.

Vitality (VT) measures feelings of energy in the everyday lives of individuals. The respondents are asked how much energy they have had during the past few weeks, and levels of tiredness

Mental Health (MH) measures psychological distress. The respondents are asked about their feelings, such as happiness, calmness and peace, sadness, or nervousness during the past few weeks.

The responses to the questions are tallied to provide eight scores between 0 and 100, with higher scores indicating better health (Van Essen, Chipchase, O'Connor, & Krishnan, 1998).

The SF-36 is referred to as a health-related quality of life measure because it assesses health concepts that represent basic human values relevant to everyone's functional status and well being (Ware, 1987). Generic health measures assess health-related quality of life outcomes; namely, those known to be most directly affected by disease and treatment. In addition, the SF- 36 is universally valued. It is not age, disease, or treatment specific, and can be used with persons with different health circumstances (Ware & Sherbourne, 1992). It can and has been utilised as an outcome measure as well as a control variable in clinical trials. It has also been used as an indicator of quality of health care and effectiveness of treatment services (Lam et al., 1999). The validity and reliability of the SF-36 in patient populations has been confirmed in studies in the USA, the UK and in Australia (Van Essen et al., 1998). Studies in clinical settings conducted in Australia (McCallum, 1995) and the United Kingdom (Garratt, Ruta, Abdalla, Buckingham, & Russell, 1993) revealed high internal consistency for all eight items. Cronbach's alpha exceeded 0.8 both in Australia and the United Kingdom. Permission to use and translate this instrument was obtained from the authors.

3.4 Development of a Questionnaire to Examine Predictors (independent variables) of Successful Outcomes Following SCI

The proposed model includes many potential predictors of successful outcome following SCI. The rationale for inclusion of each item has been noted earlier. Three experts in the field of SCI rehabilitation provided guidance for the development and subsequent modifications of the questionnaire. Measurement of the variables was undertaken via a forced choice questionnaire. The Predictors of Rehabilitation Outcomes Questionnaire appears in Appendix B. Each item and the forced choice answers are presented in Table 3.5. Where required, details regarding relevance to Thailand and or rationale for the forced choices are included in the comment section of the tables.

Table 3.5: **Characteristics of Independent Variables**

	Independent variables	Scoring grid	Calculation & Reporting	Comment
Socio-demographic variables	Age	Age in years		
	Education completed	No education, Primary school, Secondary school, College or other training, University and above		Clients self-report
	Economic status (household income)	Poor (income < 791 bahts / month), Not poor (income> 791 bahts /month		Poverty line was 791 bahts per month in Thailand at the time of data collection (Junpijam, 1998)
	Marital status	Married, Not Married		Not married included single, divorced, widowed and separated people
Disability-related variables	Age at onset	Age in years		
	Duration of disability	Measured in days and months (more than 15 days over a month were considered as another month)	Descriptive analysis: 3-6, 7-9, 10-12, >12 (months);	Clients self-report and/or medical record
	Communication problems	Yes, No		Clients self-report
	Discharge status	Live alone/ With someone (family and/or relatives)		
Environmental variables	Attendant care	Present, Absent		Clients report of in-home assistance includes help from family members
	Number of architectural barriers at home	Narrow door Narrow bathroom Inappropriate toilet room Narrow bedroom Narrow kitchen Too many steps Small wall in the doorway Floor surface inhibits wheelchair propulsion	Each item scored as present or absent. If present, score = 1. Total = total present	Clients report presence or absence of each type of architectural barrier in their home
	Transportation	Available, Not available		Defined as public or private transportation

	Independent variables	Scoring grid	Calculation & Reporting	Comment
Interface variable	Fulfilment of equipment needs	Yes, No		Clients self-report regarding needed equipment
Service-related variables	Length of Hospitalisation	Measured in days and months (more than 15 days over one month were considered as another month)	Descriptive analysis: 0-3, 4-6, 7-9, 10-12 (months);	Clients self-report and/or medical record
	Health service utilizations while in hospital	Frequency clients met each rehabilitation professional per week while in hospital including physiatrist, occupational therapist, physiotherapist, orthotist, social worker, psychologist, vocational counsellor, nurse	Each profession scored separately	Clients self-report and/or medical record
	Number of services received while in hospital	Physiatrist, occupational therapist, physiotherapist, orthotist, social worker, psychologist, vocational counsellor, nurse	Score 1 for each profession, each scored as present or absent. Total = total present. Maximum score = 8	Clients report on different types of rehabilitation services received while in hospital
	Number of services not received but required while in hospital	Physiatrist, occupational therapist, physiotherapist, orthotist, social worker, psychologist, vocational counsellor, nurse	Score 1 for each profession, each scored as present or absent. Total = total present. Maximum score = 8	Clients report whether each type of rehabilitation service was required but not received.
	Fulfilled OT needs while in hospital	Yes, No	Yes = clients received OT programs in all 4 core areas involving ADL training, pre-vocational assessment, home modification, and recreational pursuit; No = lack of treatment at least one core area	OT programs for people with SCI include four core areas as follows; ADL training, pre-vocational assessment, home and environmental modification, and recreational pursuit (Kovindha, 1990; Pajareya, 2000).
	Number of vocational services received while in hospital	Total number of visits from vocational counsellor while clients were in rehabilitation hospital		Clients self-report and/or medical record

The questionnaires for predictors of rehabilitation outcomes involved information related to both hospital and home. Questionnaire items relevant to variables at home included discharge status, attendant care, number of architectural barriers, transportation, and fulfilment of equipment needs. The collection of these data was performed at discharge. However, if the participants were not sure about the answer, the data was confirmed again at three months post-discharge by follow-up interview at the client's home. The reasons that these questions were answered at the time of discharge are explained below:

Discharge status: In Thailand, participants with SCI know beforehand whom they will live with after leaving hospital. It is usually their families, which are usually large. It is also the case that discharge procedures cannot occur in Thailand until clients know with whom they will live after leaving hospitals. Therefore, it is possible to obtain this information at the time of discharge.

Attendant care: As per discharge status, people with SCI know in advance who will look after them while they are at home. In Thai culture, it is seen as the responsibility of family to look after a family member who has a disability (Viboolpholprasert et al., 1997).

Number of architectural barriers: There is a list of architectural barriers for the participants to choose from in the questionnaire. The participants are assumed to know their own home environments.

Transportation in Thailand: There is no law to regulate transportation for people with disability (Kovindha, 2000). Participants knew the transportation problems they would face in their home and community before they leave hospitals.

Fulfilled equipment needs: In Thailand, equipment needed for use at home is provided to clients with SCI before discharge from hospital. They know if there is any equipment they need but do not currently have as they leave the hospital.

3.5 Preparation of Measurement Tools in the Thai Language

The FIM, the DASS, and the SF-36 Health Survey are standardized instruments; however, none include a Thai-language version. Similarly, the Predictors of Rehabilitation Outcomes Questionnaire was first developed in English. To prepare for data collection in Thailand, Thai-language versions were developed using translation and back-translation techniques (Babbitt, Edlen-nezin, Manikam, Summers, & Murphy, 1995; Ko & Cohen, 1998).

Three independent translators, each with more than twenty years of translation experience, first translated each instrument from English into Thai. All were certificated translators. One of them worked at the Thai Consulate General, Western Australia, one was a businessperson in Perth, and one was an English lecturer who had graduated from the University of Western Australia. Comparison of the three translations for each instrument indicated a strong level of agreement. Where there was disagreement, the researcher examined all three translations. Where there was agreement between two translations, that wording was chosen. If all three translations differed, the researcher tried to identify the reason for confusion and chose wording that best represented the English meaning (as opposed to direct translation of words). Upon completion of this process all instruments were back-translated by three different translators to confirm validity of all instruments prior to the pilot study exercise (Babbitt et al., 1995; Ko & Cohen, 1998). All translators involved in back translation were English lecturers in universities in Thailand who had greater than 20 years experience in both languages. Two of them worked at ChiangMai University, and one worked at Prince of Songkla University. There was little difference between the back-translated questionnaires in terms of wording. However, when these were compared to the original English documents they were true to the meaning of the original. No further changes were made to the instruments.

3.6 Pilot Study of the Instruments

As multiple instruments were used and multiple variables were to be measured, a pilot study of the measurement tools was undertaken. This provided the researcher with the opportunity to evaluate the effectiveness of the translated questionnaires in terms of clarity of understanding, ease of use, assessment time, and cultural appropriateness. The pilot study of the translated-instruments (Thai version) served the following purposes:

- To identify any parts of the instrument package difficult for participants to understand
- To identify items that participants found objectionable or offensive
- To determine if the sequencing of instruments within the data collection package was smooth and effective
- To determine training needs for data collection staff (Moore, 2000; Polit & Hungler, 1995; Stangor, 1998)

3.6.1 Pilot Study Methodology

The pilot study of all instruments was conducted with 15 participants between December 1999 and February 2000 in Thailand. All participants were solicited using purposive sampling from Maharaj Nakorn Chiang Mai hospital, the largest hospital in the northern part of the country. This hospital also admitted transferred clients with SCI from all areas around this region of Thailand. Purposive sampling is frequently used in clinical research situations, where the researchers handpick individuals who they believe are representative of the larger group of a population (Polit & Hungler, 1995). Of the 15 participants involved in the pilot process, 7 had quadriplegia and 8 had paraplegia.

The inclusion criteria of participants in the pilot study were:

- A primary diagnosis of traumatic SCI level A or B of the Frankel Functional Classification
- Good orientation to person, time and place
- Male, ranging in age from 15 to 60 years
- Received, at a minimum, services from occupational therapist, physiotherapist, rehabilitation nurse, and physiatrist (Rehabilitation units in Thailand mainly consist of these four professionals)
- To be discharged home (rather than to institutions)

The exclusion criteria of participants in the pilot study were:

- Additional medical problems such as infectious diseases, hearth problems, and/or fever during the time of assessment
- SCI of a progressive nature
- Discharged to other service settings such as a vocational training centre or nursing home

Table 3.6 outlines details of participants involved in the pilot study. The mean age of participants with paraplegia was 22.25 years while the mean age of participants with quadriplegia was 33.14 years. All of them were male. Levels of injury for paraplegia were between thoracic 4 and lumbar 5, and for quadriplegia were between cervical 5 and cervical 7.

Table 3.6: Description of Participants in the Pilot Study

Participants	Age (mean)	Level of injury*	Number of participants
Paraplegia	22.25 (years)	T4-L5	8
Quadriplegia	33.14 (years)	C5 – C7	7

Note. *C = Cervical, T = Thoracic, L = Lumbar

The researcher personally contacted prospective participants in the target hospital. If they expressed an interest and a willingness to participate, the purpose of the study was explained and informed consent obtained. Approval for this study was given by the Ethics Committee of Curtin University of Technology (Ethics approval number HR 212/99) and from authorities in the target hospital. Medical clearance was obtained from each participant's physician. In Thailand, permission for data collection from clients admitted to hospitals can be obtained from the authorized persons at each place, usually the director of the hospital or head of the target unit.

The pilot test involved participants completing the questionnaires, and then discussing their interpretation of questions, comprehension problems and any recommendations for improvements in wording (Williamson, 2000). Each individual was seen independently. Completion of the questionnaires and the subsequent interviews took place in the rehabilitation unit at the target hospital. The length of time for completion of each outcome measure and the Predictors of Rehabilitation Outcomes Questionnaire was recorded. During the interview, the researcher recorded all conversations, taking particular note of discussions related to comprehension, wording, assessment burden, and cultural aspects.

3.6.2 Results of Pilot Study

Overall, the pilot study revealed that participants understood all instruments. The questions were neither objectionable nor offensive to their beliefs. The assessment time to administer the entire package of instruments was, on average, 90 minutes, and all participants reported that the time burden for the whole session of assessment was acceptable. The participants' verbal feedback and recommendations were collected for the purposes of modification and adjustment of the questionnaire and other instruments. Details of the changes (all minor) for each instrument are recorded below.

- **FIM:** Only one item caused any concern for participants on completion of the FIM. Participants suggested that the FIM item "transferring from bathtub to wheelchair" be omitted due to the fact that the Thai tradition is to take either a shower or a sponge bath and most Thai homes, especially in rural areas, do not have a bathtub. This did not interfere with the validity of the FIM because a score of 1 (score range from 1 to 7) is awarded for any items that respondents cannot perform. A score of 1 is also awarded for any items that are not applicable to the respondents; for example, if the clients do not have stairs at home, a score 1 is given to the item 'going up and down stairs'. Thus, for an item such as transferring from wheelchair to bathtub or from bathtub to wheelchair, a score of 1 was awarded as per the standard scoring system. As this is accounted for in the standardized scoring method, no change was required in response to these comments from participants.
- **DASS Survey:** The pilot test revealed no changes to be made.
- **SF-36 Health Survey:** Some minor adjustments to the wording were suggested to further improve comprehension. For example the participants suggested using the term 'walking one and a half kilometers' rather than 'walking several blocks'. They also commented that the words 'walking two to three hundred meters' is more understandable than the words 'walking two or three blocks' in the Test of Physical

Functioning, part of the SF-36 Health Survey. The suggestion was made because the houses of Thai people in rural areas are scattered on the landscape rather than organized according to the more urban-like pattern of blocks. However, the elimination of the term 'walking several blocks' and 'walking two or three blocks' did not interfere with the validity of this test because it had the same meaning as 'walking one and a half kilometers' and 'walking two to three hundred meters' in this instrument.

There were also some adjustments in terms of wording to the items regarding socio-demographic variables in the Thai language to make them more understandable to participants. These adjustments did not change the meaning of the original wording and did not interfere with the validity of the instrument. For example, the term 'education level' was adjusted to 'educational level completed', and the words 'current age' was changed to 'date of birth'. By making these minor adjustments to the translated instruments, the measures were considered to be more culturally sensitive to the Thai context.

3.7 Summary

Three models relevant to the measurement of rehabilitation outcomes were reviewed:

- The research model for factors predicting rehabilitation outcomes of DeJong et al. (1984)
- The model of SCI rehabilitation proposed by Whiteneck (1987)
- The model of outcome measurement in rehabilitation by Stineman and Granger (1994)

The model of factors predicting rehabilitation outcomes proposed by DeJong et al (1984) was selected as the baseline for the development of the questionnaire for predictors of rehabilitation outcomes in the present study. The three major outcome variables in the present study were functional status, health status, and emotional status. In addition, there were five groups of independent variables: socio-demographic, disability related, environmental, interface, and service-related. Three standard instruments: the FIM, SF-36

Health Survey, and the DASS were used for the collection of functional status, health status, and emotional status respectively. The questionnaire for predictors of rehabilitation outcomes was developed and assessed by three experts in the field. Three certified translators translated all instruments from English to Thai, and another three qualified translators did the back translation. A pilot study with fifteen subjects was conducted before proceeding with data collection for the larger population.

CHAPTER 4: METHODS

4.1 Objectives

While previously there has been much emphasis on medical outcomes of spinal cord injury, emphasis in Western countries is now focused on function, independence, community integration and quality of life (QOL). Determining those factors that contribute to successful outcomes, whether medical or social, is complex and difficult. This may be even more complex in Thailand where the medical model still prevails, and clinical service remains focused on medical outcomes. Few, if any, community services exist and neither the person with a disability, their family or society in general has expectations related to community integration or inclusion. Current outcomes were defined within the context of rehabilitation services in Thailand today.

Limited research exists to inform either research or rehabilitation services in Thailand. The objectives of this research were to gain insight into the current outcomes as well as insight into predictors of those outcomes. Specifically, the objectives were:

- To describe the functional status, health status, and emotional status of people with SCI in Thailand, both at discharge from rehabilitation services and at three months post-discharge
- To compare functional status, health status and emotional status of people with SCI in Thailand at discharge from rehabilitation services and at three months post-discharge
- To identify and describe factors that predict functional status, health status, and emotional status of people with SCI in Thailand

4.2 Research Design

A prospective, descriptive clinical study was undertaken. Included in the study were males admitted with a diagnosis of spinal cord injury (SCI) to rehabilitation services at 10 major hospitals in the northern part of Thailand. Participants were included in the sample population sequentially as this approach to sampling was expected to limit potential sample bias. Data was collected just prior to discharge from rehabilitation services and again at three months post-discharge. Follow-up data was collected in the clients' homes. Participants gave informed consent to their involvement in the study.

4.3 Sample

All male clients, discharged from 10 hospitals between 5th April 2000 and 5th April 2001, were eligible to be included in the study. All of the hospitals had rehabilitation sections, with occupational therapy and physiotherapy services for people with SCI transferred from acute spinal cord injury units. The inclusion criteria (same as pilot study) formed the basis for sampling:

- A primary diagnosis of traumatic SCI level A or B of the Frankel Functional Classification
- Orientation to person, time, and place
- Male, ranging in age from 15 to 60 years
- Received services at a minimum, occupational therapy, physiotherapy, rehabilitation nursing, and physiatry
- To be discharged home and not to a residential facility
- Willing to participate in data collection both in hospital and in own home

Use of the Frankel Functional Classification ensured that all subjects had permanent SCI and prevented inclusion of clients who may have benefited from spontaneous recovery after discharge from hospital. The study was restricted to male clients because the majority of people with SCI in Thailand are male (Kovindha, 1990; Pajareya, 2000). In addition, the differences in functional roles between males and females in Thailand (Kovindha, 1990) might have confounded the interpretation of factors predicting rehabilitation outcomes. Having a homogenous sample also strengthened the results. In order to have a homogeneous group of subjects in terms of age, participants were restricted to those whose age fell within the legal work limits. Age 15 is the legal age to commence paid employment in Thailand and age 60 marks retirement (Kovindha, 1993; Pajareya, 2000).

Prior to and after the age of legal paid employment, daily activity patterns and social expectations differ considerably. Occupational therapists, physiotherapists, rehabilitation nurses, and physiatrists are considered to be the major rehabilitation service providers in Thailand (Reawpaibool, 2000). As such, receipt of service from these disciplines, was considered essential to defining a client who had received rehabilitation.

Potential participants were excluded if:

- They had additional medical problems such as infectious diseases, heart problems, or fever during the time of the discharge interview and assessment.
- Their SCI was of a progressive nature.
- They were discharged from acute rehabilitation hospitals to other service settings such as vocational training centres, nursing homes, and shelters. In Thailand shelters are institutional charitable, care facilities for people who have no support at home.

Within the data collection period (5th April 2000 and 5th April 2001) 121 potential participants who met the selection criteria were discharged from hospital. Sixty-four participants were identified with paraplegia and 57 participants were identified with quadriplegia. All potential participants agreed to participate in the study and none withdrew during the data collection period. Details of the participating hospitals and number of participants from each are outlined in Table 4.1.

Table 4.1: Hospitals and Participants Recruited

Data collection sites	Number of participants	
	Paraplegia	Quadriplegia
Maharaj Nakorn ChiangMai Hospital	34	32
McKean Hospital, Chiang Mai	6	6
ChiangRai Prachanukrua Hospital	4	2
Buddhashinaraj Pisanulok Hospital	10	8
LamPang Hospital	3	1
Prae Hospital	1	2
Kumpangpetch Hospital	1	0
Petchaboon Hospital	1	2
Payoa Hospital	2	3
Nan Hospital	2	1
Total	64	57

The largest number of participants was recruited from Maharaj Nakhon Chiang Mai Hospital. This is the largest hospital in this region in terms of patients served and number of beds and services. The hospital receives referrals from other hospitals in the northern part of the country. In some circumstances, smaller hospitals named here, such as Prae, Kumpangpetch, and Petchaboon, also refer people with SCI to Maharaj Nakhon Chiang Mai Hospital.

4.4 Variables and Measurement Tools

There were three groups of variables to be considered in the present study: outcome variables (dependent variables), predictors (independent variables) and additional variables.

4.4.1 Dependent Variables (Outcome Measures)

As noted in Chapter 3, three standardized tools were selected to measure success in the three outcomes: functional status, health status, and emotional status. The standardized outcome measures, one for each variable were; the Functional Independent Measure (FIM), the Depression, Anxiety, and Stress Scale (DASS), and the SF-36 Health Survey, respectively.

4.4.2 Independent Variables (Predictors)

Also noted in Chapter 3, the independent variables included in this study (see Table 3.2) were grouped into 5 categories:

- Socio-demographic characteristics (4 variables)
- Disability-related variables (4 variables)
- Environmental barriers (3 variables)
- An interface variable
- Services-related variables (4 variables)

Each was fully described in Chapter. The development of a comprehensive questionnaire to measure each variable was also documented in Chapter 3. The "Questionnaire for Predictors of Rehabilitation Outcomes" (Appendix B) was used to describe clients at each point in time and to compare changes over time. The questionnaire also provided data for the predictive analyses.

4.4.3 Additional Variables

Two additional variables were added to the present study. These were level of injury and causes of injury. These two variables were included in the data collection but were not considered as independent variables in the model. Although level of injury was used to divide the sample into two groups (quadriplegia and paraplegia) for some analyses, it is already known that abilities of people with SCI as demonstrated in terms of functional capacity is directly related to level of injury (Buchanan & Nawoczenski, 1987; Kohlmeyer & Yarkony, 1994; Pajareya, 2000). In addition, levels as well as causes of injury do not appear to affect perceived health and emotional status in people with SCI (Hammell, 1995; Richards et al., 1999; Westgren & Levi, 1998). Data on these two variables were collected in order to fully describe the sample but neither was used as an independent variable.

4.5 Procedures of Data Collection

There were 10 participating hospitals in the present study. Five occupational therapists from ChiangRai Prachanukrua, Buddhashinaraj, Lampang, Prae, and Petchaboon Hospitals assisted in the identification of potential participants at each hospital and administered the *Questionnaire for Predictors of Rehabilitation Outcomes.* The therapists participated in a two-day training session at the Department of Occupational Therapy, Chiang Mai University, Thailand, conducted by the researcher in mid-March, 2000. They were all trained in data collection procedures at the same time and to the same standard by the principle researcher and the three experts who had assisted with the development of the questionnaire. The occupational therapists were oriented to the data collection procedures, including the development and scoring of the questionnaire. The definition of each item on the questionnaire was explained. Following this, occupational therapists practiced data collection in pairs acting as client and therapist and reversing these roles. Following this activity, interview data were discussed and any discrepancies in data collection addressed. Then, they administered the questionnaire to the clients in the hospitals above. The researcher administered the questionnaire at Maharaj Nakorn ChiangMai, McKean, Kumpangpetch, Payoa, and Nan Hospitals.

The researcher and the five occupational therapists reviewed each client sequentially referred to rehabilitation units over the period of data collection. In Thailand, almost all clients with SCI are referred from an acute SCI unit to a rehabilitation unit as soon as their medical condition is stable. A few clients with SCI do prefer to return home without rehabilitation services. Clients who appeared to meet the selection criteria were approached and invited to participate in the study. The purpose of the study was explained, the need for data to be collected both prior to discharge and in the client's home 3 months post-discharge was outlined, and informed consent was sought (see Appendix F). Consenting clients also agreed to have their name and hospital contact details provided to the principal investigator in order for the principle investigator to make initial contact. In the two days prior to discharge, the occupational therapists (trained-research assistants) in the rehabilitation unit from five hospitals collected data on the independent variables. This was collected prior to the standard instruments being administered to reduce the fatigue that clients may experience during a long assessment process. Following a rest period, the principle investigator administered the FIM, DASS, and SF-36 Health Survey. Immediately following the assessment, participants provided an address and route map to their home. The principle investigator, to facilitate the 3-month visit for the purpose of re-testing, used this map directory. In the remaining five hospitals, the principle investigator maintained contact with the head of the rehabilitation units in order to be informed about the discharge date of each client with SCI. The assessment of outcome variables was conducted at 48 hours prior to discharge by the principle investigator (functional status, health status, and emotional status). Each participant provided their address and a route map immediately following the assessment in order for the researcher to make a re-assessment at three months post-discharge. The principle investigator assessed all pre-discharge outcome variables. At three months post-discharge, the principle investigator collected follow-up data of outcome measures in the clients' homes.

4.6 Data Analysis

Because of the marked difference in functional status of participants with paraplegia and quadriplegia, the two groups were examined separately. Unless otherwise noted, all analysis was split by level of SCI.

Data from all three-outcome measures were treated as continuous data. The SF-36 Health Survey yields scores ranging from 1 to 100, which can also be analysed as continuous data (Ware, et al. 1993). Both the FIM and the DASS employ Likert-like scales for individual items with ordinal scales of at least 4 levels. These are then totalled and averaged. Kiess (1989) has stated that such scores provide more than merely ordinal information. Healey (1990) supports this, noting that they possess a continuous rank-ordered characteristic similar to interval data, even though the distance between ranks may not be equivalent. Furthermore, the large sample size (121 participants) supports the use of parametric statistical analysis. Thus it was concluded that the data could be treated as continuous data based on the summated nature of the scores, the use of at least 4 levels of ranked data and the large sample size (Healey, 1990; Kiess, 1989; Kijpredarborisut, 2002). This justified the use of parametric statistics.

Data analysis was based on the three research objectives posed in this research. All data analysis was performed using SPSS PC version 10 (2000), SPSS Inc. Chicago, IL.

Research Objective 1:

- Describe the functional performance, health status, and emotional status of people with SCI in Thailand, both at discharge from rehabilitation services and at three months post-discharge.
- Descriptive statistics (mean and standard deviation) were used to describe both independent variables (predictors) and dependent variables (rehabilitation outcomes) at initial and post-discharge testing.

Research Objective 2:

- Compare functional performance, health status and emotional status of people with SCI in Thailand at discharge from rehabilitation services and at three months post-discharge.
- To test differences between the FIM, DASS, and SF-36 Health Survey scores at discharge and three months post discharge, a paired t-test was considered most appropriate. It is appropriate for analysing the difference between two means in the same group of participants at two different times.

However, the inappropriate use of multiple t-tests when more than two comparisons are made within a single set of data may result in a Type I error, which is specified by α (Portney & Watkin, 1993). At $\alpha = .05$, there is a 5 % chance of error in stating that group means are different in one comparison. There is a need to differentiate this one comparison from the situation where α is set at .05 for each of several comparisons in one experiment. Although it is true that $\alpha = .05$ for each individual comparison, the potential cumulative error for the set of comparisons is actually greater than .05. This cumulative probability has been called the "family wise error rate" (α_{FW}) and represents the probability of making at least one Type I error.

The Type I error rate for a family comparisons at $\alpha = .05$ is equal to

$$\alpha_{FW = 1} - (1 - \alpha)^c$$

where c represents the total number of comparisons (Portney & Watkin, 1993). For example, in comparing three means at $\alpha = .05$: therefore, $\alpha_{FW = 1} - (1 - .05)^3 = .143$

This means that in performing three t-tests, there is a greater than 14 % chance that at least one of these significant differences occurred by chance. This exceeds the generally accepted standard of a 5 % risk for a Type I error. As the number of comparisons increases, so does the probability that at least one significant difference will occur by chance. This means that α_{FW} is dependent on the number of planned comparisons (c). It is essential to split α evenly among the set of planned comparisons, so that each contrast is tested at α_{FW}/c. For example, if the researcher wants an overall probability of .05 for a set of five comparisons, each individual comparison will have to achieve significance at .05/5 = .01. This process of adjusting α is called Bonferroni's correction (Portney & Watkin, 1993). All t-tests conducted in this study used this technique. There were three sets of data in the present study including functional status, emotional status, and health status. There was only one comparison in the functional status so the Bonferroni's correction was not used in this set of data. However, there were three comparisons of emotional status including the comparisons of depression, anxiety, and stress. Therefore, the α value at .05 was divided by 3, which equal to .016. In addition, there were eight comparisons in health status including the comparisons of general health, physical functioning, role physical, role emotional, social functioning, bodily pain, vitality, and mental health. Therefore, the α value at .05 was divided by 8, which is equal to .006.

The strength of the findings from the t-test can be analysed by the effect size statistic known as eta squared (Pallant, 2001). This statistic provides an indication of the magnitude of the differences between the comparative means. There are a number of different effect size statistics, the most common of which is eta squared (Pallant, 2001). Eta squared represents the proportion of variance of the dependent variable that is explained by the independent (group) variable. Values for eta squared can range from 0 to 1. To interpret the strength of eta squared values the following guidelines can be used:

.01 = small effect;
.06 = moderate effect; and
.14 = large effect (Cohen, 1988).

Research Objective 3:

- Identify and describe factors that predict functional status, health status, and emotional status in people with SCI in Thailand.
- Multiple regression analysis is used to examine the relationship between outcome variables and two or more independent variables (Flaherty, Lombardo, Morgan, & de Silva, 1996; Polit & Hungler, 1995). In this study, this statistic allowed an examination of the influence of independent variables on and their ability to predict outcome variables. Multiple regression allows the independent variables to be either

continuous interval, and ratio scales or dichotomous variables (Polit & Hungler, 1995). The purpose of multiple regression analysis in this study was two fold:

- To determine which variables were most predictive of functional performance, health status and emotional status (depression, anxiety and stress) in people with SCI in northern Thailand
- To determine what proportion of variance in these outcome variables could be explained by independent or predictive variables.

Prior to any data analysis the assumptions behind multiple regression - linearity, normality and homogeneity were tested. The correlation coefficient was the statistic used to investigate the linearity of data (Pallant, 2001). Normality can be assessed by obtaining the Skewness and Kurtosis values (Pallant, 2001). The Kolmogorov-Smirnov test proved to be too sensitive for the large sample size (Pallant, 2001). However, using Skewness and Kurtosis as a test of normality gave acceptable results. Normality was confirmed by graphical analysis (normal probability plots). The residual scatter plot was used to assess homoscedasticity (Bobko, 2001; Pallant, 2001). All these statistics were analysed using the SPSS version 10.

4.7 Ethical Considerations

This research was approved by Curtin University of Technology Human Research Ethics Committee (Ethics Approval code: HR 212/99). As is customary in Thailand, authorized persons at each hospital in Thailand also provided permission to conduct the research within their premises. Consent forms were handed to the respondents who were willing to participate in the study. All participants were informed that the data they provided would be used only for the purpose of research and would be treated confidentially. It was made clear both in written format (see Appendix C) and verbally that each person was free to withdraw their consent to participate at any time without impact on provision of medical or rehabilitation intervention.

According to the Curtin University of Technology regulations, all data has been stored in locked cabinets by the researcher and will continue to be so stored for a period of five years and then destroyed. Participants were identified using a coding system and no identifying information was recorded on the data collection sheets. In all forms of dissemination, only aggregated group totals have and will be reported and no identifying information will allow identification of individuals. Pseudonyms are used when referring to individual cases. Therefore, anonymity and privacy of all participants were protected.

CHAPTER 5: RESULTS

This chapter presents the results of the study. Firstly, a descriptive analysis of the independent variables, (socio-demographic variables, disability-related variables, environmental variables, an interface variable, and service-related variables) paints a picture of the sample studied and those factors proposed as important to successful outcome following SCI. Following this, results of the study are organised and presented based on the three objectives of the study, namely:

- To describe the functional status, health status, and emotional status of people with SCI in Thailand, both at discharge from rehabilitation services and at three months post-discharge
- To compare functional status, health status and emotional status of people with SCI in Thailand at discharge from rehabilitation services and at three months post-discharge
- To identify and describe factors that predicts functional status, health status, and emotional status in people with SCI in Thailand

5.1 Descriptive Analysis of the Sample Characteristics and Independent Variables

One hundred and twenty one males with spinal cord injury met the inclusion criteria for the study. Of the 121 men, 57 had quadriplegia and 64 had paraplegia. Table 5.1 indicates that the largest group of participants sustained injuries at the cervical level (47.1%), followed by thoracic (34.7%), and lumbar (22%). The most frequent cause of SCI in this study was road traffic accidents (61.2%).

Table 5.1: Frequency and Percentage of Levels and Causes of SCI (N = 121)

Variables		Frequency	Percentage
Level of injury	C5-C8	57	47.10
	T1-T12	42	34.70
	L1-L5	22	18.20
Cause of injury	Traffic accidents	74	61.20
	Falls	35	28.90
	Gun shot wounds	12	9.90

Because many of the independent variables also served to describe the sample, these are presented here and tabulated in Tables 5.2 to 5.7. Information presented in these tables was collected from participants during the first data collection period, within 48 hours prior to discharge from rehabilitation units.

Socio-demographic variables included age, education level, economic status, and marital status (see Table 5.2). Most participants were in the youngest age group (57.0%), ranging between 15 and 30 years of age. The majority had completed either elementary (34.7%) or secondary education (42.1%), and approximately half of the participants were classified as economically poor. Almost half of the participants (48.8%) stated they were unmarried.

Disability-related variables included age at onset of SCI, duration of disability, and discharge status. Data shown in Table 5.3 demonstrates that age at onset of injury for more than half (57.9%) of the participants was between 15 and 30. The time since onset for the majority of participants (62.0%) was from 7 to 9 months. A large number of these participants (99.2%) stated they did not have any difficulties communicating with other people. The majority (90.9%) lived with their families upon leaving hospital.

Table 5.2: **Frequency and Percentage of Socio-demographic Variables (N=121)**

Variables		Frequency	Percentage
Current age	15-30 years	69	57.00
	31-45 years	39	32.20
	46-60 years	13	10.70
Education completed	No education	4	3.30
	Elementary education	42	34.70
	Secondary education	51	42.10
	College	21	17.40
	University and above	3	2.50
Economic status	Poor	63	52.10
	Not poor	58	47.90
Marital status	Married	55	45.50
	Single	59	48.80
	Divorced	4	3.30
	Widowed	3	2.50

Table 5.3: **Frequency and Percentage of Disability-related Variables (N=121)**

Variables		Frequency	Percentage
Age at onset	15-30 years	70	57.90
	31-45 years	38	31.40
	46-60 years	13	10.70
Duration of disability	3-6 months	36	29.80
	7-9 months	75	62.00
	10-12 months	8	6.60
	> 12 months	2	1.70
Communication problems	Yes	1	0.80
	No	120	99.20
Discharge status	Live alone	0	0.00
	Live with family	110	90.90
	Live with relatives	11	9.10

Environmental variables measured were use of attendant care, housing, and transportation (Table 5.4). These variables were obtained at time of discharge. In the case that participants were not sure about the answers, data was collected again at three months post-discharge. Eighty per cent of participants had assistance provided at home, mostly from their family members. Almost all participants reported architectural barriers at homes, ranging in number from 1 to 6 types of barriers. All participants reported the unavailability of accessible public and private transportation in their community.

Table 5.4: Frequency and Percentage of Environmental Variables (N=121)

Variables		Frequency	Percentage
Attendant care	Present	97	80.20
	Absent	24	19.80
Number of architectural barriers	0	2	1.70
	1	19	15.70
	2	30	24.80
	3	36	29.80
	4	30	24.80
	5	1	0.80
	6	3	2.50
Transportation	Available	0	0.00
	Not available	121	100.00

An interface variable, fulfilment of adaptive equipment needs, was based on self-report. Since there is no formal follow-up rehabilitation for people with disability in Thailand (Reawpaibool, 2000), adaptive equipment necessary for use at home would normally be provided at the time of discharge from hospital. Results in Table 5.5 show that participants reported only 29.8% had adaptive equipment that met their needs for activities of daily living at the time of discharge.

Table 5.5: Frequency and Percentage of the Interface Variable (N=121)

Variable		Frequency	Percentage
Fulfillment of equipment needs	Yes	36	29.80
	No	85	70.20

Service-related variables provided data on relevant rehabilitation services, including length of hospitalisation and health service utilization, number of different services received, number of services not received but required, fulfilment of OT needs and the number of vocational rehabilitation services received. Table 5.6 describes the results of all variables above except health service utilization, which is presented separately in Table 5.7.

Table 5.6: Frequency and Percentage of Service-related Variables (except health service utilization) in Participants with SCI (N=121)

Variables		Frequency	Percentage
Hospitalisation	0-3 months	36	29.80
	4-6 months	75	62.00
	7-9 months	8	6.60
	10-12 months	2	1.70
Number of services received while in hospital (self-report)	1	0	0.00
	2	0	0.00
	3	0	0.00
	4	95	78.50
	5	23	19.00
	6	2	1.70
	7	1	0.80
Number of services not received but required while in hospital (self-report)	0	1	0.80
	1	28	23.10
	2	45	37.20
	3	43	35.50
	4	4	3.30
Fulfilled OT needs	Yes	35	28.90
	No	86	71.10
Number of vocational service received while in hospital (total number of visits from vocational counsellor)	0	111	91.70
	1	7	5.80
	2	2	1.70
	3	0	0.00
	4	0	0.00
	5	1	0.80

The most common length of time spent in hospital was four to six months (62.0%). Nearly 80% of participants received four rehabilitation services, mainly from occupational therapists, nurses, physiotherapists, and physiatrists while in hospital (Table 5.7). For number of services required but not received, participants were presented with a list of rehabilitation professionals and then asked if each professional provided service for them.

Table 5.7: **Frequency and Percentage of Health Service Utilisation of people with SCI (N = 121)**

Variables	Visit(s) per week	Number of people reporting this frequency	Percentage of total
Physiatrist	1	109	91.80
	2	8	6.60
	3-4	0	0.00
	5	4	3.30
Nurse	1-4	0	0.00
	5	2	1.70
	6	1	0.80
	7	118	97.5
Occupational therapist	1	0	0.00
	2	9	7.40
	3	15	12.40
	4	0	0.00
	5	89	73.60
	6	8	6.60
Physiotherapist	1-3	0	0.00
	4	3	2.50
	5	106	87.60
	6	12	9.90
Orthotist	0	108	89.30
	1	13	10.80
Social worker	0	103	85.10
	1	18	14.9
Psychologist	0	116	95.90
	1	5	4.10
Vocational counsellor	0	113	93.40
	1	8	6.60

These are different from number of vocational services received, which focused on the frequency with which people with SCI met a vocational counsellor during rehabilitation. OT needs fulfilled, and number of vocational services received, were emphasised in the present study because they had strong correlation to rehabilitation outcomes of people with SCI as proposed by DeJong et al. (1984). Almost all participants (99.2%) reported areas where services were required, but not provided. Investigation into the fulfilment of occupational therapy (OT) needs revealed that only 28.9% of participants had their occupational therapy needs fulfilled. Occupational therapy services recommended by previous studies for people with SCI comprise ADL training, prevocational evaluation, equipment and environmental modification, and recreational pursuits (Kovindha, 1990; Pajareya, 2000). Participants who received OT programs in all these areas were classified as having their OT needs fulfilled. The majority of participants (91.7%) reported that there was no vocational counselling or psychological service available to them. Results reported in Table 5.7 demonstrated that most people in the present study (91.8%) met with a medical doctor (physiatrist) once a week. However, almost all participants (97.5%) were cared for daily by a rehabilitation nurse. Many participants (73.6%) also received services from occupational therapists, on average, five days per week and from physiotherapists also (87.6%), on average, five days per week, when they were in rehabilitation units. The majority of people with SCI in this study did **not** receive services from personnel such as orthotists (89.3%); social workers (85.1%); psychologists (95.9%) or vocational counsellors (93.4%). In Thailand, orthotists still provide body and leg braces for people with SCI (Kovindha, 1990)

5.2 Description of Functional Status, Health, and Emotional Status of People with SCI in Thailand at Discharge and Three Months Post-Discharge

This section presents the descriptive findings of the study. Prior to the analysis, the data was examined to determine whether the sample exhibited the same functional performance differences between participants with paraplegia and participants with quadriplegia found in other studies (Kohlmeyer & Yarkony, 1994; Kovindha, 1990). A simple comparison of FIM scores on the three outcome measures at three months post-discharge for the two groups was conducted using a student's t-test for independent samples. . The mean scores of functional status of people with quadriplegia (M = 74.12) was significantly lower than the mean scores of functional status of people with paraplegia (M = 106.36) at $p<.05$. Results confirmed a difference in functional status between people with quadriplegia and people with paraplegia. Therefore, all results related to functional performance were analysed and reported separately for the two groups. However, many research studies (Fuhrer et al., 1992; Siosteen et al., 1990; Somers, 1992) have indicated that there is no difference in the perception of life satisfaction and health, emotional states (such as depression, anxiety, and stress), and quality of life between people with quadriplegia and people with paraplegia. A comparison of depression, anxiety, and stress scores between participants with quadriplegia and participants with paraplegia in the present study, using a paired t-test confirmed this, showing no significant difference in emotional states between groups. Scores on the SF-36 Health Survey also showed no significant differences between participants with quadriplegia and participants with paraplegia in the present study. Based on this analysis of the data, the results in the present study related to the emotional status (depression, anxiety and stress) and perceived health status represent both cohorts, leaving only functional status to be reported separately for the two groups.

5.2.1 Functional status

Functional performance was measured using the FIM, within the 48-hour period prior to discharge, and at three months post discharge. The FIM records 7 levels of functional status ranging from Level 1 - total assistance to level 7 - complete independence (refer to chapter 3). Higher scores indicate more positive outcomes and greater independence. Table 5.8 outlines the functional level of people with paraplegia at 48 hours before discharge and at three months post-discharge from hospital.

Table 5.8: Functional Status of Participants with Paraplegia Measured at Discharge and at Three Months Post-discharge from Hospital (N = 64)

Variables		**Number of Participants at each FIM Level Discharge / Follow-up**						
		1	**2**	**3**	**4**	**5**	**6**	**7**
Self-care	Feeding	0/0	0/0	0/0	0/0	0/0	3/0	61/64
	Grooming	0/0	0/0	0/0	2/2	0/2	2/7	60/53
	Bathing	1/3	3/0	4/1	1/7	8/20	29/11	18/22
	Dressing (upper part)	0/0	0/0	1/1	1/1	1/11	13/10	48/41
	Dressing (lower part)	0/2	3/0	2/2	2/8	7/15	26/21	24/16
	Toileting	4/8	7/0	6/5	10/17	18/ 14	10/17	9/3
Sphincter control	Bladder	7/6	14/14	20/18	9/13	5/8	9/5	0/0
	Bowel	12/10	15/12	17/17	11/13	3/7	6/4	0/0
Mobility* (transfer)	Bed, Chair, and W/C	0/9	1/1	0/2	2/6	3/2	31/21	27/23
	Toilet	1/16	1/1	2/3	4/9	4/7	42/22	10/6
Locomotion	Walk	35/55	17/8	12/1	0/0	0/0	0/0	0/0
	W/C	0/2	0/1	1/1	2/22	2/15	59/23	0/0
	Stairs	31/52	21/4	11/6	1/0	0/1	0/1	0/0
Communication	Comprehension							
	- visual	0/0	0/0	0/0	0/0	7/1	15/24	42/39
	- auditory	0/0	0/0	0/0	0/0	7/1	13/21	44/42
	Expression							

Variables		Number of Participants at each FIM Level Discharge / Follow-up						
		1	2	3	4	5	6	7
	- verbal	0/0	0/0	0/0	0/0	0/0	8/10	56/54
	- non-verbal	0/0	0/0	0/0	0/0	0/0	56/10	8/54
Social cognition	Social interaction	0/0	0/0	0/0	0/0	12/18	23/21	29/25
	Problem solving	0/0	0/0	0/0	0/0	1/2	13/19	50/43
	Memory	0/0	0/0	0/0	0/0	0/0	7/13	57/51

Note: *Transfers to and from a bathtub were not evaluated because Thai homes do not traditionally have bathtubs and none of the clients' homes had bathtubs.

Results reported in Table 5.8 demonstrate that the majority (61 out of 64) of people with paraplegia in the present study demonstrated complete independence (FIM level 7) in feeding activities at discharge. At post-discharge all of participants performed independently in feeding activity. In addition, 60 of 64, and 48 of 64 people performed well (FIM level 7) in grooming, and dressing (upper part) respectively at before discharge from hospital. However, at discharge, a number (45 of 64) still needed help (FIM level 1 to 5) for toileting activities such as adjusting clothing before and after using toilet. The majority of participants with paraplegia (55 of 64) needed assistance (FIM level 1 to 5) for bladder management at discharge compare to 49 of 64 at three months post-discharge. In addition, 58 of 64 people needed assistance (FIM level 1 to 5) in bowel management at discharge while 60 of 64 people needed assistance at three months post-discharge. However, most participants (58 of 64) performed well (FIM level 6 and 7) in transferring from bed to chair, and wheelchair at discharge. At post-discharge, there were only 44 of 64 who performed well (FIM level 6 and 7) in transferring. There were 12 of 64 who needed help (FIM level 1 to 5) transferring from wheelchair to toilet at discharge compared to 36 of 46 post-discharge. Five of sixty-four people needed help (FIM level 1 to 5) in wheelchair uses (locomotion) at discharge, compared to 41 of 64 at post-discharge. All participants could not walk or go up and down stairs independently (FIM level 6 and 7), both at discharge and at post-discharge.

The majority of participants were independent (FIM level 6 and 7) in the areas of communication and social cognition. Only a few had some difficulty in comprehension and social interaction. The assessment of communication in the FIM focused on the ability to comprehend what was heard and seen and the ability to express needs. The assessment of social cognition in the FIM focused on social interaction, problem solving, and memory. Communication and social cognition were assessed in this sample in terms of environmental and behavioural involvement, not in relation to neurological deficiency.

As noted, data for people with quadriplegia were analysed separately. Table 5.9 describes the functional ability of participants with quadriplegia at 48 hours before discharge and at 3 months post-discharge.

Table 5.9: Functional Status of People with Quadriplegia at Discharge and at Three Months Post-discharge from Hospital (N = 57)

Variables		Number of Participants at each FIM Level; Discharge/ Follow-up						
		1	2	3	4	5	6	7
Self-care	Feeding	0/1	0/4	1/4	8/16	9/15	26/16	13/1
	Grooming	0/7	5/6	6/15	15/10	19/11	10/8	2/0
	Bathing	46/41	5/8	1/3	1/5	1/0	2/0	1/0
	Dressing (upper part)	6/11	9/3	0/12	7/17	15/3	18/11	2/0
	Dressing (lower part)	33/33	16/12	2/5	2/7	0/0	3/0	1/0
	Toileting	44/45	6/8	3/4	3/0	1/0	0/0	0/0
Sphincter control	Bladder	48/46	5/10	2/0	2/1	0/0	0/0	0/0
	Bowel	48/47	5/10	2/0	2/0	0/0	0/0	0/0
Mobility* (transfer)	Bed, Chair, and W/C	33/38	16/6	4/6	3/7	1/0	0/0	0/0
	Toilet	48/47	5/9	2/1	2/0	0/0	0/0	0/0
Locomotion	Walk	57/57	0/0	0/0	0/0	0/0	0/0	0/0
	W/C	2/18	5/17	9/9	11/6	23/6	7/1	0/0
	Stairs	57/54	0/3	0/0	0/0	0/0	0/0	0/0
Communication	Comprehension							
	-visual	0/0	0/0	0/0	0/0	2/0	14/12	41/45
	-auditory	0/0	0/0	0/0	0/0	1/0	12/11	44/46
	Expression							
	-verbal	0/0	0/0	0/0	0/0	0/0	1/5	56/52
	-non-verbal	0/0	0/0	0/0	0/0	0/0	6/6	51/51
Social cognition	Social interaction	0/0	0/0	0/0	0/0	6/12	23/15	28/30
	Problem solving	0/0	0/0	0/0	0/1	3/1	5/17	49/38
	Memory	0/0	0/0	0/0	0/0	1/1	5/12	51/44

Note: *Transfers to and from a bathtub were not evaluated because Thai homes do not traditionally have bathtubs and none of the clients' homes had bathtubs.

Eighteen of fifty-seven people needed assistance in feeding activity at discharge compared to 39 of 57 at three months post-discharge. Grooming activity also had the same trend as feeding activity. The majority of these participants (54 of 57) needed assistance in bathing at discharge while at three months post-discharge all of them depended on others (FIM level 1 to 5). The same trend occurred in all other items of FIM in this group. Not surprisingly, all participants with quadriplegia needed assistance in bowel and bladder management, mobility (transfer), walking or going up and down stairs, both at discharge and at post-discharge. The majority of participants had no cognitive function problems at discharge and at post-discharge. There were only six people of 57 who needed some guidance or supervision (functional level 5) in social interaction at discharge compared to 12 of 57 people at post-discharge.

5.2.2 Emotional States of Depression, Anxiety, and Stress

The results of the DASS can be treated as continuous data (Lovibond & Lovibond, 1996) and presented as means and standard deviations. Alternatively, the DASS scores can be converted to Z scores. This method was chosen to enable comparison between DASS scores for depression, anxiety and stress of the current participants. Five levels of depression, anxiety and stress were identified by Lovibond &Lovibond, (1996) as normal, mild, moderate, severe, and extremely severe. Table 5.10 outlines the emotional status as measured by the DASS at each level of depression, anxiety and stress.

Table 5.10: Emotional Status as Measured by the DASS at Discharge and at Three Months Post-discharge (N = 121)

Emotional states	Levels of measurement	Discharge		Post-discharge	
		Frequency	Percent	Frequency	Percent
Depression	Normal	11	9.10	4	3.30
	Mild	29	24.00	17	14.00
	Moderate	58	47.90	44	36.40
	Severe	19	15.70	45	37.20
	Extremely severe	4	3.30	11	9.10
Anxiety	Normal	17	14.00	4	3.30
	Mild	15	12.40	9	7.40
	Moderate	66	54.50	56	46.30
	Severe	11	9.10	32	26.40
	Extremely severe	12	9.90	20	16.50
Stress	Normal	51	42.10	49	40.50
	Mild	42	34.70	31	25.60
	Moderate	27	22.30	30	24.80
	Severe	1	0.80	11	9.10
	Extremely severe	0	0.00	0	0.00

Results reported in Table 5.10 demonstrate that as many as 58 people out of 121 (47.9%) had moderate depression at discharge from hospital while another 29 people (24.0%) had mild depression. Only 11 (9.1%) reported no depression at all. There were, however, more extreme levels reported. Nineteen people (15.7%) reported severe depression and four people (3.3%) reported levels of extremely severe depression. Depression levels at three months post-discharge appeared to indicate a shift toward more severe scores. Forty-four participants (36.4%) reported moderate depression 45 (37.2%) reported severe depression and 11 (9.1%) reported extremely severe depression three months after discharge. These results suggest a move toward more severe depression at three months post discharge.

Anxiety scores showed the same trend. The majority of participants (66 people or 54.5%) reported moderate anxiety, 11 people (9.1%) reported severe anxiety, and 12 people (9.9%) reported extremely severe anxiety at the time of discharge from hospitals. At three months post-discharge, the number of people who reported severe and extremely severe anxiety stood at 32(26.4%) and 20(16.5%) respectively. As noted with the depression scores, the trend was that fewer people reported moderate anxiety. Fifty-six people or 46.3% reported moderate anxiety, nine 9 people (7.4%) reported mild anxiety and only four participants (3.3%) reported no anxiety at all at three months post-discharge.

Stress scores presented a different picture than that of depression and anxiety scores. Depression and anxiety results indicated that the largest portion of respondents reported either moderate or severe depression and anxiety. In contrast, a high percentage of participants reported either normal (no stress) or mild stress scores. Only one participant reported severe stress at discharge. At three months post-discharge, the trend toward more people reporting more severe stress was less marked but still apparent.

5.2.3 Health Status

The SF-36 Health Survey yielded sub-scores on eight domains of health status including general health, physical functioning, role physical, role emotional, social functioning, bodily pain, vitality, and mental health. For each dimension, the item scores were coded, summed, and transformed into a scale from 0 to 100, on which 0 indicated worst possible health and 100 indicated best possible health. Results are displayed in Table 5.11.

Table 5.11: Mean Scores on the SF-36 of Participants at Discharge and at Three Months Post-discharge (N = 121)

Variables	Mean (SD)	
	Discharge	Post-discharge
General health	55.40 (9.91)	49.21 (11.52)
Physical functioning	27.85 (12.02)	24.05 (14.44)
Role physical	44.17 (17.36)	37.11 (17.97)
Role emotional	54.41 (18.49)	53.31 (21.71)
Social functioning	61.26 (16.17)	49.60 (16.05)
Bodily pain	61.02 (16.98)	61.15 (14.89)
Vitality	57.93 (12.47)	55.35 (12.81)
Mental health	59.83 (11.04)	54.96 (12.45)

Referring to Table 5.11, the mean score on the general health domain at discharge was 55.40, and at three months post-discharge was 49.21. The mean score of physical functioning was 27.85 at discharge and 24.05 at three months post-discharge. The mean score of the role physical domain was 44.17 at discharge and 37.11 at post-discharge. The mean score on social functioning at discharge was 61.26 and 49.60 at three months post-discharge. Finally, the mean score on the mental health domain at discharge was 59.83, and 54.96 at three months post-discharge. Mean scores of role emotional, bodily pain, and vitality changed minimally from discharge to three months post-discharge.

5.3 Comparison of FIM, DASS, and SF-36 Health Survey Scores at Discharge and at Three Months Post- Discharge from Hospital

The second objective of the research was to compare functional performance, health status and emotional status of people with SCI in Thailand at discharge from rehabilitation services, and at three months post-discharge.

5.3.1 Data screening for the paired t-test

In order to compare differences in rehabilitation outcomes between discharge and three months post-discharge using the FIM, DASS, and SF-36 Health Survey, a paired t-test was used. Prior to further analysis, all outcome variables at both times were subjected to test for normality of the data. Normality of variables can be assessed by either statistical or graphical methods (Tabachnick & Fidell, 1996). Skewness and Kurtosis was used to test for normality and the results were acceptable. Normality was confirmed by graphical analysis - normal probability plots – and the results were acceptable. Skewness and kurtosis refer to the shape of the distribution. Values for skewness and kurtosis are zero if the observed distribution is exactly normal (Coakes & Steed, 1996; Pallant, 2001). Negative skewness values indicate a clustering of scores at the high end (right hand side of a graph). Positive values of skewness indicate a positive skew with a cluster of scores at the lower end (left hand side of a graph). Negative values of kurtosis indicate a distribution that is flat while positive values indicate a distribution that is peaked (Coakes & Steed, 1996; Pallant, 2001). The descriptive statistics in the SPSS version 10 provide these two values. However, in a study with large sample as in the present study, a graphical method to directly inspect the shape of the distribution was recommended (Tabachnick & Fidell, 1996). Therefore, in order to confirm the formal inference tests of skewness and kurtosis, a normal probability plot was prepared. These methods were used to test the assumption of normality in the present study because they are suitable to use with a large sample size (Tabachnick & Fidell, 1996).

Table 5.12: Test of Normal Distribution (skewness and kurtosis) of Outcome Variables for the Paired T-Test in People with SCI (N = 121)

Instruments	Variables	Discharge		Post-discharge	
		Skewness	Kurtosis	Skewness	Kurtosis
FIM	Functional status	-0.09	-1.31	0.05	-1.26
DASS	Depression	0.19	-0.63	-0.11	-0.84
	Anxiety	1.90	2.80	0.18	-0.46
	Stress	0.24	-0.47	0.36	-0.50
SF-36 Health Survey	General health	-0.56	-0.07	-0.27	-0.72
	Physical functioning	0.58	-0.15	0.55	-0.52
	Role physical	0.43	-0.58	0.13	-0.40
	Role emotional	0.79	0.42	0.54	0.13
	Social functioning	0.18	-0.24	0.56	-0.02
	Bodily pain	-0.66	0.42	-0.32	1.26
	Vitality	-0.53	-0.02	-0.03	-0.56
	Mental health	-0.05	-0.13	0.02	-0.14

Values of skewness and kurtosis in Table 5.12 were not far away from zero. The Fisher's Measure of Skewness and Kurtosis formula, based on deviations from the means, was the statistic used to ascertain acceptable values of a normal distribution (Munro, 2001). The scores considered normally distributed fall between +1.96 and –1.96 standard deviation (SD) from the mean (Munro, 2001). Together with the inspection of the normal probability plot in the present study, all variables demonstrated reasonably straight lines. These results suggested a normal distribution of the outcome variables. Once the assumption of normality was ascertained, the statistical analysis was undertaken. A significance level of $p \leq 0.05$ was chosen for all analysis. To avoid Type I error, a Bonferroni adjustment was used as described in Chapter 4. Effect size was calculated by eta squared and the power calculation was completed.

5.3.2 Functional status

The FIM scores obtained from an individual on a number of separate scales were totalled. Such scales provided more than ordinal data (Kiess, 1989). Instead, the resulting summated scores were treated as interval scales in statistical analysis (Healey, 1990; Kiess, 1989; Kijpredarborisut, 2002). The FIM scores were analysed using parametric statistics.

A comparison of FIM scores at discharge and three months post-discharge demonstrated that the mean functional status of participants at discharge ($M = 96.74 \pm 18.42$) was significantly higher ($T=7.02$; $p \leq .000$) than at three months post-discharge ($M = 91.17 \pm 19.79$). These results indicate that at three months post-discharge, participants were significantly more functionally dependent than at discharge. The eta squared statistic of .30 indicated a large effect size. With only one comparison, a Bonferroni adjustment for multiple comparisons was not used and the significance level ($p \leq .05$) was not adjusted.

5.3.3 Depression, Anxiety, and Stress

Tests of significance for three comparisons of depression, anxiety, and stress were possible with the results of the DASS data (Table 5.13). Using a Bonferroni's correction for three comparisons the required p value was 0.017 ($p= 0.05 =0.05/3 =0.017$). The mean depression score at discharge ($M = 16.13$) was significantly lower than the mean depression score three months post discharge ($M = 19.52$). This indicates that participants demonstrated more depressive symptoms after three months at home than at discharge from rehabilitation hospitals. The eta squared statistic of .24 indicated a large effect size.

The same result was found for the anxiety scale. At discharge, the mean anxiety score was 10.73, which was significantly different than the score of 14.40 three months later. Participants appeared to be more depressed and have higher levels of anxiety at three months post-discharge. The eta squared statistic for anxiety was .39, again indicating a large effect size. However, the mean score of stress at discharge (M = 16.20) was not significantly different from the mean score of stress at three months post-discharge (M = 17.24).

Table 5.13: Comparison of Depression, Anxiety, and Stress in Participants with SCI at Discharge and at Three Months Post discharge (N=121)

Variables	Mean (SD)		T-value	Sig. (2-tail)*	Eta squared
	Discharge	Post-discharge			
Depression	16.13 (5.69)	19.52 (5.97)	-6.08	0.000	0.24
Anxiety	10.73 (5.01)	14.40 (4.29)	-8.75	0.000	0.39
Stress	16.20 (4.47)	17.24 (5.66)	-1.92	0.058	0.03

*p<.017 (p=.05 adjusted for three comparisons)

5.3.4 Health status

Health status was measured using the SF-36, which yields eight domain scores. A Bonferroni correction for eight comparisons requires a p value of 0.006. There was a statistically significant difference in general health, physical function, role physical, social functioning and mental health domains from one time to the other (Table 5.14). The eta squared statistic for each domain (range 0.16 to 0.26) also indicated that, in each case, the effect size was large (> 0.14). However, there were no significant differences in mean scores on the domain scores of role emotional, bodily pain, and vitality at discharge and at three months post discharge in these participants.

Table 5.14: Comparison of Health Status at Discharge and at Three Months Post- discharge (N=121)

Variables	Mean (SD)		T-value	Sig.(2-tail)*	Eta squared
	Discharge	Post-discharge			
General health	55.40(9.91)	49.21 (11.52)	5.91	0.000	0.23
Physical functioning	27.85(12.02)	24.05 (14.44)	5.58	0.000	0.21
Role physical	44.17(17.36)	37.11 (17.97)	4.74	0.001	0.16
Role emotional	54.41(18.49)	53.31 (21.71)	0.55	0.585	0.02
Social functioning	61.26(16.17)	49.60 (16.05)	6.44	0.000	0.26
Bodily pain	61.02(16.98)	61.05 (14.89)	-0.08	0.935	0.00
Vitality	57.93(12.47)	55.35 (12.81)	1.82	0.072	0.03
Mental health	59.83(11.04)	54.96 (12.45)	5.44	0.000	0.20

*p<.006

5.4 Predictors of Functional Status, Emotional Status, and Perceived Health Status in Participants with SCI

The third objective of this research was to identify and describe factors predicting functional status, health status, and emotional status in people with SCI in Thailand.

Multiple regression analysis was used to identify predictors (independent variables) that affected rehabilitation outcomes (dependent variables). Skewness and Kurtosis values, together with normal probability plot, were used for the test of normality. The tests of normal distribution were examined for the independent variables (predictors), and reported in Table 5.15.

Table 5.15: Test of Normal Distribution of Predictors of Outcome Variables in People with SCI (N = 121)

Predictors	Skewness(SE)	Kurtosis(SE)
Current age	0.42(0.22)	-0.36(0.44)
Age at onset	0.41(0.22)	-0.35(0.44)
Education level	0.29(0.22)	-0.18(0.44)
Duration of disability	0.39(0.22)	0.84(0.44)
Number of architectural barriers	0.14(0.22)	-0.07(0.44)
Hospitalisation	0.40(0.22)	0.83(0.44)
Health service utilisation (8 areas)		
- Frequency met psychiatrist (per week)	4.44(0.22)	19.94(0.44)
- Frequency met OT (per week)	-0.43(0.22)	0.81(0.44)
- Frequency met PT (per week)	-1.50(0.22)	11.01(0.44)
- Frequency met orthotist (per week)	3.30(0.22)	10.39(0.44)
- Frequency met social worker (per week)	2.60(0.22)	6.28(0.44)
- Frequency met psychologist (per week)	5.65(0.22)	34.64(0.44)
- Frequency met nurse (per week)	-6.97(0.22)	46.33(0.44)
- Frequency met vocational counsellor (per week)	5.83(0.22)	39.71(0.44)
Number of services received (while in hospital)	0.38(0.22)	0.85(0.44)
Number of service not received but required (while in hospital)	-0.09(0.22)	-0.76(0.44)
Number of vocational services received (while in hospital)	6.34(0.22)	48.77(0.44)

Note: Marital status, economic status, communication problem, discharge status, attendant care, transportation, fulfilled equipment need, and fulfilled OT needs are dichotomous variables

Results from Table 5.15 show some independent variables violated the assumption of normality because their skewness and kurtosis values were far from zero. The variables violating the assumption of normality were primarily in health services utilisation; such as, frequency of treatment by physiatrists, physiotherapists, orthotists, social workers, psychologists, nurses, and vocational counsellors. Another variable that violated this assumption was the number of vocational services received. These variables were deleted from the multiple regression in the present study. Predictors that were included in the models at this stage were: current age, age at onset, marital status, economic status, education level, duration of disability, communication problems, discharge status, attendant care, number of architectural barriers, transportation, fulfilled equipment needs, hospitalisation, frequency of meeting occupational therapists, fulfilled OT needs, number of services received, and number of services not received but required.

The test of multicollinearity was conducted for all continuous independent variables by utilising the correlation matrix. A high correlation ($r > .7$) among variables presents a problem of multicollinearity (Pallant, 2001). The results of the test of multicollinearity on the study data were that there were two pairs of independent variables in the present study that had high correlation: current age and age at onset ($r = 0.99$); and duration of disability and hospitalisation ($r = 0.85$). The current age variable was similar to age at onset and so was dropped from the analysis. Similarly, the length of hospitalisation, which was very similar to duration of disability, was eliminated. Three other variables, discharge status and transportation, communication problems were excluded from the regression equation because all participants answered the same to these items. Following these adjustments, the 12 independent variables included in the regression model were age at onset, marital status, economic status, education level, duration of disability, attendant care, number of architectural barriers, fulfilled equipment needs, frequency meet occupational therapist, fulfilled OT needs, number of services received, and number of services not received but required.

Separate analysis was performed for each of the outcome measures. The test of homoscedasticity was also conducted. One of the ways to test the assumption of homoscedasticity was to inspect the residual scatter plot (Coakes & Steed, 1996; Pallant, 2001). This assessment was conducted for each of the 12 regression models. The results of the inspection in all 12 multiple regression models confirmed the assumption of homoscedasticity.

5.4.1 Predictors of Functional Status

Multiple regression analysis was used to identify those selected independent variables, which predicted change in functional status, as measured by the FIM three months post-discharge from hospitals. The result of the final regression model for functional status is demonstrated in table 5.16.

Table 5.16: Multiple Regression Analysis for Functional Status in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	-0.188	-7.187	3.331	-2.157	0.033*
Economic status	0.029	1.107	3.200	0.346	0.730
Age at onset	0.039	6.980	0.158	0.440	0.660
Education level	0.087	1.844	1.807	1.020	0.310
Duration of disability	-0.044	-0.440	0.669	-0.658	0.512
Attendant care	-0.271	-12.940	3.614	-3.580	0.001*
Number of architectural barriers	-0.187	-2.792	1.319	-2.117	0.037*
Fulfilled equipment needs	-0.097	-3.695	3.309	1.117	0.267
Fulfilled OT needs	0.247	9.969	3.259	3.059	0.003*
Frequency met OT	0.036	0.623	1.359	0.459	0.647
Number of services received	-0.120	-3.157	2.081	-1.517	0.132
Number of services not received but required	-0.184	-4.279	2.046	-2.092	0.039*

*$p \leq .05$, $R^2 = 0.626$, Adjust $R^2 = 0.584$, SEE = 12.31

Five variables appeared to be important in their ability to predict functional status in participants with SCI. Fulfilment of occupational therapy needs had a significant positive effect (β = 0.247) while marital status, (β = -0.188), attendant care (β = -0.271), number of architectural barriers (β = -0.187), and number of services not received but required (β = -0.208) had significant negative effects on functional status. Other variables included in the analysis made no significant contribution to the prediction equation. The Adjusted coefficient of determination (Adjusted R^2), with this equation was 0.584 indicating that the model presented explains 58.4% of the variance in functional status.

Fulfilment of occupational therapy needs appears to have had a positive effect on functional ability; this indicates that participants who had their occupational therapy needs fulfilled demonstrated higher scores in functional status than participants who did not have these needs met. In contrast, marital status made a negative contribution to equation to predict functional status; this suggests that participants who are not married were more likely to have higher scores in functional status than participants who were married. The negative affect of attendant care on functional ability indicates that people with SCI who have someone to look after them have lower functional ability than people with SCI who do not have anybody to take care of them. Number of architectural barriers also had a negative effect on the prediction of functional status; the greater the number of architectural barriers at home the lower the scores on functional status. In addition, the number of services required but not received also had a negative effect on the equation: participants who reported that they had not received needed services were more likely to have lower scores on the FIM than participants who received the required services. In summary, participants who had all OT needs fulfilled, were not married, had no attendant care, encountered fewer architectural barriers at home, and had received all needed services were more likely to be independent in functional status.

5.4.2 Predictors of Emotional Status

The emotional states of depression, anxiety, and stress were measured with the following results.

- **Predictors of depression**

Table 5.17 demonstrates the results of the multiple regression analysis of depression for the participants with SCI at three months post-discharge from hospitals. Four significant predictors of depression were identified as important; marital status ($\beta = -0.283$), education level ($\beta = -0.239$), economic status ($\beta = -0.292$), and fulfilled OT needs ($\beta = -0.224$) all made negative contributions to the outcome of depression.

Table 5.17: Multiple Regression Analysis for Depression in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	-0.283	-3.452	1.070	-3.227	0.002*
Economic status	-0.292	-3.552	1.027	-3.458	0.001*
Age at onset	0.046	2.629	0.051	0.517	0.606
Education level	-0.239	-1.621	0.580	-2.794	0.006*
Duration of disability	-0.024	-7.788	0.215	-0.363	0.717
Attendant care	-0.020	-0.304	1.160	-0.262	0.794
Number of architectural barriers	0.010	4.742	0.432	0.112	0.901
Fulfilled equipment needs	-0.094	-1.143	1.063	-1.075	0.285
Fulfilled OT needs	-0.224	-2.889	1.047	-2.760	0.007*
Frequency met OT	-0.043	-0.256	0.388	-0.609	0.511
Number of services received	-0.066	-0.555	0.668	-0.830	0.408
Number of services not received but required	0.013	9.548	0.712	0.134	0.894

*$p \leq .05$, $R^2 = 0.622$, Adjusted $R^2 = 0.580$, SEE = 3.95

Participants who were not married were more likely to be depressed than participants who were married. Participants with low education levels were more likely to have higher scores on the depression measure than participants with high education levels. Poor participants also demonstrated higher levels of depression than participants who were classified as not poor. Fulfilment of occupational therapy needs must be interpreted carefully due to inverse relationships. Participants who had their OT needs fulfilled demonstrated lower levels of depression. In other words, those who had their OT needs fulfilled were less likely to be depressed. Remaining variables had some prediction value but were not statistically significant. The overall equation, as indicated by the Adjusted coefficient of determination (AdjustedR^2 = 0.580), indicates that the model presented explains 58.0% of the variance in scores of depression.

- **Predictors of Anxiety**

Five significant predictors for anxiety were identified. Marital status (β = -0.378), education level (β = -0.233), and fulfilled OT needs (β = -0.151) had negative effects on anxiety, while age at onset (β = 0.273), and the number of services required but not received had a positive effect on anxiety (β = 0.407). The Adjusted R^2 was 0.672, indicating that the model presented explains 67.2% of the variance in anxiety scores.

Table 5.18: Multiple Regression Analysis for Anxiety in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	-0.378	-3.238	0.663	-4.884	0.000*
Economic status	-0.024	-0.201	0.637	-0.316	0.753
Age at onset	0.273	0.109	0.032	3.470	0.001*
Education level	-0.233	-1.109	0.360	-3.085	0.003*
Duration of disability	0.037	8.264	0.133	0.621	0.536
Attendant care	-0.108	-1.155	0.719	-1.605	0.111
Number of architectural barriers	0.065	0.219	0.262	0.834	0.406
Fulfilled equipment needs	-0.039	-0.332	0.659	-0.504	0.615
Fulfilled OT needs	-0.151	-1.368	0.649	-2.109	0.037*
Frequency met OT	-0.072	-0.297	0.240	-1.236	0.219
Number of services received	-0.050	-0.294	0.414	-0.711	0.479
Number of services not received but required	0.407	2.043	0.441	4.632	0.000*

*$p \leq .05$, $R^2 = 0.705$, Adjusted $R^2 = 0.672$, SEE = 2.45

The analysis indicates that participants who were not married, had low education levels, and their OT needs had not been fulfilled were more likely to demonstrate anxiety than participants who were married, had high education levels, and their OT needs had been fulfilled. In addition, participants with older age, and had greater number of services not received but required demonstrated more anxiety than participants of younger age and had their service requires met. The remaining variables had little influence on the regression equation for anxiety but not statistical significance.

- **Predictors of Stress**

Five significant predictors of stress were identified in the multiple regression analysis. Marital status (β = -0.271), education level (β = -0.225), economic status (β = -0.243), and number of services received (β = -0.243) all had negative effects (Table 5.19). Duration of disability had a positive effect on stress (β = 0.170). Participants who were not married had low education levels, were classified as poor, and had fewer number of different services received, were more likely to have more stress than participants who were married, were more educated, not poor, and had greater number of different services received. The remaining variables made limited contribution to the equation but these were not statistically significant.

Table 5.19: Multiple Regression Analysis for Stress in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	-0.271	-3.144	1.190	-2.643	0.009*
Economic status	-0.243	-2.806	1.143	-2.456	0.016*
Age at onset	-0.005	-2.535	0.057	-0.045	0.946
Education level	-0.225	-1.450	0.645	-2.248	0.027*
Duration of disability	0.170	0.521	0.239	2.181	0.031*
Attendant care	-0.050	-0.726	1.291	-0.562	0.575
Number of architectural barriers	0.085	0.385	0.471	0.818	0.415
Fulfilled equipment needs	0.081	0.936	1.182	0.792	0.430
Fulfilled OT needs	-0.094	-1.155	1.164	-0.993	0.323
Frequency met OT	-0.120	-0.669	0.431	-1.551	0.124
Number of services received	-0.243	-1.939	0.743	-2.610	0.010*
Number of services not received but required	0.001	3.893	0.791	0.005	0.966

*$p \leq .05$, $R^2 = 0.483$, Adjusted $R^2 = 0.426$, SEE = 4.40

In summary, the results indicated that levels of emotional status (depression, anxiety, and stress) were all significantly affected by persons' marital status, and education level. Marital status had a negative effect on all three emotional states of depression, anxiety, and stress. This indicated that people with SCI who were married had lower depression, anxiety, and stress than people with SCI who were not married. People with high education also had lower depression, anxiety, and stress than people with low education. Economic status showed similar results. Fulfilled OT needs also had a negative effect on emotional state of depression and anxiety. People with SCI who had their OT needs fulfilled had lower depression and anxiety than people who did not have their OT needs fulfilled. Lastly, the number of different services received had a negative effect on stress. The greater the number of different services received in hospital predicted lower stress levels. Three variables (age at onset, duration of disability, and number of services not received but required) had positive predictive values. People of a young age had lower anxiety than people of an older age. People who sustained a disability for a longer period of time had more stress than people who had sustained a disability for a shorter period of time. The greater the number of services not received but required the higher the anxiety people experienced.

5.4.3 Predictors of Health Status

Health status in the present study was divided into eight areas including general health (GH), physical functioning (PF), role physical (RP), role emotional (RE), social functioning (SF), bodily pain (BP), vitality (VT), and mental health (MH). Higher scores indicate better health in each domain.

- **Predictors of General health (GH)**

GH is the overall perception of general health. Table 5.20 demonstrates measured variables and their abilities to predict change in the scores of general health in participants with SCI at three months post-discharge from hospitals.

Table 5.20: Multiple Regression Analysis for General Health in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	0.269	6.191	1.883	3.288	0.001*
Economic status	0.070	1.617	1.808	0.894	0.373
Age at onset	-0.135	-0.146	0.090	-1.629	0.106
Education level	0.194	2.487	1.021	2.435	0.017*
Duration of disability	-0.162	-0.982	0.378	-2.600	0.011*
Attendant care	-0.121	-3.486	2.043	-1.707	0.091
Number of architectural barriers	-0.137	-1.239	0.745	-1.662	0.099
Fulfilled equipment needs	0.079	1.821	1.870	0.974	0.332
Fulfilled OT needs	0.095	2.310	1.842	1.254	0.212
Frequency met OT	-0.033	-0.371	0.682	-0.544	0.587
Number of services received	0.014	0.228	1.176	0.194	0.846
Number of services not received but required	-0.369	-4.976	1.253	-3.972	0.000*

*$p \leq .05$, $R^2 = 0.672$, Adjusted $R^2 = 0.635$, SEE = 6.96

Four significant predictors of general health were identified, accounting for 63.5% of the variance (Adjusted $R^2 = 0.635$). Marital status ($\beta = 0.269$) and education level ($\beta = 0.194$) had positive effects on general health. Participants who were married, and had high education levels had better general health than participants who were not married, and had low education levels. In contrast, the number of services not received but required ($\beta = -0.407$) and duration of disability ($\beta = -0.145$) negatively contributed to the prediction equation for general health. This suggests that participants who had had their SCI for a longer period of time and who had a greater number of service needs unmet tended to have lower scores in perceived general health than other participants.

- **Predictors of Physical Functioning (PF)**

Physical functioning of the SF-36 measures limitations in performance in everyday physical activities. Table 5.21 demonstrates variables and their abilities to predict changes in scores of physical functioning.

Table 5.21: Multiple Regression Analysis for Physical Functioning in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	-0109	-3.187	2.631	-1.211	0.228
Economic status	0.019	0.567	2.527	0.224	0.823
Age at onset	0.050	6.882	0.125	0.550	0.584
Education level	0.175	2.850	1.427	1.997	0.048*
Duration of disability	-0.019	-0.149	0.528	-0.283	0.778
Attendant care	-0.371	-13.537	2.855	-4.742	0.000*
Number of architectural barriers	-0.156	-1.779	1.042	-1.708	0.091
Fulfilled equipment needs	0.107	3.317	2.614	1.200	0.233
Fulfilled OT needs	0.190	5.877	2.574	2.283	0.024*
Frequency met OT	0.078	1.812	1.865	0.966	0.329
Number of services received	-0.119	-2.384	1.643	-1.451	0.150
Number of services not received but required	-0.139	-2.378	1.175	-1.358	0.177

*$p \le .05$, $R^2 = 0.601$, Adjusted $R^2 = 0.557$, SEE = 9.72

Three significant predictors of physical functioning were identified; education level ($\beta = 0.175$) and fulfilment of OT needs ($\beta = 0.190$) had positive effects on physical functioning while attendant care ($\beta = -0.371$) had a negative effect on physical functioning. In other words, participants with higher levels of education and who had their OT needs fulfilled demonstrated better physical functioning than participants with low education whose OT needs had not been fulfilled. However, people who have someone to look after them demonstrated lower physical functioning than people who do not have anybody to look after. The remaining variables had some effects on physical functioning but these were not statistically significant. The Adjusted R^2 was 0.557 indicating that the model presented explained 55.7.1% of the variance in scores of physical functioning.

- **Predictors of Role Physical (RP)**

Role physical in the SF-36 is the measurement of the extent that a disability impacts on everyday activities and work due to physical problems. Three significant variables influenced this domain (Table 5.22). Marital status ($\beta = 0.220$), and number of different services received ($\beta = 0.197$) had positive effects while the number of architectural barriers ($\beta = -0.261$) had a negative effect on role physical. Participants who were married and had greater number of different services received demonstrated higher scores in role physical than participants who were not married and received fewer services while in rehabilitation. In contrast, participants who reported a greater number of architectural barriers tended to have lower scores on role physical than participants who reported fewer numbers of architectural barriers at home. Other variables had some influence on role physical but these were not statistically significant. The Adjusted R^2 was 0.358, indicating that the overall model presented explained 35.8% of the variance in scores of role physical.

Table 5.22: Multiple Regression Analysis for Role Physical in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	0.220	7.911	3.895	2.031	0.045*
Economic status	-0.042	-1.498	3.741	-0.400	0.690
Age at onset	0.178	0.299	0.185	1.614	0.110
Education level	0.137	2.732	2.113	1.293	0.199
Duration of disability	-0.052	-0.488	0.782	-0.624	0.534
Attendant care	0.039	1.731	4.225	0.410	0.683
Number of architectural barriers	-0.261	-3.663	1.542	-2.376	0.019*
Fulfilled equipment needs	0.145	5.227	3.869	1.351	0.180
Fulfilled OT needs	0.123	4.672	3.810	1.226	0.223
Frequency met OT	0.122	4.662	3.709	1.220	0.230
Number of services received	0.197	4.875	2.432	2.004	0.048*
Number of services not received but required	0.033	0.687	2.591	0.265	0.791

*$p \leq .05$, $R^2 = 0.423$, Adjusted $R^2 = 0.358$, SEE = 14.39

- **Predictors of Role Emotional (RE)**

Role emotional is the measurement of problems of participants with work or other daily activities as a result of emotional problems. Table 5.23 indicate four significant variables influenced role emotional. Marital status ($\beta = 0.215$), education level ($\beta = 0.355$), and fulfilment of OT needs ($\beta = 0.188$) had positive effects indicating that participants who were married with high education, and who had their OT needs fulfilled had better role emotional than other participants. In contrast, duration of disability ($\beta = -0.166$) and the number of services required but not received ($\beta = -0.239$) negatively effected the prediction of role emotional. Thus, people who had sustained their disability for a longer period of time and lacked needed services were more likely to have lower levels of role emotional. The Adjusted R^2 was 0.450, indicating that the model presented explained 45.0% of the variance in scores of role emotional.

Table 5.23: Multiple Regression Analysis for Role Emotional in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	0.215	9.320	4.357	2.139	0.035*
Economic status	-0.077	-3.321	4.185	-0.794	0.429
Age at onset	-0.032	-6.464	0.207	-0.312	0.756
Education level	0.355	8.564	2.364	3.623	0.000*
Duration of disability	-0.166	-1.905	0.874	-2.179	0.031*
Attendant care	-0.063	-3.401	4.727	-0.719	0.473
Number of architectural barriers	-0.051	-0.874	1.725	-0.507	0.613
Fulfilled equipment needs	-0.050	-2.191	4.329	-0.506	0.614
Fulfilled OT needs	0.188	8.619	4.263	2.022	0.046*
Frequency met OT	0.140	2.925	1.579	1.852	0.067
Number of services received	0.037	1.106	2.721	0.406	0.685
Number of services not received but required	-0.0.293	-7.468	2.889	-2.576	0.011*

*$p \leq .05$, $R^2 = 0.505$, Adjusted $R^2 = 0.450$, SEE = 16.10

- **Predictors of Social Functioning (SF)**

Social functioning within the SF-36 measures limitation in normal social activities due to personal or emotional problems. The results reported in Table 5.24 indicates three variables influenced social functioning. Marital status ($\beta = 0.248$), education level ($\beta = 0.431$), and fulfilled OT needs ($\beta = 0.194$) had positive effects on social functioning. The Adjusted R^2 was 0.629, indicating that the model presented explained 62.9% of the variance in scores of social functioning.

Table 5.24: Multiple Regression Analysis for Social Functioning in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	0.248	7.946	2.646	3.004	0.003*
Economic status	0.004	0.117	2.541	0.046	0.963
Age at onset	-0.035	-5.209	0.126	-0.414	0.680
Education level	0.431	7.689	1.435	5.358	0.000*
Duration of disability	-0.029	-0.249	0.531	-0.469	0.640
Attendant care	-0.064	-2.578	2.870	-0.898	0.371
Number of architectural barriers	-0.154	-1.933	1.047	-1.846	0.068
Fulfilled equipment needs	0.076	2.454	2.628	0.934	0.353
Fulfilled OT needs	0.194	6.586	2.588	2.544	0.012*
Frequency met OT	0.021	0.320	0.959	0.334	0.739
Number of services received	-0.059	-1.295	1.652	-0.784	0.435
Number of services not received but required	-0.111	-2.082	1.760	-1.183	0.239

$*p \leq .05$, $R^2 = 0.666$, Adjusted $R^2 = 0.629$, SEE = 9.770

- **Predictors of Bodily Pain (BP)**

Bodily pain refers to limitations in performing activities due to the severity of bodily pain. Three significant variables influenced bodily pain (Table 5.25). Participants who were married, and had high levels of education reported higher scores on this domain of the SF-36. Higher scores are more positive, meaning, less pain. In contrast, age at onset (β = -0.325) made a negative contribution to the equation for bodily pain. Younger participants had more positive scores (less pain) than the older participants. Other variables had non-significant contributions to the overall adjusted coefficient of determination, which accounted for 52.3% of the variance in scores of bodily pain (Adjusted $R^2 = 0.523$).

Table 5.25: Multiple Regression Analysis for Bodily Pain in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	0.378	11.261	2.785	4.044	0.000*
Economic status	0.012	0.365	2.675	0.136	0.892
Age at onset	-0.325	-0.453	0.132	-3.419	0.001*
Education level	0.326	5.407	1.511	3.580	0.001*
Duration of disability	-0.096	-0.757	0.559	-1.355	0.178
Attendant care	0.031	1.148	3.021	0.380	0.705
Number of architectural barriers	-0.123	-1.436	1.102	-1.303	0.195
Fulfilled equipment needs	0.107	3.207	2.766	10159	0.249
Fulfilled OT needs	0.060	1.879	2.725	0.690	0.492
Frequency met OT	-0.012	-0.175	1.009	-0.174	0.863
Number of services received	0.141	2.895	1.739	1.664	0.099

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Number of services not received but required	-0.070	-1.227	1.853	-0.662	0.509

*$p \leq .05$, $R^2 = 0.571$, Adjusted $R^2 = 0.523$, SEE = 10.280

• Predictors of Vitality (VT)

Energy in participants' everyday life at three months post-discharge was measured with the VT domain of the SF-36. Marital status ($\beta = 0.265$) and education level ($\beta = 0.256$) had positive effects on vitality (Table 5.26). Participants who were married and had high levels of education had better vitality than other participants In contrast, the number of architectural barriers ($\beta = -0.210$) and the number of services required but not received ($\beta = -0.216$) had negative effects on vitality i.e. participants who had a greater number of architectural barriers and greater number of service needs unmet tended to report lower vitality scores than other participants. The Adjusted R^2 was 0.510, indicating that the regression model presented explained 51.9% of the variance in scores of vitality.

Table 5.26: Multiple Regression Analysis for Vitality in Participants with SCI (N = 121)

Variables	Beta (β)	B	SE B	T-value	Sig. (2-tail)
Marital status	0.265	6.654	2.378	2.798	0.006*
Economic status	0.091	2.288	2.284	1.002	0.319
Age at onset	-0.031	-3.611	0.113	-0.319	0.750
Education level	0.256	3.576	1.290	2.773	0.007*
Duration of disability	-0.125	-0.826	0.477	-1.732	0.086
Attendant care	-0.039	-1.222	2.580	-0.474	0.637
Number of architectural barriers	-0.210	-2.061	0.941	-2.109	0.031*
Fulfilled equipment needs	0.090	2.271	2.362	0.962	0.338
Fulfilled OT needs	0.020	0.528	2.326	0.227	0.821
Frequency met OT	0.015	0.187	0.862	0.217	0.828
Number of services received	-0.078	-1.349	1.485	-0.908	0.366
Number of services not received but required	-0.216	-3.177	1.582	-2.008	0.047*

*$p \leq .05$, $R^2 = 0.559$, Adjusted $R^2 = 0.51$, SEE = 8.785

• Predictors of Mental Health (MH)

Psychological distress was measured via the MH domain and results were reported in Table 5.27. Marital status ($\beta = 0.312$), education level ($\beta = 0.239$), and economic status ($\beta = 0.278$) made positive contributions to the prediction of mental health. Participants who were married, had high levels of education, and were classified as not poor had better mental health than participants who were not married, had lower levels of education, and were classified as poor. In contrast, the number of architectural barriers ($\beta = -0.175$) had a negative effect on mental health. No other variables made significant contributions to the understanding of MH however, the adjusted coefficient of determination indicated that the model accounted for 60.7% of the variance in scores (Adjusted $R^2 = 0.607$).

Table 5.27: Multiple Regression Analysis for Mental Health in Participants with SCI (N = 121)

Variables	**Beta (β)**	**B**	**SE B**	**T-value**	**Sig. (2-tail)**
Marital status	0.312	7.771	2.111	3.681	0.000*
Economic status	0.278	6.889	2.028	3.397	0.001*
Age at onset	-0.059	-6.824	0.100	-0.680	0.498
Education level	0.239	3.316	1.145	2.896	0.005*
Duration of disability	-0.080	-0.526	0.424	-1.243	0.217
Attendant care	-0.044	-1.373	2.290	-0.599	0.550
Number of architectural barriers	-0.175	-1.705	0.836	-2.040	0.044*
Fulfilled equipment needs	0.051	1.276	2.097	0.608	0.544
Fulfilled OT needs	0.013	0.336	2.066	0.163	0.871
Frequency met OT	0.083	1.001	0.765	1.308	0.194
Number of services received	0.041	0.699	1.319	0.530	0.597
Number of services not received but required	-0.065	-0.948	1.405	-0.675	0.501

*$p \leq .05$, $R^2 = 0.647$, Adjusted $R^2 = 0.607$, SEE = 7.800

In conclusion to predictors of health status, results indicated that almost all dimensions of health status were significantly affected by a person's marital status. People with SCI who were married had better health status in seven dimensions (all except Physical Functioning (PF) than people with SCI who were not married.

Education level also had a positive effect on all dimensions of health status except Role Physical (RP). People with SCI who had high education levels tend to have better health than people with SCI who had low education.

The fulfilment of OT needs had a positive effect on three dimensions of health status including PF, Role Emotional (RE), and Social Functioning (SF). This indicated that people with SCI whose OT needs had been fulfilled tended to have better health in these three areas than people with SCI whose OT needs had not been fulfilled.

The number of different services received from rehabilitation professional had a positive effect on RP.

Economic status had a positive effect on health status in the dimension of health status.

The number of architectural barriers had a negative effect on health status in three dimensions including RP, Vitality (VT), and Mental Health (MH). People who had fewer architectural barriers at home tended to have better health in these three areas than people more architectural barriers.

Number of services not received but required also had a negative effect on health status in three dimensions including General Health (GH), RE, and VT. People who had fewer services not received but required tended to have better health status in these three areas.

Age at onset had a negative effect on health in the area of Bodily Pain (BP). Older people with SCI tended to report bodily pain more than younger people with SCI.

Duration of disability had negative effects on GH and RE. People who had sustained a disability for a long period of time reported lower scores of GH and RE than people who had sustained their disability for a short period of time.

Attendant care had a negative effect on PF. People with SCI who have someone to look after them had lower scores for PF than people with SCI who had to look after themselves.

5.5 Summary of the Study Results

Traumatic SCI in this study generally occurred in people of younger age, with an age range between 15 and 30 years. The most frequent cause of injury was motor vehicle accident and the majority of the injuries were at the cervical level (C5-C8). SCI occurred almost equally in people at all levels of education, regardless of their economic or marital status. Almost all study participants lived with their family after discharge from rehabilitation hospitals and many required attendant care, which was provided almost exclusively by family members. The participants complained about architectural barriers in their homes and the unavailability of transportation, with the majority of people with SCI reporting that they did not have adaptive equipment necessary to function independently in their daily lives. Most participants also reported that they had received rehabilitation services from the four main rehabilitation professions - occupational therapists, physiotherapists, rehabilitation nurses and medical doctors, but the also reported they had not received other assistance from vocational counsellors, psychologists orthotists, and social workers. In addition, many participants did not receive sufficient occupational therapy services to address issues of independent functioning in their home and community environments. Almost no one received vocational rehabilitation services.

Rehabilitation outcomes addressed by this study included functional status measured by the FIM; emotional status (depression, anxiety, and stress) measured by the DASS; and health status measured by the SF-36 Health Survey. Evidence suggests that people with SCI continue to experience poor functional ability, general health problems, and emotional problems following discharge. Many study participants were not independent in ADL activities such as bathing, toileting, dressing and bowel and bladder management both in hospital and at home. Investigation of emotional status provided evidence that people with SCI suffered depression, anxiety and stress both in hospital and at home. In terms of health status, participants scored lowest in the Physical Functioning domain indicating that the health status of this population was indeed affected by their ability to perform everyday physical activities.

Comparisons of rehabilitation outcomes of people with SCI at discharge and at three months post-discharge demonstrated that functional status scores were lower at home than in hospital. Health status scores were also lower at home than in hospital. Depression and anxiety scores were higher while they were at home than while they were in hospital. However, there was no statistically significant difference in scores of stress between discharge and at three months post-discharge.

This study of factors predicting rehabilitation outcomes provided evidence that the major predictors of functional status consist of marital status, attendant care, number of architectural barriers, fulfilment of OT needs, and number of services not received but required. Factors predicting health status consisted of marital status, economic status, age at onset, education level, duration of disability, attendant care, number of architectural barriers, fulfilment of OT needs, number of different services received, and number of services required but not received. Factors predicting depression comprised marital status, economic status, education level, and fulfilled OT needs. Predictors of anxiety comprised marital status, age at onset, education level, fulfilled OT needs, and number of services not received but required. Factors predicting stress consisted of marital status, economic status, education level, duration of disability, and number of services received. Potential factors predicting rehabilitation outcomes are summarised in Table 5.28.

Table 5.28: Summary of predictors of functional status, emotional status, and health of people with SCI at three months post-discharge (N = 121)

Predictor variables	FIM	DASS			SF-36 Health Survey							
	Functional status (β)	Depression (β)	Anxiety (β)	Stress (β)	GH^a (β)	PF^b (β)	RP^c (β)	RE^d (β)	SF^e (β)	BP^f (β)	VT^g (β)	MH^h (β)
Marital status	-0.188*	-0.283*	-0.378*	-0.271*	0.269*	-0.109	0.220*	0.215*	0.248*	0.378*	0.265*	0.312*
Economic status	0.029	-0.292*	-0.024	-0.243*	0.070	0.019	-0.042	-0.077	0.004	0.012	0.091	0.278*
Age at onset	0.039	0.046	0.273*	-0.005	-0.135	0.050	0.178	-0.032	-0.035	-0.325*	-0.031	-0.059
Education level	0.087	-0.239*	-0.233*	-0.225*	0.194*	0.175*	0.137	0.355*	0.431*	0.326*	0.256*	0.239*
Duration of disability	-0.044	-0.024	0.037	0.170*	-0.162*	-0.019	-0.052	-0.166*	-0.029	-0.096	-0.125	0.080
Attendant care	-0.271*	-0.020	-0.108	-0.050	-0.121	-0.371*	0.039	-0.063	-0.064	0.031	-0.039	-0.044
No. of architectural barriers	-0.187*	0.010	0.065	0.085	-0.137	-0.156	-0.261*	-0.051	-0.154	-0.123	-0.210*	-0.275*
Fulfilled OT needs	0.247*	-0.244*	-0.151*	-0.094	0.095	0.190*	0.123	0.188*	0.194*	0.060	0.020	0.013
No. of service received	-0.120	-0.066	-0.050	-0.243*	0.014	-0.119	0.197*	0.037	-0.059	0.141	-0.078	0.041
No. of service not received but required	-0.208*	0.013	0.407*	0.001	-0.369*	-0.139	0.033	-0.293*	-0.111	-0.070	-0.216*	-0.065

Note: GH^a = General health, PF^b = Physical functioning, RP^c = Role physical, RE^d = Role emotional, SF^e = Social functioning, BP^f = Bodily pain, VT^g = Vitality, MH^h = Mental health; $*p \leq .05$

CHAPTER 6: DISCUSSION

The discussion section of the study has three parts. The first part is a description of rehabilitation for people with disability following SCI in Thailand. It incorporates the data arising out of Objective One - to describe the three outcome variables of functional status; health status; and emotional states of depression, anxiety, and stress, of people with SCI at discharge from hospital, and at three months post-discharge. The second part of the discussion examines issues arising from the data for Objective Two - to compare the three outcome variables at 48 hours prior to discharge and at three months post-discharge. The third part of the discussion examines the predictors of the outcome variables as they relate to social determinants of health, disability and rehabilitation services. Supporting data was derived from Objective Three - to identify those factors that predicted the main outcome variables of functional status, health status, depression, anxiety, and stress.

6.1 Description of Rehabilitation for People with Disability Following SCI in Thailand

Thailand is changing from a primarily agricultural economy to an industrial economy as people migrate from rural areas to the cities to seek employment (Viboolpholprasert et al., 1997). With this increase in urban living has come a commensurate rise in the use of cars and motorcycles, with young males being the predominant users. The main cause of SCI in this study was motor vehicle accidents. Other research in Thailand and internationally ((Kovindha, 1993);(Hammell, 1995; Parsons & Lammertse, 1991) confirm that finding.

The largest group of participants (all male) in this study of SCI were between 15 and 30 years old. Approximately 35% of the participants had completed elementary school only, and 42.1% had completed secondary school.

In Thailand, clients usually spend two to three months in acute care treatment following traumatic SCI before being transferred to rehabilitation units (Pajareya, 2000). Discharge from hospital occurs within four to six months of the initial injury. The experiences of the participants in this study reflected that trend.

Ninety-one percent of the people with SCI in this study moved from hospital to live with their families, and the remainder (9.1 %) went to live with relatives following discharge. Eighty percent reported that family members provided attendant care. Kovindha and Yawila (1998) and Garseewong (1998; 1997) also reported the majority of participants in their studies returned to live with parents, spouses, daughters or sons.

Viboolpholprasert et al. (1997) stated that it was not only family members who assisted people with disabilities at home but also relatives and neighbours. This assistance could be interpreted as being over-protective of people with disability. Thai culture views people with disability as dependant care recipients and not as active members of society (Viboolpholprasert et al., 1997). Having family members and extended social networks involved in rehabilitation programs from the outset may be a useful adjunct to rehabilitation programs in order for people to understand the aims and objectives of treatment, and the potential abilities of the individual with a disability in their family.

The majority of participants (98.3 %) reported between one and six architectural barriers at home. In addition, all participants reported a lack of appropriate transportation, both public and private. This supported the findings of a survey of architectural barriers faced by people with disabilities in Chiang Mai province. The study found that most public buildings, streets, and facilities such as telephones, toilets, and car park bays did not allow access to people with disability (Kovindha, 2000).

Kovindha also stated that public transportation was accessible only to able – bodied people. In Thailand, there is no law to compel either the public or private sector to provide accessible facilities and transportation for people with disability (Julajarit, 1992). Collaboration between rehabilitation team members and the consumers (people with disability) and their families could provide a platform to propose the issue of environmental adaptation and transportation facilities for people who are handicapped by the physical environment. Kanta (1992) also noted that architectural barriers at home limited the ability of people with disability to be independent in self-care.

Participants in this study reported a lack of assistive devices necessary for daily independence. The majority of participants (70.2 %) reported that they did not have adaptive devices provided by therapists for home use. According to Thai regulations, it is the responsibility of the rehabilitation team (mainly occupational therapists) to provide, or suggest adaptive devices to people with disabilities to enhance functional performance both in hospital and at home (Punyamee, 2000).

Participants in this study reported that the rehabilitation services they received in hospital were provided almost exclusively by physiatrists, rehabilitation nurses, occupational therapists, and physiotherapists. More than 90% reported that they received services from the head of the rehabilitation team - the physiatrist, but this occurred only once a week. Reawpaibool (2000b) found that there were insufficient physiatrists available in Thai hospitals to provide for expected levels of service.

Nursing staff in the rehabilitation unit, which includes certified nurses, assistant nurses and rehabilitation workers (Viboolpholprasert et al., 1997), provide nursing care to clients in Thailand. Almost 98% of participants in this study said that they had received daily services from rehabilitation nurses. Rehabilitation nurses are important personnel in the rehabilitation team as they work closely with clients in the prevention of medical complications and provision of information relating to self-care (Pajareya, 2000).

Approximately 75% of participants stated that they had received services from occupational therapists daily, (five days per week), while almost 88% reported that they had received services from physiotherapists daily (five days per week). These two professional disciplines are considered the principal personnel providing rehabilitation services in Thailand. Major hospitals in the country always employ occupational therapists and physiotherapists. However, 89.3% of participants stated that they had not received services from a prosthetist or an orthotist. In addition, 85.1% reported they did not receive services from social workers and as many as 95.9% stated that they did not receive services from psychologists. Rehabilitation in Thailand, under the health care policy assigned by the government, still has not formally included social workers and psychologists in the rehabilitation team (Viboolpholprasert et al., 1997). These two professional groups usually work in their own units in the hospital and provide services for people with disability upon referral from the rehabilitation team. Ninety-three percent of the participants also reported that they did not have access to vocational counsellors during their rehabilitation. Currently, there is insufficient government funding to employ vocational counsellors in rehabilitation hospitals (Reawpaibool, 2000).

When asked the general question of whether they had had service needs unmet, the majority of people in the study (99.2 %) still had service needs remaining unmet. These services included vocational counselling, psychology, and services from social workers, prosthetists and orthotists.

6.1.1 Thailand's Rehabilitation Service Conundrum

A medical model approach to health care, fragmentation of the health care system, and limits to government funding have prevented the employment of sufficient staff to provide any service beyond the doors of the hospital following discharge (Viboolpholprasert et al., 1997). Yet, rehabilitation team members and other health professionals need to consider how effective hospital-based programs are in determining the future needs of people living with permanent disabilities. There is a greater range of issues than just physical rehabilitation. Price and Lightbody (1994) noted in their study of a community living program for people with SCI in Queensland, Australia ,that education in community living skills, and independent living techniques, provided to these people at home, enhanced the likelihood of success for their reintegration into the community. Zaman (2003) found in her study of effectiveness of a training package for independent living provided for people with disability in the community in Bangladesh , that this program helped improve functional performance skills.

It appears, then, that it would be beneficial for people with SCI in Thailand for the rehabilitation team to adopt concepts of community based rehabilitation services.

Team members would have an important role in visiting clients' homes before discharge and liaising with community support services in facilitating a transition from hospital to home. This would help individuals with disabilities to overcome initial fears, and increase their sense of competence and self-esteem (Hammell, 1995).

6.2 Functional Status of Participants with SCI at Discharge and at Three Months Post-discharge

Schonherr, Groothoff, Mulder, and Eisma, (1999) found in their study of functional outcomes of 55 people with SCI from admission to discharge that people with a complete cord lesion did not achieve maximal independence in self-care. They also did not perform well in bowel and bladder management, needing assistance from other people (Schonherr et al., 1999). Similar results were found in this study for participants with paraplegia and quadraplegia at discharge. In addition, all participants with quadriplegia needed assistance (FIM level 1 to 5) in bathing, toileting, dressing (lower part of the body, transferring, and locomotion).

The paired t-test for the comparison of functional status demonstrated that people with SCI had significantly lower functional status scores at three months post-discharge than at discharge. The results also revealed that the majority of participants with paraplegia had lower functional status at post-discharge in mobility (transfers) and locomotion (wheelchair use) than at discharge. At three months post-discharge, there were 36 of 64 people with paraplegia who needed varying levels of assistance (FIM level 1 to 5) in transferring from wheelchair to toilet compared with 12 of 64 people at discharge. Forty-one of 64 people who needed help in wheelchair use at three months post-discharge compared with 54 of 64 people at discharge. The same trend occurred in people with quadriplegia. There were 40 of 57 people with quadriplegia who needed assistance in feeding at post-discharge compared to only 18 of 57 at discharge. Grooming activity was also problematic. Forty-nine of fifty-seven people with quadraplegia needed assistance in this activity at post-discharge compared with 45 of 57 people at discharge. This is compatible with a study by Kanta (1992), in Thailand, who found that self-care abilities were lower in people with SCI at post-discharge than at discharge.

In Thailand, family members prefer not only to assist people with disability to perform these activities in order to save time, but also to fulfil a spiritual need to show mercy

(Viboolpholprasert et al., 1997). Thai culture fosters the idea that able- bodied people should show mercy and generosity to people with disabilities (Viboolpholprasert et al., 1997). Therefore, family members, relatives, and even neighbours volunteer to assist people with disabilities in almost all activities of daily living. Many people do not understand the concept of independent living, which leads them to give physical assistance, and to donate money to people with disability rather than support independence and self-reliance (Sittikan et al., 2000). Doing things for others less fortunate then oneself is part of the Buddhist tradition in Thailand that promotes helping others for spiritual benefit (Dhammananda, 1988). This opportunity to be rewarded in the next life enhances the motivation for able-bodied people to try to assist people with disability. At home, people with disabilities usually get assistance from their family members and relatives even when they actually can perform activities independently by themselves. This is a key factor in explaining why the scores of functional status as measured by the FIM are lower at home than in hospital

Kanta (1992) suggested that a significant factor hindering the ability of people with SCI in performing activities of daily living was architectural barriers in and around the home including rough floor surfaces, inappropriate toilets and bathrooms, narrow doorways and kitchens, and too many steps at the house entrance for wheelchair users.

It is important for rehabilitation team members in Thailand to educate not only people with SCI but also significant others such as their spouses, and family members to understand the aims and objectives of rehabilitation. Rehabilitation is not only concerned with the treatment of disease or injury but also addresses the sequelae, or effects of that disease or injury. Health professionals who work in institutions and adopt a medical model approach in their treatment may argue that an education program is outside their duties. However, therapists cannot focus their program on physical dysfunction alone since, in rehabilitation, dysfunction does not determine the success of rehabilitation in the entire process (Hammell, 1995). Treatment should focus not only on impairment but rather promote independent living, participation in society, and reintegration into the community (Jarutas, 2000). Rehabilitation should not end at the day of discharge but rather extend to all aspects of individuals' lives post-discharge. Encouraging independence will not only decrease the burden on family members but also enhance the self-esteem and confidence of individuals with disabilities and provide them with greater choices for social participation. Education s provided to clients, family members, and relatives should be incorporated in rehabilitation programs This presents a conceptual challenge for Thai therapists in determining the best strategy to assist able-bodied people to consider other approaches in supporting people with disability to be as independent as possible. Sittikan et al. (2000) noted in their study of an independence skills program for people with SCI in Thailand that education provided for clients and family members regarding the nature of SCI, the advantages of living an independent life, and knowledge of self- care enhanced life satisfaction and functional capacity of people with SCI.

6.3 Health Status in Participants with SCI at Discharge and at Three Months Post-discharge

- **General health**

Scores of the perception of general health in people with SCI at three months post-discharge declined significantly from discharge. This is consistent with a study by Kovindha and Yawila (1998), which investigated the health status of 72 people with SCI after having left hospital and returned to their communities in Thailand. The authors reported that most people with SCI had health complications at home post-discharge; such as, urinary tract infections, fevers, and pressure sores (Kovindha & Yawila, 1998). An explanation for the decline in general health may be that the participants lacked knowledge and confidence in how to take care of their health. In addition, architectural barriers at home obstructed their ability to look after themselves. A study by Kanta (1992) suggested that pressure sores resulted from persons with quadriplegia at cervical level 5 being unable to roll over from side to side due to inappropriate bed design.

- **Physical Functioning**

Scores of physical functioning of people with SCI at three months post-discharge were significantly lower than at discharge. This is similar to the Kanta (1992) study which investigated ability in self-care of people with paraplegia two weeks post-discharge from rehabilitation hospitals in Thailand. Kanta (1992) reported that people with paraplegia declined in their abilities in self-care after leaving hospital due to architectural barriers. There were no formal services providing home care or environmental modifications for people with disabilities from members of rehabilitation teams in Thailand due to limited human and financial resources (Viboolpholprasert et al., 1997). Family members assisted with activities of daily living, which caused greater dependency at home than in hospital.

- **Role Physical**

Role physical is the measurement of the extent to which physical problems caused disability in individuals' regular work activities. In this study, scores of role physical for people with SCI at three months post-discharge were significantly lower than at discharge. The majority of people with SCI reported that their physical disabilities limited their capability in income generating activities. Lack of architectural accessibility also contributes to this outcome (Kovindha & Yawila, 1998).

- **Role Emotional and Mental Health**

Emotional scores on the SF-36 at three months post-discharge were not significantly different from scores at the day of discharge. It seems that emotional problems were not a major factor in limiting work or other activities for this group. Emotional problems may have been present but were not the main factor inhibitor of work and daily activities. Since emotional problems accompanied by other factors such as poor health may constrain independence in daily living activities, rehabilitation teams should not overlook possible psychological problems after SCI. The majority of participants reported feeling more distressed at home, three months post-discharge, than in hospital. Scores on mental health indicated that this may have been due to low self-esteem and lack of confidence to return to community life with a permanent disability (Kovindha & Yawila, 1998). Some people with disability in a study by Chuenklin (2000) reported that they seemed like persons who had no future, were a burden to other people, and were ashamed due to their physical disfigurement. Most people with disabilities in Thailand cannot gain employment due to discrimination (Kovindha & Yawila, 1998). All these factors can cause mental distress to people with disability, including people with SCI. A study of depression, and anxiety of people with SCI in the present study also demonstrated that these people had more depression and anxiety at home than in hospital.

- **Social Functioning**

The majority of participants reported that their personal and emotional problems limited their normal social activities such as religious group membership, community work, and social get-togethers. Again, significantly more problems were experienced at followup. Since disability is viewed in Thailand as something to be ashamed of (French, 1994; Viboolpholprasert et al., 1997), this may have caused people to isolate themselves. Some families even hide their family members out of sight of the public (French, 1994). One potential activity of rehabilitation team members and consumers is to break down attitudinal barriers impacting on the lives of people with disabilities through education and advocacy. Currently, however, the shortage of therapists affects their ability to work actively to make changes within the community.

Clark, Steinberg, and Bischoff (1997) in their study of perceived health status in 76 elderly people in Australia, who had been discharged home from hospital, found that their perceived health status deteriorated at 7 to 10 days post-discharge. These authors suggested that the deterioration of health status may have been because hospitals focus treatment on acute care but are not concerned with the health of people after discharge (Clark et al., 1997). In addition, health professionals have a tendency to perform many functions for their clients rather than allowing them to participate independently and this may not encourage insight into difficulties they will face on returning home (Clark et al., 1997). All these findings highlight the need for post-discharge and longer-term community-based care.

6.4 Depression, Anxiety, and Stress of Participants with SCI at Discharge and at Three Months Post-discharge

The study provides some evidence that depression existed both at discharge and at post-discharge. Participants had moderate depression scores at both times. Nevertheless, the scores were significantly higher at three months post-discharge. The same situation occurred for anxiety among participants. People with SCI demonstrated more anxiety three months post-discharge, while they were at home, than at the point of discharge from hospital. Comparison of the data for stress, however, revealed that stress at three months post-discharge did not significantly change from stress at discharge.

Chuenklin (2000) noted in her study of the lived experience of persons with paraplegia in Thailand that people experienced intense grief due to the loss of their ability to walk. Chuenklin also noted that people with disability were depressed while they were at home because they could not perform activities, and were frequently left alone for most of their days. Most people with SCI became unemployed after sustaining their disability. This caused loss of income to support their families (Kovindha & Yawila, 1998).

The literature suggests that anxiety is likely to occur when people face performance demands that are both testing and significant to their self-esteem (Lovibond & Lovibond, 1996). Anxiety also occurs when a person perceives the probability of failure to be high; such as, frequently after the discontinuation of physical treatment (Lovibond & Lovibond, 1996). Some therapists are reluctant to tell people with SCI that they face permanent disability. People with SCI may have anxiety and doubts about their symptoms for a number of reasons. Limited general knowledge of spinal cord injury and its consequences coupled with limited provision of education following SCI both contribute. In one study in Thailand, some people with complete cord lesions even expected to walk normally again (Chuenklin, 2000). As the participants in the current study generally had undertaken limited formal education, this could easily have occurred. This issue points to the need for rehabilitation team members to find the right time to approach clients to provide realistic information about their prognosis.

Chuenklin (2000) noted in her study of the lived experiences of people with paraplegia that people demonstrated stress when they realised that they could not walk. It is important, therefore, to be aware of and sensitive to these issues when providing information on future prognosis for people with SCI in order to ensure that emotional support is provided at potentially critical times.

6.5 Predictors of Rehabilitation Outcomes

In order to provide a concise and clear discussion of factors predicting rehabilitation outcomes, the potential predictors were divided into three groups as follows:

- Social determinants of health-related predictors in this group include marital status, economic status, and education level completed.
- Disability-related predictors include age at onset, duration of disability, attendant care, and number of architectural barriers.
- Service-related predictors include fulfilled OT needs, number of different services received, and number of different services required but not received.

6.5.1 Social determinants of health-related predictors

There were three predictors in this group - marital status, economic status, and education level completed. These predictors are discussed below.

- **Marital Status**

Marital status was a predictor of almost all outcome variables including functional status, depression, anxiety, and stress, and health status in the areas of general health, role physical, role emotional, social functioning, bodily pain, vitality, and mental health. Physical functioning was the only outcome that was not significantly affected by marital status. Participants with SCI who were married demonstrated lower scores of functional ability than participants who were not married. An explanation for this is that in Thai culture, it is seen as the responsibility of families, especially female spouses, to look after their family members. This would be emphasised if their partners had a disability (Viboolpholprasert et al., 1997). People with SCI who had someone to assist them in daily activities scored lower in functional ability because they performed fewer activities independently than those who had no assistance. Single men were more likely to be independent than married men, possibly because they did not have family member to do activities for them. This resulted in higher scores of functional status for single men than for married men with SCI.

Participants who were married had lower depression, anxiety, and stress than participants who were not married. An explanation may be that they always had someone they could talk with, and someone who supported them. Somers (1992) stated that female spouses provided the most support to people with SCI. Viboolpholprasert et al. (1997) suggested that males, who were married, received support and encouragement not only from their spouses but also from their children. In Thailand, a female spouse who looks after a husband with a disability, is viewed by other members of society as a good wife (a good person). In this study, the caring role provided by spouses contributed to the lower levels of depression, anxiety, and stress in people who were married compared with people who were not married.

Participants who were married also had higher scores for general health, role physical, role emotional, social functioning, vitality, mental health, and bodily pain than participants who were not married. Higher scores for all but bodily pain may be because people who were married received support and encouragement from the people taking care of them. Kovindha and Yawila (1998) stated that most males with SCI in Thailand, who were married, lived with their spouses after leaving hospitals. Their spouses assisted them in terms of exercise, hygiene, and self-care so that they maintained good health. It was not surprising, therefore, for people who were married to report higher scores in these areas of health. In contrast, high scores for bodily pain indicated that people who were married had greater limitations in activities due to bodily pain than people who were not married. Bodily pain in people with SCI can be caused from the injury to the spine itself, muscle spasm, joint pain through lack of movement, and positioning problems (Kovindha, 1990; Pajareya, 2000). It may be because people with SCI who were married had their spouses help them with activities that caused even minimal pain so that they reported more limitations in doing tasks than those who were not married.

One confounding element to the scoring of the functional status assessment involved value judgements of how much of an activity could be performed. If technical aids and adaptive devices were used to accomplish activities, lower scores were allocated to those activities. Furthermore, people with SCI who live independent lifestyles by managing and directing others received lower scores when assessed by this instrument.

- **Economic Status**

Economic status was a significant predictor of emotional states of depression and stress, and health status in the area of mental health. Participants with SCI, who were classified as not poor, scored lower on depression and stress scores than participants with SCI who were classified as poor. Results also revealed that people who were classified as not poor had better mental health than people who were classified as poor. This may be because people who were not poor had more opportunity to partake in alternative treatment and recreational pursuits, and to procure adaptive equipment. Viboolpholprasert (1997), in his study of people with disability in rural areas of Thailand, concluded that people with high economic status had more opportunity to find resources to support their mental health than people with low economic status. Since Thailand does not have insurance for unemployed persons, people with higher economic status tended to have lower levels of psychological distress because they were not concerned about meeting daily living expenses. They could also afford to finance home and environmental adaptations to make their lives easier. Economic status influenced psychological health more than physical health.

- **Education level completed**

Education level completed was a significant predictor of depression, anxiety, and stress. People with high education levels tended to participate more in community life and work than people with low education levels. Musikhasung (1992), in studying self-esteem of 120 Thai people with SCI found that highly educated participants tended to believe that they could regain independence, were more optimistic than people with lower education levels and had increased self-worth. People with high education levels, who were more likely to be involved in organizational activities and hold leadership positions, had increased self-esteem and confidence (DeJong et al., 1984). Viboolpholprasert (1997) stated in his study of people with disability in the rural areas in Thailand that people with high education levels tended to manage stress and sought more stress relieving resources; such as, religious ceremonies, talking with relatives and neighbours, and creative pursuits. Anxiety was most likely to develop when people perceived the probability of failure in their lives to be high (Lovibond & Lovibond, 1996).

The results from the present study also revealed that participants with high education levels had higher health status scores for general health, physical functioning, role emotional, social functioning, bodily pain, vitality and mental health than participants with lower education levels. Thai people who are highly educated are more likely seek available resources for their health needs. These resources may include regular health checks, health care facilities in their community and libraries where they can access health care literature. Musikhasung (1992), in studying the relationship between education levels and empowerment in 120 people with SCI in Thailand found that people with higher education levels tended to be more involved in their own health care than people with lower education levels.

Marital status, economic status, and education level are predictors of the emotional states of depression, anxiety, and stress in people with SCI. These predictors also affected health status in the area of mental health on the SF-36 Health Survey Marital status was the only variable in this group that had an influence on functional status of people with SCI, while economic status and education level influenced mainly emotional status.

6.5.2 Disability-related Predictors

There were four predictors in this group - age at onset, duration of disability, attendant care, and number of architectural barriers. These predictors are discussed below.

- **Age at Onset**

Age at onset was a significant predictor of the emotional state of anxiety, and health status in the area of bodily pain. Older participants tended to report higher anxiety and bodily pain than younger participants. These results were congruent with a study by Munrasartsathorn et al. (1995) who found that older people were more anxious about their health than younger people. In addition, older people reported lower tolerance to pain than younger people (Munrasartsathorn et al., 1995). Although there was some agreement with the literature in this area, further study is required for a greater understanding of these factors.

- **Duration of Disability**

Duration of disability was a significant predictor of the emotional state of stress and health status in the areas of general health and role emotional. Participants with SCI who had sustained a disability for a longer period of time reported higher levels of stress than people who had recently sustained SCI. However, participants who had sustained SCI for a longer period had lower scores of general health and role emotional than participants with SCI who sustained disability for shorter period.

During the early stages of recovery people with SCI may not fully understand that they have a permanent disability, and may even have expectations that they will recover fully. In addition, health professionals may have difficulty in communicating a realistic prognosis to clients. There is a delay, therefore in people with SCI having to face the implications of permanent functional loss, and having to adapt to life with disability. When facing up to the realisation that life will never return to normal, people experience emotional stress. Chuenklin (2000) studied lived experiences in 10 people with SCI in Thailand and reported that emotional responses of people following SCI can be divided into three periods; the early period, the transition period, and the living with SCI period. In the early period, people with SCI expressed anger and denial and still hoped that they would recover. In the transition period, people expressed doubt, uncertainty, and stress. Lastly, during the living with SCI period, people learned to adapt to life with a disability (Chuenklin, 2000). At the time of assessment of participants in this study most people according to Chuenklin's descriptions of emotional responses would have been in the transition stage. Participants with SCI had not only emotional stress but also reported poor general health. This is compatible with Chuenklin who reported that people with SCI not only had high stress but also lacked interest in their general health during the transition period.

- **Attendant Care**

Attendant care was a significant predictor of functional status and health status in the area of physical functioning. People with SCI who had someone to look after them had lower scores in functional status and physical functioning than people who did not have anyone to look after them. Functional status and physical functioning were similar in their definitions as they both assessed activities of daily living. However, functional status, as measured by the FIM, was more detailed than the SF-36, which measured physical functioning.

Attendant care was similar in that regard to marital status. Participants who were married had lower scores in functional status. In Thailand, mainly female spouses provide attendant care (Viboolpholprasert et al., 1997).

- **Number of Architectural Barriers**

Number of architectural barriers was a significant predictor of functional status and health status in the areas of role physical, vitality, and mental health. Participants who had a greater number of architectural barriers at home had lower functional ability, and lower scores in role physical, vitality, and mental health than participants who had fewer numbers of architectural barriers. Architectural barriers in Thai homes such as narrow doors, high steps, narrow bathrooms and toilets, and rough surfaces can hinder the performance of functional abilities (Kanta, 1992). Not only do architectural barriers at home obstruct functional performance but so do barriers in public places (Kovindha, 2000).

Architectural barriers also predicted role physical, vitality, and mental health. Role physical is the measurement of the extent that physical disability impacts on everyday activities and work. Participants with SCI have muscle weakness that obstructs their ability to perform usual daily activities and work activities. Participants with SCI who had a great number of architectural barriers at home also reported low vitality. Kovindha (2000) found in her study of architectural barriers of people with disability in Thailand that inappropriate home and community environments prevented people engaging in activities and this negatively influenced vitality, self-esteem and mental health.

Attendant care and number of architectural barriers were good predictors of functional status. None of these predictors influenced depression. Only one predictor - age at onset - influenced anxiety. Duration of disability influenced stress. Predictors in the disability-related group mostly influenced physical health as opposed to psychological health.

6.5.3 Service-related predictors

Three potential predictors in this group were fulfilled OT needs, number of different services received, and number of services required but not received. These predictors are discussed below.

- **Fulfilled OT Needs**

Fulfilled OT needs was a significant predictor of functional status, emotional states of depression and anxiety, and health status in the areas of physical functioning, role emotional, and social functioning.

Participants who had their OT needs fulfilled were more likely to have better functional status scores than participants who did not have these needs met. Occupational therapists in Thailand take responsibility for ADL training for people with disability (Punyamee, 2000). ADL programs that occupational therapists are responsible for include self-care training, mobility and locomotion practices, and social and communication skills relearning. Not only are occupational therapists responsible for ADL programs in Thailand but they are also responsible for other services; such as pre-vocational training, home and environmental modification, and recreational activities (Kovindha, 1990; Pajareya, 2000). Occupational therapists encourage people with disability to perform activities by themselves as much as possible even in restricted environments. Results suggested participants who received all of these services performed daily activities at home better than participants who received less or none at all.

In addition, participants with SCI who had their OT needs fulfilled demonstrated lower levels of depression and anxiety than participants whose OT needs had not been fulfilled. OT programs attempt to address both the physical and psychological aspects of disability. Recreational activities can decrease feelings of depression and anxiety. Kovindha (1998) found that for people with SCI, after leaving hospital in Thailand, recreational activities increased the motivation to participate in activities and decreased feelings of sadness and gloom.

Participants who had their OT needs fulfilled demonstrated higher scores in physical functioning, role emotional, and social functioning than participants whose OT needs had not been fulfilled. Participants who had completed occupational therapy programs had learned how to perform activities to gain maximum independence, especially in environments with architectural barriers. This increased their performance in physical functioning.

Occupational therapy also provided treatment activities that decreased feelings of distress. It may be that having accessed these OT programs increased scores of role emotional. People with disability who had their OT needs fulfilled also had better social skills than those whose OT needs had not been fulfilled. Occupational therapists provided social skills training as part of their services (Boonrayong, 2000). This may have positively influenced scores of social functioning.

- **Number of Different Services Received**

Number of different services received was a significant predictor of the emotional state of stress and health status in the area of role physical. Participants who received greater numbers of different services from the rehabilitation team were more likely to have less stress and higher scores in role physical than participants who received less services. Rehabilitation teams in Thailand mainly consist of physiatrists, physiotherapists, occupational therapists, and rehabilitation nurses. However, personnel such as psychologists, social workers, orthotists, and vocational counsellors participate in the treatment upon consultation. Services from psychologists address stress in people with disability while services from other professionals all help to relieve stress in different ways.

- **Number of Services Required but not Received**

Number of services required but not received was a significant predictor of functional status, the emotional state of anxiety, and health status in the areas of general health, role emotional, and vitality. Participants who lacked services demonstrated lower scores of functional status than participants who had a greater number of different services provided. These unmet service needs reported by participants included vocational counselling and training, prosthetic and orthotic services, psychological support, and services from social workers. The main reason that this group of people did not receive these services was that there were no positions for these personnel in some hospitals due to government budget limitations (Reawpaibool, 2000; Viboolpholprasert et al., 1997). This is a political issue that requires the combined advocacy efforts of rehabilitation team members to persuade the Thai government to supply financial support to employ these personnel on behalf of people with SCI.

Participants who had greater numbers of different services required but not received had more anxiety than participants who had fewer numbers of different services required but not received. Information from personnel such as vocational counsellors, social workers, and psychologists is important in the lives of people with disabilities. Vocational counsellors and social workers provide information regarding income-generating occupations and psychologists provide programs for psychological support. All of these approaches contribute to the reduction of anxiety for people with disabilities.

Vitality scores were also low in participants who had a great number of services required but not received. Similar to the lower scores in general health and role emotional, the low vitality scores might be because these participants did not receive the information necessary to encourage them to fully participate in society; such as, advice on income-generating occupations, and availability of health care in the community.

In conclusion, predictors in the service-related group influenced rehabilitation outcomes in many areas. Fulfilled OT needs and number of service required but not received were good predictors of functional status, emotional states of depression and anxiety, and health status. However, the number of services received was a weaker predictor than fulfilled OT needs and number of service required but not received. Number of services received was a significant predictor of stress and health status in only one area, role physical. These results indicate that services provided for people with SCI should focus on living independently and productively. In addition, the issues of different rehabilitation services required by clients should be brought to the attention of government in Thailand.

6.6 Limitations of the Study

One hundred twenty-one people with SCI participated in this study. All lived in the northern part of Thailand. Although the Thai population is homogeneous in terms of culture, lifestyle, and religious beliefs, participants from other regions of the country may differ in terms of outcomes and predictors of outcomes. It would be useful to broaden the scope of the study to include a wider sample geographically.

This study was limited to the rehabilitation outcomes of people with SCI at three months post discharge from hospitals. Rehabilitation outcomes at six months or one year after discharge may show different results. There may be value in investigating outcomes at different time frames post-discharge.

There were limitations to the selection and measurement of the independent variables (predictors) in the present study. Selection of potential predictors of rehabilitation outcomes was supported by research originating outside Thailand. Some of the variables might not be appropriate to the situation in Thailand. However, there was a certain level of confidence in including these variables since there was no theoretical evidence to support their exclusion.

Some variables were deleted from the multiple regression based on their violation of the assumption of normality as assessed by the skewness and kurtosis values. The variables were primarily in health services utilisation; such as frequency of treatment by physiatrists, physiotherapists, orthotists, social workers, psychologists, nurses, and vocational counsellors. Another variable that violated this assumption was the number of vocational services. Elimination of some variables may have introduced some bias, however unintentional, to the results.

Data for some variables were confounded by the routines in rehabilitation units in Thailand; for example, health services utilization, where visits by the team members are highly scheduled. Participants' answers, therefore, showed that they all met with team members according at the same frequency.

Finally, there was some difficulty in the measurement of number of different services received from rehabilitation team because participants had difficulty in discerning the difference among rehabilitation professionals, especially between physiotherapists and occupational therapists. The same problem occurred with the measurement of number of different services required but not received. Recognising the limitations inherent in the study, the results of this study can be used as baseline data for further research relevant to factors predicting rehabilitation outcomes of people with disability in Thailand.

6.7 Conclusion

This study has demonstrated the characteristics of rehabilitation outcomes for people with SCI, the differences before discharge and at three months after discharge from hospital, and factors predicting these outcome variables. There were three areas of rehabilitation outcomes in the present study including functional status, emotional status (depression, anxiety, and stress), and health status (general health, physical functioning, role physical, role emotional, social functioning, bodily pain, vitality, and mental health). The comparisons of rehabilitation outcomes (paired t-tests) in this population revealed that scores of most outcome variables were significantly lower at three months post-discharge than at discharge. The comparisons of emotional states of depression, anxiety, and stress also revealed that scores of depression and anxiety were higher at post-discharge than at discharge. However, there were no significant differences in scores of stress at discharge and at post-discharge. The comparisons of eight dimensions of health status revealed significantly lower scores at three months post-discharge than at discharge in five areas including general health, physical functioning, role physical, social functioning, and mental health. These results draw attention to the need for people with SCI to have continued service from rehabilitation professionals following discharge from hospital.

The results of the study also found that marital status, economic status, education completed, age at onset, duration of disability, attendant care, number of architectural barriers, fulfilled OT needs, number of different services received, and number of different service required but not received were predictors, by varying degrees and strengths, of functional, emotional and health status. Rehabilitation professionals in Thailand should consider the effects of the factors that potentially affect the success of treatment programs.

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APPENDICES

Appendix A: Terminology
Appendix B: Questionnaire of Predictors of Rehabilitation Outcomes
Appendix C: The Functional Independence Measure (FIM)
Appendix D: The Depression, Anxiety, and Stress Scales (DASS)
Appendix E: The SF-36 Health Survey
Appendix F: Consent Form
Appendix G: Letter to Ask for Permission to Collect Data at Each Target Hospital in Thailand

Appendix A: Terminology

Rehabilitation outcomes: functional status, health status, and emotional states of depression, anxiety, and stress

Functional status: levels of ability in activities of daily living

Health status: health-related quality of life known to be most directly affected by disease and medical treatment. Health status as measured by SF-36 Health Survey focuses on eight dimensions including general health, physical functioning, role physical, role emotional, social functioning, bodily pain, vitality, and mental health

Emotional status: emotional states of depression, anxiety, and stress

Physiatrist: medical doctor in the rehabilitation field

Rehabilitation hospital: the major hospital in Thailand where provides rehabilitation services

Attendant care: care provided for people with SCI by family members and relatives

Fulfilled OT needs: clients received OT programs in all 4 core areas involving activities of daily living training, prevocational assessment, home visit and modification, and recreational pursuit.

Appendix B: Questionnaire of Predictors of Rehabilitation Outcomes

This questionnaire asks in five areas: socio-demographic, disability-related, environmental, interface, and service-related data.

Please answer every question, if you are unsure about how to answer, please give the best answer you can.

Socio-demographic data

1. Name................................ Date of Birth ....

2. Gender: Male ☐ Female ☐

3. Marital status

	Please tick
Married	
Single	
Separated or Divorced	
Widowed	

4. Are any of the following substantially dependent on you for financial or other support?

	Please tick if yes
None	
Spouse	
Parent	
Children	
Other relatives	
Friends	
Others (please specify)	

5.Educational level completed

	Please tick
No education	
Primary school	
Secondary school	
University	
College or other training (please specify)	

6. Work history or employment status prior to injury ....

....

....

7. Current occupation:………………………………………………………………………………

8. Income of your family or your caretaker:……………………per month/year.

Disability-related data

1. Diagnosis:……………………………………………………………………………………

2. Cause:………………………………………………………………………………………

3. Age at onset:……………years.

4. Duration of disability:……….year(s)……….month(s)………day(s).

5. Communication problems: Yes ☐ No ☐

6. Discharge status:

	Please tick
Home alone	
Home with family	
Home with relatives	
Transfer to extended care facility	
Others (please specify) ……………………………………………………………… ………………………………………………………………	

Environmental data

1. In home assistance: Yes ☐ No ☐

2. Primary carer

	Please tick
None	
Spouse	
Daughter/Son	
Parent	
Other relatives	
Neighbours	
Others (please specify) ……………………………………………………………… ………………………………………………………………	

3. Other supports

	Please tick if yes
Foundation for people with disability	
Non-government organisation	
Social worker foundation	
Others (please specify)	

4. Housing: Architectural barriers in and about the home

	Please tick if yes
Narrow door for wheelchair (W/C) use	
Narrow bathroom for W/C use	
Inappropriate toilet room for W/C use	
Narrow bedroom for W/C use	
Narrow kitchen for W/C use	
Too many steps	
Small wall in the doorway	
Floor surface inhibit W/C propulsion	
Others (please specify)	

5. Community access

	Please tick if yes
Ramp	
Elevator	
Toilet for people with disability	
Others (please specify)	

6. What place can you visit? Please specify or provide address if possible.

	Please tick if yes	Address
Market		
Temple		
Theatre		
Bank		
Friends' and relatives' home		
Others (please specify)		

7. Transportation barriers: Availability of accessible public or private transportation:
Yes ☐ No ☐

7.1 Can you use these public transportations?

Train	Yes	No
Taxi	Yes	No
Bus	Yes	No

7.2 Do you have access to private transportation? Yes ☐ No ☐

Interface data

1. What aids or equipment do you currently use in your daily live?

	Please tick if yes
Transfer board	
Sock aids	
Shoe aids	
Reacher grip	
Overhead loop	
Cushion	
Grasp bar	
Utensil holders	
Commode chair	
Soap bag	
Hand grove	
Hand stick	
Others (please specify) …………………………………………………………………………………… ……………………………………………………………………………………	

2. Is there any equipment you need that you do not currently have?

Yes ☐ Please specify ……………………………………………………………………

No ☐

Service-related variables

1. Health service utilisation while in hospital:

	Please tick if yes	Frequency per week	Length of time per session
Occupational therapy			
Physiotherapy			
Orthotist			
Social worker			
Psychologist			
Physiatrist			
Rehabilitation nurse			
Vocational counsellor			
Others (please specify) …………………………………………………………………………………… ……………………………………………………………………………………			

2. Please specify services you have not received in hospital but they are in your require

	Please tick
Occupational therapy	
Physiotherapy	
Orthotist	
Social worker	
Psychologist	
Physiatrist	
Rehabilitation nurse	
Vocational counsellor	
Others (please specify) ……………………………………………………………………………………… ………………………………………………………………………………………	

3. Date of admission:……………….. Date of discharge:……………….

4. Length of stay:………………..

5. Did you receive the activities of daily living training by an occupational therapist in these areas?

	Please tick if yes
Dressing	
Feeding	
Hygiene	
W/C training	
Transfer	
Ambulation	
Cooking	
Cleaning house	
Laundry	
Making the bed	
Ironing	
Others (please specify) ……………………………………………………………………………………… ………………………………………………………………………………………	

6. Did you receive home and environmental assessment: Yes☐ No☐
and modification: Yes☐ No☐

7. Did you receive work assessment: Yes☐ No☐ ; work training: Yes☐ No☐
and work modification: Yes☐ No☐

8. Did you receive suggestion with your leisure activities: Yes☐ No☐

9. Have you received any information (service) regarding your future work from vocational counsellor: Yes ☐ No☐
if yes, how many times have you received this service:……………………………………..

Thank you for your participation

Appendix C: The Functional Independence Measure (FIM)

Note: For copyright reasons Appendix C (p. 152-154) has not been reproduced.

Source: Uniform Data System for Medical Rehabilitation, 1996.

(Co-ordinator, ADT Program (Bibliographic Services), Curtin University of Technology, 07/01/2004)

Appendix D: The Depression, Anxiety, and Stress Scales (DASS)

DASS21 Name:………………………………………………Date:……………..

Please read each statement and circle a number 0, 1, 2 or 3, which indicates how much the statement applied to you *over the past week.* There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0: Did not apply to me at all
1: Applied to me to some degree, or some of the time
2: Applied to me to a considerable degree, or a good part of time
3: Applied to me very much, or most of the time

1. I found it hard to wind down	1	2	3	4
2. I was aware of dryness of my mouth	1	2	3	4
3. I couldn't seem to experience any positive feeling at all	1	2	3	4
4. I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	1	2	3	4
5. I found it difficult to work up the initiative to do things	1	2	3	4
6. I tended to over-react to situations	1	2	3	4
7. I experienced trembling (e.g., in the hands)	1	2	3	4
8. I felt that I was using a lot of nervous energy	1	2	3	4
9. I was worried about situations in which I might panic and make a fool of myself	1	2	3	4
10. I felt that I had nothing to look forward to	1	2	3	4
11. I found myself getting agitated	1	2	3	4
12. I found it difficult to relax	1	2	3	4
13. I felt down-hearted and blue	1	2	3	4
14. I was intolerant of anything that kept me from getting on with what I was doing	1	2	3	4
15. I felt I was close to panic	1	2	3	4
16. I was unable to become enthusiastic about anything	1	2	3	4
17. I felt I wasn't worth much as a person	1	2	3	4
18 I felt that I was rather touchy	1	2	3	4
19. I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	1	2	3	4
20. I felt scared without any good reason	1	2	3	4
21. I felt that life was meaningless	1	2	3	4

Appendix E: The SF-36 Health Survey

INSTRUCTIONS: This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities.

Answer every question by marking the answer as indicated. If you are unsure about how to answer a question, please give the best answer you can.

1. In general, would you say your health is:

(circle one)

Excellent 1
Very good 2
Good 3
Fair 4
Poor 5

2. Compared to one year ago, how would you rate your health in general now?

(circle one)

Much better now than one year ago 1
Somewhat better now than one year ago 2
About the same as one year ago 3
Somewhat worse now than one year ago 4
Much worse now than one year ago 5

The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

(circle one number on each line)

ACTIVITIES	**Yes, Limited A Lot**	**Yes, Limited A Little**	**No, Not Limited At All**
a. **Vigorous activities**, such as running, lifting heavy objects, participating in strenuous sports	1	2	3
b. **Moderate activities**, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	1	2	3
c. Lifting or carrying groceries	1	2	3
d. Climbing **several** flights of stairs	1	2	3
e. Climbing **one** flight of stair	1	2	3
f. Bending, kneeling, and stooping	1	2	3

ACTIVITIES	**Yes, Limited A Lot**	**Yes, Limited A Little**	**No, Not Limited At All**
g. Walking more than a mile	1	2	3
h. Walking **half a mile**	1	2	3
i. Walking one hundred yards	1	2	3
j. Bathing or dressing yourself	1	2	3

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

(circle one number on each line)

	Yes	**No**
a. Cut down on the **amount of time** you spent on work or other activities	1	2
b. **Accomplished less** than you would like	1	2
c. Were limited in the **kind** of work or other activities	1	2
d. Had **difficulty** performing the work or other activities (for example, it took extra effort)	1	2

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

(circle one number on each line)

	Yes	**No**
a. Cut down on the **amount of time** you spent on work or other activities	1	2
b. **Accomplished less** than you would like	1	2
c. Didn't do work or other activities as **carefully** as usual	1	2

During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

(circle one)

Not at all	1
Slightly	2
Moderately	3
Quite a bit	4
Extremely	5

How much bodily pain have you had during the past 4 weeks?

(circle one)

None	1
Very mild	2
Mild	3
Moderate	4
Severe	5
Very severe	6

During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

(circle one)

Not at all	1
A little bit	2
Moderately	3
Quite a bit	4
Extremely	5

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling . How much of the time during the past 4 weeks -

(circle one number on each line)

	All of the time	**Most of the time**	**A Good Bit of the time**	**Some of the time**	**A Little of the time**	**None of the time**
a. Did you feel full of life?	1	2	3	4	5	6
b. Have you been a very nervous person?	1	2	3	4	5	6
c. Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
d. Have you felt calm and peaceful?	1	2	3	4	5	6
e. Did you have a lot of energy?	1	2	3	4	5	6
f. Have you felt downhearted and low?	1	2	3	4	5	6
g. Did you feel worn out?	1	2	3	4	5	6
h. Have you been a happy person?	1	2	3	4	5	6
i. Did you feel tired?	1	2	3	4	5	6

During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

(circle one)

All of the time	1
Most of the time	2
Some of the time	3
A little of the time	4
None of the time	5

How TRUE or FALSE is each of the following statements for you?

(circle one number on each line)

	Definitely True	**Mostly True**	**Don't Know**	**Mostly False**	**Definitely False**
a. I seem to get ill more easily than other people	1	2	3	4	5
b. I am as healthy as anybody I know	1	2	3	4	5
c. I expect my health to get worse	1	2	3	4	5
d. My health is excellent	1	2	3	4	5

Appendix F: Consent Form

Curtin
UNIVERSITY OF TECHNOLOGY

School of Occupational Therapy
Curtin University of Technology
GPO Box U 1987
Perth, Western Australia 6845

9 April 2000

Dear……………………………,

My name is Pisak Chinchai, I am an occupational therapist currently enrolled to complete my doctoral studies at Curtin University of Technology, Australia. I am performing a study entitled "A study of people with spinal cord injury (SCI) in Thailand: functional, health, and emotional statuses." The purpose of this project is to identify functional status, health status, and emotional status as rehabilitation outcomes of people with SCI both at discharge and at post-discharge. It will also investigate factors predicting these outcome variables in these people. Moreover, the study will provide an opportunity to the researcher to propose a service model for people with SCI in their transition from rehabilitation hospital to home environments. This will help to fulfil the entire process of rehabilitation service in Thailand.

I invite you to participate in this study, which will be conducted by interviewing your perception of health and your emotional states of depression, anxiety, and stress. In addition, the interviewer will also assess your abilities in your daily life. The assessment will be performed twice, at forty-eight hours before discharge from hospital and again at three months post-discharge at your home.

I would like to inform you that all data you provide will be used for the purpose of research only. Neither your name nor the names of people you mention will be used in a subsequent procedure. Therefore, your anonymity and privacy will be protected. Moreover, you can withdraw your participation at anytime without any negative consequence to you.

If you require further clarification or information, please contact me at Department of Occupational Therapy, Faculty of Associated Medical Sciences, Chiang Mai University, Phone number: (053) 945094.

Sincerely yours,

(Pisak Chinchai)

Participant's consent

I,..., do hereby agree to participate the research project entitled "A study of people with spinal cord injury in Thailand: functional, health, and emotional statuses," and understand the commitments required.

I have read the letter enclosed with this page of document. I understand the purposes of this study and understand that my participation is voluntary. I hereby give permission to be interviewed and assessed by the researcher.

Signed (Participant) ______________________________

Date ______________________________

Signed (Witness) ______________________________

Date ______________________________

Signed (Investigator) ______________________________

Date ______________________________

Appendix G: Letter to Ask for Permission to Collect Data at Each Target Hospital in Thailand

Curtin
UNIVERSITY OF TECHNOLOGY

School of Occupational Therapy
Curtin University of Technology
GPO Box U 1987
Perth, Western Australia 6845

9 April 2000

To Whom It May Concern:

My name is Pisak Chinchai, I am an occupational therapist currently enrolled to complete my doctoral studies at Curtin University of Technology, Australia. I am performing a study entitled "A study of people with spinal cord injury (SCI) in Thailand: functional, health, and emotional statuses." The purpose of this project is to identify functional status, health status, and emotional states of depression, anxiety, and stress as rehabilitation outcomes of people with SCI both at discharge and at post-discharge. It will also investigate factors predicting these outcome variables in these people. Moreover, the study will provide an opportunity to the researcher to propose a service model for people with SCI in their transition from rehabilitation hospital to home environments. This will help to fulfil the entire process of rehabilitation service in Thailand.

Data will be collected from people with SCI by interviewing their perception of health and emotional states of depression, anxiety, and stress. The assessment of their functional status will also be performed. The investigation will be conducted under the consent of the participant at two different times, at forty-eight hours prior to discharge from hospital and again at three months post-discharge. As obliged by the Curtin University's Human Research Ethics Committee (approval number HR 212/99), neither the participant's name nor other names mention will be used in any subsequent procedure. Moreover, the participants will be informed that they can withdraw their participation at anytime without any negative consequences to them. All information they provide will be used for the purpose of research only.

I, therefore, would like to ask a permission to collect data from people with SCI in the rehabilitation unit at the hospital under your supervision. If you have any further questions regarding the data collection procedure or to the research project, please do not hesitate to contact me at (053) 945094.

Sincerely yours,

(Pisak Chinchai)