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Adaptation to Stroke and a Model of Successful Ageing

A thesis submitted to the
University of Dublin, Trinity College
for the degree of
Doctor of Philosophy

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Department of Medical Gerontology
March 2008

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Claire Donnellan

March 2008

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Dedication

To my mother Bridget who always shows an interest in her special way and to my father Michael who probably foresaw the finishing line from a far.

Dawn

Ecstatic bird songs pound
the hollow vastness of the sky
with metallic clinkings
beating color up into it
at a far edge,--beating it, beating it
with rising, triumphant ardor,--
stirring it into warmth,
quickening in it a spreading change,--
bursting wildly against it as
dividing the horizon, a heavy sun
lifts himself--is lifted--
bit by bit above the edge
of things,--runs free at last
out into the open--!lumbering
glorified in full release upward--
songs cease.

William Carlos Williams (1883-1963)

Summary

The focus of this research is to apply and examine the Baltes' successful ageing model of selection, optimization and compensation (SOC) (Baltes & Baltes, 1990) in the context of stroke which has sudden onset and uncertain potential for recovery or recurrence, in order to gain further understanding into the process of adaptation for this condition. The process of adaptation to the physical and psychosocial consequences after stroke is a major challenge for many individuals affected by stroke. This process involves responding to the functional, psychological, and social changes that occur with the onset and experience of living with a disability, chronic illness, or associated treatments. Following a review of the literature that has defined and quantified coping strategies after stroke, it was highlighted that a limited number of studies dealt with coping as part of the psychological adaptation process after stroke; theoretical frameworks to support operational coping models were lacking; and other methodological problems in relation to coping measurement within stroke were similar to those that exist within the general coping literature especially in terms of the limited reporting psychometric properties.

The SOC model was chosen as a potential framework to investigate the process of adaptation after stroke because the contribution of the SOC model to date has been shown to address improvement, maintenance and reorientation in terms of coping with major life change and loss. Therefore, the aim of this study was to examine the extent to which individuals, following the impact of an acute physical condition, engage in SOC strategies and the relationship of the SOC strategies with functional ability, health-related quality of life (HRQOL) and depression one year later.

Stroke patients (n=153) were interviewed within one month of admission and followed up one year later. Adaptive strategies were measured using the Selection, Optimiztion and Compensation 15-item questionnaire (SOC-15). Resources available, including internal (recovery locus of control was measured using the Recovery Locus of Control Questionnaire (RLOC), stroke severity using the Orpington Prognostic Score (OPS), and perceived social support using the Multidimensional Scale of Perceived Social Support (MPSS)) and external (marital status, socio-economic status, living arrangements and

education) were also assessed. Outcome measures used to assess HRQOL, functional ability and depression respectively were the Stroke Specific Quality of Life Questionnaire (SS-QoL), the Nottingham Extended Activities of Daily Living Scale (NEADL) and the Depression Subscale of the Hospital Anxiety and Depression Scale (HADS-D).

Findings indicated that although there were some associations between the use of SOC strategies and stroke outcomes, the individual SOC subscales or composite SOC were not predictive of HRQOL, functional ability or depression one year after stroke. Overall findings showed that use of SOC strategies in a stroke population, were not age specific and that there was no change in the use of SOC strategies over time, with the exception of the subscale compensation.

In conclusion, stroke patients did engage in the use of SOC strategies indicating that SOC strategies may potentially be used in response to loss regulation after stroke. Results from this thesis highlight that it is an individual's initial HRQOL functional ability, levels of depression and socio-economic status that are important factors in determining outcome one year after stroke. Further insights into the operationalisation of SOC as a generic measure within the context of a health-related condition have been gained as a result of this research. Overall findings would indicate that a stroke specific measure of SOC may be warranted in order to detect significant differences in determining outcomes for a stroke population.

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Abbreviations

HADS	Hospital Anxiety and Depression Scale
HARP	Healthy Ageing Research Programme
HRQOL	Health-related Quality of Life
ICF	International Classification of Functioning, Disability and Health
ICIDH	International Classification of Impairment, Disability and Handicap
NEADL	Nottingham Extended Activities of Daily Living
RLOC	Recovery Locus of Control
SES	Socio-economic status
SS-QOL	Stroke-specific Quality of Life
SOC	Selection, optimization and compensation
SOC-15	Selection, optimization and compensation 15-item questionnaire
WHO	World Health Organization

1 Stroke occurrence and consequences for outcomes of adaptation and/or recovery

Stroke is a global health problem and is the second commonest cause of death and a leading cause of adult disability worldwide (World Health Organization, 2004). Stroke and its residual disabilities (such as physical, cognitive, emotional and social changes) are a common experience in the lives of many individuals. In addition to physical disability, stroke patients are likely to experience a variety of psychological consequences that can compromise the rehabilitation process and affect long-term adjustment (Bronstein, 1991; Swartzman, Gibson, & Armstrong, 1998; Thompson, Sobolew-Shubin, Graham, & Janigian, 1989). Therefore, in the last decades, stroke literature shifted attention from survival and functional outcomes to psychological factors that influence post stroke subjective well-being (Wyller, Holmen, Laake, & Laake, 1998). Depression has received the most attention in the research literature on the consequences of stroke (Berg, Palomaki, Lehtihalmes, Lonnqvist, & Kaste, 2003; Brodaty, Withall, Altendorf, & Sachdev, 2007; Herrmann, Black, Lawrence, Szekely, & Szalai, 1998; Sinyor et al., 1986; Starkstein, Robinson, & Price, 1988). Other psychological problems that can emerge following the traumatic event of a stroke include fears of loss of control, fears about death and disfigurement, social isolation, helplessness, and worry about the loss of social roles (Thompson et al., 1989). Having a stroke is considered a major life event that will inevitably require the use of coping strategies in order to try to re-establish acceptable life equilibrium (Rochette & Desrosiers, 2002). Individuals who have had a stroke must cope with many changes in their lives. Initially, the focus is on the physical changes and functional abilities; however, coping with the emotional and cognitive changes also requires attention (Sisson, 1998).

1.1 Global incidence of stroke

In international terms, stroke incidence may be in decline as a result to improved control of risk factors, but life time risk has not declined to the same degree and this may be due to improved life expectancy (Carandang et al., 2006; Rothwell et al., 2004). Although stroke does sometimes affect children and young adults, it is mainly a disease of older people (Warlow, Sudlow, Dennis, Wardlaw, & Sandercock, 2003).

The burden of stroke is predicted to increase over the years ahead because of the rapid rise in the proportion of older people in the population in both the developed and developing world (Rothwell et al., 2004). According to two reviews, there is a steep rise in incidence with age, with three-quarters of all first strokes occurring after the age of 65 years, at least in white populations (Feign, Lawes, Bennett, & Anderson, 2003; Sudlow & Warlow, 1997). In the first year after stroke 30% of patients will die, most within the first ten days (Carroll, Murad, Eliahoo, & Majeed, 2001). More than a third of people who survive a stroke will have severe disability (Anon, 2005). Two-thirds of stroke deaths occur in less developed countries and, by 2020, stroke mortality will have almost doubled, mainly as a result of an increase in older people and the future effects of current smoking patterns in less developed countries (Warlow et al., 2003).

Almost 10,000 people in Ireland suffer from an acute stroke every year (Coughlan & O'Neill, 2004). Approximately 2,000 people die from stroke each year accounting for more deaths than breast cancer, lung cancer and bowel cancer combined. There are an estimated 30,000 people in the community are living with residual disability from stroke (Irish Heart Foundation, 2000). This disease has an enormous social and economic impact on society and according to the Irish Heart Foundation (2000), it is second only to dementia as the most expensive illness in health and social care costs, and these costs exceed those of either cancer or ischaemic heart disease. The progressive increase in the elderly population in Ireland (Fahey, 1995) is likely to lead to an increased prevalence of strokes in the future.

1.2 Consequences of stroke

The physical, psychological, social and emotional sequelae following a stroke are well documented (Binder, 1984; Churchill, 1998; Heitzner & Teasell, 1998; Mukherjee, Levin, & Heller, 2006; Swartzman & Teasell, 1993), although the evidence to support how individuals manage and adjust to such sequelae remains limited. The World Health Organisation (WHO) International Classification of Functioning, Disability and Health (ICF) (2001) may be a useful framework for understanding the relationship between the sequelae of stroke and its impact on the lives of the individuals affected (Mayo et al., 1999). It does not emphasize only a mechanistic approach, but in many ways has proven an enabling platform for

considering the interplay between physical, psychological and social factors in illnesses causing disability (Wade & Halligan, 2003). ICF is a classification of health and health-related domains that describe body functions and structures, activities and participation. This framework originates from the initial WHO's International Classification of Impairments, Disabilities and Handicaps (ICIDH) framework (World Health Organization, 1980). The terminology of the ICF and ICIDH are used interchangeably within the literature e.g. activity limitations are often referred to as disability in studies (see figure 1-1). The domains of the ICF are classified from body, individual and societal perspectives. Since an individual's functioning and disability occurs in a context, ICF also includes a list of personal (psychological) and environmental factors (World Health Organization, 2001). Therefore the inclusion of these contextual factors has widened the perspective of the role of psychological and environmental inputs to function and quality of life after stroke (Wade, 2003).

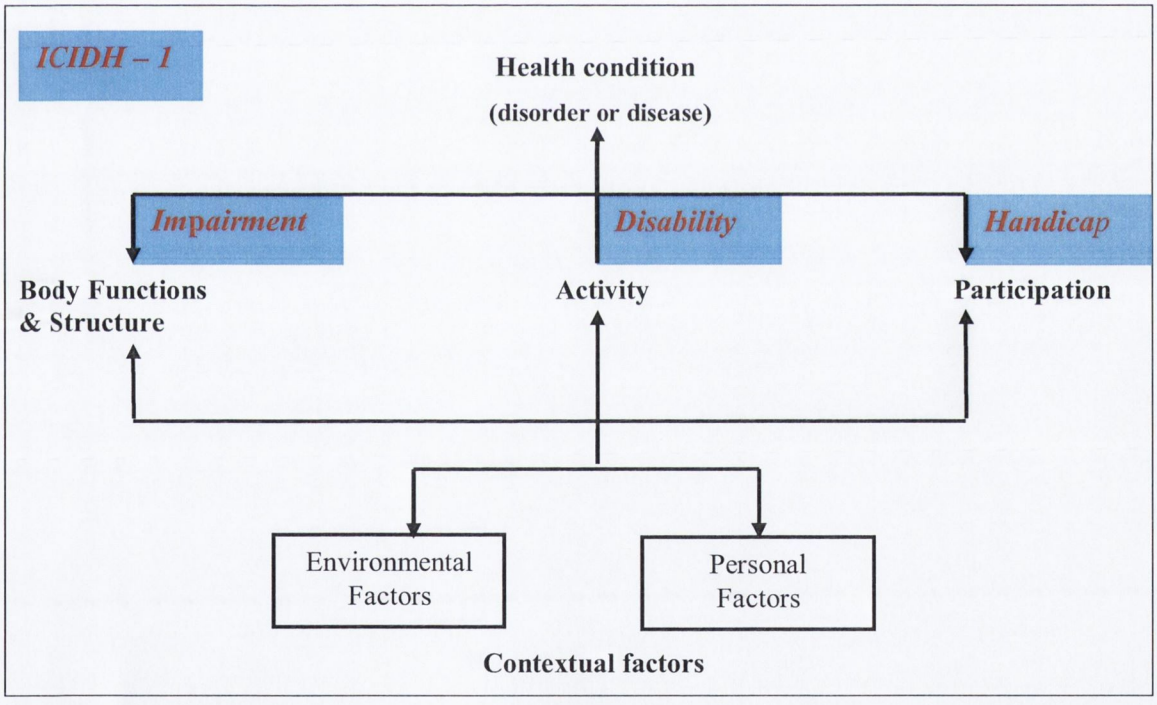

Figure 1-1 The International Classification of Functioning, Disability and Health (ICF) (2001)

(The original ICIDH (1980) categories impairment, disability and handicap are also presented)

In the next section, the multitude of consequences that can result from a physical, psychological, emotional and social perspective following a stroke will be described

under the headings – Pathology, Impairment, Activities and Participation, and Personal and Environmental Contextual Factors provided by the ICF framework.

1.2.1 Pathology

Stroke is defined by the World Health Organisation (World Health Organization, 1980) as a syndrome of rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer, or leading to death, with no apparent cause other than of vascular origin. There are three pathological types: ischaemic stroke (about 80% in Caucasian populations), primary intracerebral haemorrhage (about 15%), and subarachnoid haemorrhage (about 5%) (Warlow et al., 2003). Ischaemic strokes are further divided by pathophysiological mechanism into thrombotic and embolic subtypes. Thrombotic strokes, which are more common, develop in narrowed cerebral vessels and embolic strokes are caused by migration of material to central nervous system blood vessels from some distant source causing vascular occlusion and ischaemia of brain tissue. Ischaemic strokes are classified into four clinical subtypes (depending on the area of cerebral circulation affected): total anterior circulation infarct (TACI), partial anterior circulation infarct (PACI), lacunar infarct (LACI), and posterior circulation infarct (POCI).

1.2.2 Impairments of body functions and structure

Impairments refer to problems in body function or structure (including psychological functions) such as a significant deviation or loss. A number of physical impairments can result following stroke depending on the location and size of the lesion (haemorrage or infarct) within the brain. Motor impairments are the most prevalent of all deficits seen after stroke, usually with involvement of the face, arm, and leg, alone or in various combinations. These neuromuscular impairments can result in hemiparesis (partial weakness of one side of the body) or hemiplegia (complete paralysis of one side). As a result of neuromuscular impairments, balance and gait can also be affected. Sensory and notably, visual deficits are also common impairments following stroke. Sensory deficits range from loss of primary sensations to more complex loss of perception such as neglect or extinction. Patients may describe numbness, tingling, or altered sensitivity or have complete lack of awareness and position of a body part or one side of their body. Specific visual deficits that stroke can cause are monocular visual loss (loss of vision in one eye), homonymous

hemianopia (half the visual field is cut as a result of stroke), or cortical blindness (no visual representation in the visual cortex). Motor and sensory impairments can have a very significant impact on an individual's functioning in terms of everyday activities and participation. These effects on activities of everyday living will be discussed further in this chapter under the sections activity limitations and participation limitations.

1.2.2.1 Stroke severity

Stroke severity is a clinical determinant of prognosis that has been used in several stroke studies determining recovery and outcome. Measures of stroke severity are able to ascertain the precise nature of stroke-related impairments (including both cognitive and physical impairments) and to characterise severity. Assessment of stroke severity can estimate the degree of neuromuscular impairment such as limb power and balance, sensory deficits such as proprioception and cognitive deficits. Therefore specific residual ability or physical or cognitive function remaining following the impact of stroke can be determined. Stroke severity scores have been shown to estimate early survival, need for long-term institutional care, and dependence in basic activities of daily living allowing survivors, families, providers, and healthcare systems to plan for the future (Studenski, Wallace, Duncan, Rymer, & Lai, 2001). For example, the Kansas City Stroke Study was able to determine estimates of functional recovery rates 3 to 6 months after stroke in five patient-centered functional outcomes (severe dependence in self-care; full dependence in self-care; and independence in meal preparation, managing medications, and community mobility) from the initial stroke severity levels (Studenski et al., 2001).

1.2.2.1.1 Cognitive deficits

Cognitive and, in particular perceptual sequelae of stroke can cause impairments in orientation, memory, concentration, attention, and executive function. For the majority of patients, some degree of cognitive impairment will be evident in the acute phase post stroke (British Psychological Society, 2002). Many of the cognitive problems resolve over time but approximately 35% of individuals will be left with some long term cognitive impairment (Tatemichi et al., 1994). In a recent study, post stroke dementia occurred in 21% of survivors, and vascular mild cognitive impairment in 37% of survivors (Sachdev et al., 2006). Clearly, the ability to learn

and retain new information can therefore be seriously affected after stroke. Cognitive impairment three months after stroke is independently associated with older age, ethnicity, lower social class, left hemispheric stroke, visual field defect, and urinary incontinence (Patel, Coshall, Rudd, & Wolfe, 2003). Post stroke dementia and cognitive impairment are associated with poor long-term outcomes, including survival and disability, up to 4 years after stroke (Patel, Coshall, Rudd, & Wolfe, 2002). A further study by these authors concluded that cognitive impairment remains highly prevalent up to three years after first stroke and recovery from cognitive impairment is negatively associated with smoking and possibly right hemisphere strokes, and compromised by visual neglect (Patel et al., 2003). A more recent study showed that stroke severity in acute stroke and cognitive impairment at 18 months after stroke onset were associated with impairment in activities of daily living and increased costs for utilization of care during the first year (Claesson, Linden, Skoog, & Blomstrand, 2005). Several factors, including type of stroke, recurrent episodes, the site and laterality of the lesion(s), volume of cerebral infarction, medial temporal lobe atrophy, and coexistent neurodegenerative pathology predict the degree of impairment. Aphasia, diabetes mellitus, atrial fibrillation, and depression are listed among other biologic factors that further exacerbate cognition and affect long-term survival (Kalaria & Ballard, 2001).

Depression and anxiety subsequent to stroke can increase the likelihood of cognitive difficulties especially executive function (Mukherjee et al., 2006). Executive function has been found to be impaired in stroke patients with depression (Kauhanen et al., 1999; Leeds, Meara, Woods, & Hobson, 2001) (Kauhanen, Korpelainen, Hiltunen et al., 1999). Although executive dysfunction is frequent after ischaemic stroke, a study that examined the interactions between executive functions, activities of daily living and depression found that executive dysfunction could be distinguished from depression. Executive functions refer to a group of cognitive actions that include the capacity to form a plan of action, initiate behaviour, think flexibly, solve problems and self-monitor and self-regulate behaviour in accordance with the environment (Stuss & Benson, 1986). Therefore executive function contributes to the ability to manage and control daily life activities and includes cognitive processes such as organising, planning, decision-making, judgment, inhibition, metacognition,

creativity, initiative and the ability to direct behaviour in a goal-directed manner (Mukherjee et al., 2006).

1.2.2.1.2 Speech and language problems

Speech and language functions can be impaired in at least one third of stroke survivors with most people regaining at least some of their language function but between 30 and 43% of those affected remaining severely aphasic in the long term (Bakheit et al., 2007; Kertesz & McCabe, 1977; Laska, Hellblom, Murray, Kahan, & Von Arbin, 2001; Pedersen, Vinter, & Olsen, 2004). Aphasia and dysarthria are the most common language deficits following stroke. Aphasia is an impairment of the capacity to interpret and formulate multimodal language symbols whereas, dysarthria is characterized by weak, imprecise, and poorly coordinated speech production with decreased articulation and intelligibility without problems in word retrieval or comprehension. Apraxia of speech is another impairment that can also occur that affects the voluntary execution of complex speech-motor activities. Communication difficulties can include problems with reading, writing, word finding, articulation of speech and understanding spoken speech. Approximately 20% of patients have impairments of expression and comprehension of language after a stroke (Dobkin, 2005). One of the main difficulties as a result of speech and language problems in addition to the impact on everyday living can be the difficulty of assessing mood and cognitive ability.

1.2.2.2 Psychological problems

In addition to physical impairments, stroke can trigger various psychological and social reactions and experiences. Individuals are likely to experience a variety of psychological sequelae such as depression, anxiety and emotional lability that can compromise the rehabilitation process and affect long-term adjustment (Bronstein, 1991; Swartzman et al., 1998; Thompson et al., 1989). Therefore, the more recent stroke literature, as well as focusing on survival and functional outcomes, has incorporated studies examining psychological factors that influence post stroke subjective well-being (Wyller et al., 1998), with depression receiving the most attention in the post stroke research literature to date (Astrom, Adolfsson, & Asplund, 1993; Berg et al., 2003; Creed, Swanwick, & O'Neill, 2004; Gestsdottir & Lerner, 2007; Herrmann & Wallesch, 1993; Johnston, Pollard, Morrison, & MacWalter, 2004;

Robinson, 2003; Sinyor et al., 1986). Other psychological problems that have been addressed include fear of loss of control (Johnston, Morrison, Macwalter, & Partridge, 1999), fears about death and disfigurement, social isolation, helplessness, and worry about loss of social roles (Thompson et al., 1989). According to Swartzman and Teasell (Swartzman & Teasell, 1993), post stroke mood disorders arise out of a complex interaction between psychological reactions to the disability and neurophysiological consequences of the brain damage itself. The issue of post stroke psychological well-being has come to the forefront as a result of the increased survival of severely functionally impaired individuals and also because of its impact on rehabilitation and community integration (Bronstein, 1991). A more recent study by Powell, Johnston and Johnston (2008) indicates that negative affectivity (a general dimension of subjective distress) both affects and is affected by activity limitations following acute stroke.

1.2.2.2.1 Depression

Affective disorders associated with stroke, such as depression, can be conceptualised as triggered responses, or initial stressors, during the process of adaptation to stroke and its long-term consequences (Robinson, 2003). Clinical depression and depressive symptoms are the most common affective disturbance seen post stroke. The incidence of depression has been shown to vary from 20% to 50%. Depression tends to be observed more often in the months after stroke than during the acute event but the course of depression can fluctuate. Symptoms include loss of energy, lack of interests, loss of appetite, and insomnia. It remains an unresolved debate whether depression post stroke is better understood as a reaction to the functional and cognitive losses faced by the stroke patient, or is intrinsically related to the brain damage or pre-existing brain damage secondary to occult or overt cerebrovascular disease (Herrmann et al., 1998; Singh et al., 2000). The debate is also complicated by the fact that depression is also a risk factor for ischaemic stroke, although the newly emerging concept of vascular depression may explain some of this association (Roman, 2003). The evidence on range of frequency and predictors of depression post stroke has evolved in recent years. Two recent reviews by Hackett and colleagues have looked at the frequency and predictors of depression after stroke (Hackett & Anderson, 2005; Hackett, Yapa, Parag, & Anderson, 2005). Their findings were that 33% of all stroke survivors experience depressive symptoms although frequencies varied considerably

across studies. The differences in case mix and method of mood assessment was their suggested explanation for some of this variation. The risk of occurrence was similar for the early, medium and late stages of stroke recovery: this clarified some of the literature which suggested that depressive symptoms might occur at specific stages of post stroke recovery. In relation to predictors of depressive symptoms, the findings were that physical disability, stroke severity and cognitive impairment were consistently associated with depression. Despite high prevalence and significant sequelae, post stroke depression remains often undetected and untreated. Early diagnosis and successful intervention may improve clinical outcome and should be considered a key priority for better stroke care (Dafer, Rao, Shareef, & Sharma, 2008).

1.2.3 Activity and participation limitations

In the original WHO's ICIDH framework, activity limitations were referred to as disabilities and participation limitations as handicaps as a result of the disabilities. The terminology change occurred with the introduction of the ICF revised framework, although a large proportion of the literature will refer to activity limitations as disability and participation limitations as handicap (see figure 1-1).

1.2.3.1 Activity limitations

Activity limitations are difficulties an individual may have in executing everyday tasks and actions e.g. mobility, activities of daily living, use of transport, handling of objects. Stroke is considered one of the most disabling chronic conditions because its sequelae impacts on virtually all functions: gross and fine motor ability, ambulation, capacity to carry out basic and instrumental activities of daily living, mood, speech, perception and cognition (Mayo et al., 1999) resulting in limitations of several activities required for everyday function. A series of longitudinal and cross-sectional studies by Mayo et al. (1999) described the disabilities experienced by individuals during the first year after stroke. Their findings overall were that most improvement in measures of impairment and disability occurred during the first month and by 3 months, there was still considerable room for improvement in all measures i.e. 85% were still impaired in gait speed, 78% had not reached age-specific norms for upper extremity function, 68% still demonstrated slow physical mobility, 37% needed assistance with basic activities of daily living and 29% were impaired on balance. By

one year, 73% scored the maximum for basic activities of daily living but 51% and 67% reported their physical and mental health to be lower than expected. There is a general consensus that functional improvement mainly occurs within the first 3 to 6 months after stroke (Dobkin, 2005; Heitzner & Teasell, 1998; Hendricks, van Limbeek, Geurts, & Zwarts, 2002; Kwakkel, Wagenaar, Kollen, & Lankhorst, 1996; Kwakkel, Kollen, & Twisk, 2006), although some individual may show considerable recovery at a later stage. Some studies have reported the level of functional improvement at different time points following stroke. For example, one study indicated that only 25% of patients at 3 months post stroke returned to the level of everyday participation and physical functioning of community-matched persons who did not have a stroke (Lai, Studenski, Duncan, & Perera, 2002) and another study at 6 months post stroke reported over 45% of survivors were functionally independent (Wade & Hewer, 1987).

Assessment of activity limitations is considered a very important outcome measure in terms of the level of functional recovery. Functional recovery can be divided into two levels. The first type of recovery is spontaneous or intrinsic neurological recovery of impairments and the second type is functional or adaptive recovery from disability. Spontaneous or neurological recovery refers to early recovery of local central nervous system (CNS) processes (resolution of oedema, ischaemic penumbra and remote functional depression (diaschisis)) and late recovery involving CNS reorganisation. Functional recovery refers to improvement of independence in such areas as self-care and mobility i.e. activities of daily living (basic and instrumental). Longitudinal studies indicate that neurological and functional recovery is faster in the first weeks post stroke (Dobkin, 2005). However, most human studies predicting recovery will be referring to functional recovery, as spontaneous or neurological recovery has until recently been regarded as largely inaccessible to medical intervention or manipulation. This perception has changed with increasing use of thrombolysis in the last 10 years.

Several indicators have been identified as predictors of functional recovery or improvement such as age, stroke severity, cognitive problems, medical comorbidities, incontinence, supportive environment or carer, depression and initial functional ability. One of the earliest reviews with 33 studies identified the factors of prior

stroke, older age, urinary and bowel incontinence, and visuo-spatial deficits as adverse prognostic indicators of function (Jongbloed, 1986). Another review identified the variables that successfully predict the recovery of disability after stroke (Kwakkel et al., 1996). The variables indicated were age, previous stroke, urinary incontinence, consciousness at onset, disorientation in time and place, severity of paralysis, sitting balance, disability on admission, level of social support and metabolic rate of glucose outside the infarct area in patients with high blood pressure. A more recent review identified predictor variables similar to Kwakkel et al's (1996) review such as age, disability on admission, urinary incontinence, and severity of paralysis but, in addition, identified swallowing problems, apraxia, visuospatial construction problems and ischaemic stroke complications (extraparenchymal bleeding, cerebral oedema and size of intraparenchymal haemorrhage) (Meijer et al., 2003). The differences between these two reviews can be explained by the fact that there were slight differences in search criterias. Meijer et al's (2003) review based their conclusions upon more studies (included studies up to and including 2002), excluded studies with less than 50 patients, used more keywords in the search and included more digital databases and guidelines.

The impact of post stroke depression on functional recovery has been well documented but due to the heterogeneity of studies such as different sample sizes, timing post stroke and measures used, results and findings can be inconsistent. The majority of studies have reported depression to be associated with poorer functional recovery during the acute phase and in the long-term following stroke (Chemerinski, Robinson, & Kosier, 2001; Parikh et al., 1990; Ramasubbu, Robinson, Flint, Kosier, & Price, 1998; van de Weg, Kuik, & Lankhorst, 1999). However, other studies have shown equal improvements in functional ability between depressed and non-depressed groups (Morris et al. 1992; Sinyor et al. 1986). Another study showed that depression in an Irish sample was not related to functional disability or early functional outcome following rehabilitation, although this study had a relatively small sample size (n=50) (Cassidy, O'Connor, & O'Keane, 2004).

1.2.3.2 Participation limitations

Participation is involvement in a life situation (World Health Organization, 2001) and represents the societal perspective of functioning and therefore participation

restrictions are problems an individual may experience in involvement in life situations or roles.

Participation and HRQOL are sometimes referred to as a similar construct or are perceived as the same construct especially in terms of measurement (Geyh, Cieza, Kollerits, Grimby, & Stucki, 2007; Salter et al., 2005). Many of the items used in HRQOL instruments can in fact be used to measure the domain of participation (see Salter et al. 2005). However, according to Mayo et al. (1999), HRQOL may also be affected by other factors (not specified) in addition to components of impairments, disability and handicap, that differentiates HRQOL from participation. In this current study, HRQOL, described in the next section, was the construct of interest because of its emphasis on the emotional and social domains affected in tandem with physical limitations.

1.2.3.3 Health Related Quality of Life (HRQOL)

HRQOL currently does not exist as a separate construct in the ICF framework although some authors would now argue for its existence within this framework. Attempts have been made to extend the ICIDH and ICF frameworks by adding in quality of life (Geyh et al., 2007; Szilvia Geyh et al., 2004; Post, de Witte, & Schrijvers, 1999; Tennant & McKenna, 1995). As a result of the differing conceptualisations of quality of life and health-related quality of life, these attempts have not been entirely successful so far. One of the major challenges in QOL research is the lack of clarity regarding its definition because it can be defined as, effectively, anything beyond mortality data, with the term used interchangeably in the literature with terms such as 'health status', 'subjective wellbeing', 'life satisfaction' and 'functional disability' (Hickey, Barker, McGee, & O'Boyle, 2005). HRQOL can be conceptualised as a broad construct that can capture the consequences of stroke in describing the impact of stroke sequelae on the individual. HRQOL is therefore defined as the value assigned to duration of life as modified by impairments, functional status, perceptions and opportunities influenced by disease, injury, treatment and policy (Patrick & Erickson, 1993). The construct HRQOL is frequently used interchangeably with quality of life (QOL) within the stroke literature.

There has been increasing use of QOL or HRQOL as an outcome measure in stroke studies (Darlington et al., 2007; Haacke et al., 2006; Hackett, Duncan, Anderson, Broad, & Bonita, 2000; Jonsson, Lindgren, Hallstrom, Norrving, & Lindgren, 2005; Kauhanen et al., 2000; King, 1996; Lau & McKenna, 2001; Mackenzie & Chang, 2002; Paul et al., 2005; Sturm, Donnan, Dewey, Macdonell, Gilligan, & Thrift, 2004), as QOL is the person's (patient's) own evaluation of all of his or her life, including the patient's perception of his or her pathology, impairments, activities, and participation, interpreted in the light of the patient's own context (Carr, Gibson, & Robinson, 2001; Wade, 2003).

The stroke literature has identified factors associated with and predictors of HRQOL in both the short-term (within the first year after stroke) (Darlington et al., 2007; Gray et al., 2007; Kauhanen et al., 2000; Mackenzie & Chang, 2002; Mayo, Wood-Dauphinee, Cote, Durcan, & Carlton, 2002) and long-term (a year later or longer after stroke) (Haacke et al., 2006; Jonsson et al., 2005; Kim, Warren, Madill, & Hadley, 1999; King, 1996; Patel, McKevitt, Lawrence, Rudd, & Wolfe, 2007; Patel et al., 2006; Paul et al., 2005; Sturm, Donnan, Dewey, Macdonell, Gilligan, Srikanth et al., 2004). It has been shown consistently that survivors of stroke have a poorer HRQOL in general compared to healthy individuals of similar age and gender (Mayo et al., 2002; Paul et al., 2005). After 3 months post stroke, predictors of HRQOL were previous stroke, physical function, satisfaction with social support and HRQOL within the first 2 weeks (Mackenzie & Chang, 2002). After 5 months and within 12 months, predictors were coping strategies, physical functioning (Darlington et al., 2007), depression and being married (Kauhanen et al., 2000). In long-term studies, predictors of HRQOL between 1 to 3 years were depression, functional status, social support, marital status, gender (female), age (Jonsson et al., 2005; Kim et al., 1999; King, 1996), socio-economic status (SES) (manual worker), right hemisphere lesions, urinary incontinence, cognitive impairment (Patel et al., 2007), stroke severity and neglect (Sturm, Donnan, Dewey, Macdonell, Gilligan, Srikanth et al., 2004). After 4 years post stroke, physical function, depression, cognitive impairment and urinary incontinence continue to be predictors (Haacke et al., 2006), as is age, lower SES and stroke severity after 5 years (Paul et al., 2005).

Studies that reported changes in HRQOL over time have reported improvement in HRQOL after 3 months (Mackenzie & Chang, 2002) and 16 months (Jonsson et al., 2005), whereas other studies have found no significant improvement after the first year (Darlington et al., 2007; Kauhanen et al., 2000) after stroke. There are consistent findings between studies in that similar predictors have been found between studies, even at different time points. Some studies consistently reported reduced HRQOL post stroke, even among patients with good functional recovery (Astrom, Asplund, & Astrom, 1992; de Haan, Limburg, Van der Meulen, Jacobs, & Aaronson, 1995; Kauhanen et al., 2000; Sturm, Donnan, Dewey, Macdonell, Gilligan, Srikanth et al., 2004). However at 6 years after stroke, HRQOL appeared to be relatively good for the majority of patients even though they still experienced limitations in physical functioning (Haacke et al., 2006). There may be a certain period of time required for people to adjust to living with long-term consequences of stroke and this transition to everyday living and functioning with physical limitations may in fact require several years before life satisfaction returns nearly to a similar point as general population norms. At present, there is no substantial empirical evidence to support the length of time taken for adaptation to take place after stroke.

According to Tennant (1995), disease, impairment, disability and handicap all influence quality of life and these are mediated by personality, coping and beliefs, and by society, environmental resources and work. Therefore, it may be important to identify and establish if psychological variables such as coping and beliefs determine quality life and other outcomes after stroke. The impact of stroke on patients' quality of life may be minimised by helping them adjust their expectations and adapt to their changed clinical status. Therefore one approach that may be beneficial in improving HRQOL is to identify the use of adaptive strategies and encourage the use of these strategies in everyday functioning.

1.2.4 Personal factors

In the context of the ICF framework, personal factors refer to the experiences of an individual (which are objective) and their resultant expectations, beliefs, goals and aspirations (which are subjective) (Wade, 2000). These can include gender, age, coping styles, social background, education, profession, past and current experience, overall behaviour pattern, character and other factors that influence how disability is

experienced by the individual (World Health Organization, 2001). In this current study, personal factors of interest were recovery locus of control, perceived social support and adaptive strategies (see chapter 2).

1.2.4.1 Recovery locus of control

Greater belief in perceived personal control i.e. internal locus of control has been associated with more beneficial outcomes in terms of health and ill-health related conditions. Control beliefs have been predictive of disability in rheumatoid arthritis (Lorig, Lubeck, Kraines, Seleznick, & Holman, 1985) and spinal injury patients (Schulz & Decker, 1985). Partridge and Johnston (1989) investigated in two different patient groups (stroke and wrist fracture) that a greater belief in personal control over recovery, i.e. greater internality, would be predictive of faster and more complete recovery from physical disability. Findings from this study indicated that greater internality was associated with faster recovery in both patients with stroke and those with a wrist fracture. From this study, the Recovery Locus of Control Scale was developed. Recovery locus of control refers to the extent that patients perceive they have control over their own recovery e.g. 'It's up to me to make sure that I make the best recovery possible'. In a later study, recovery locus of control at 1 month after stroke was a predictor of disability 6 months later (Johnston et al., 1999). It has since been shown to be a predictor of functional independence at 3 years following stroke, adjusting for demographics and clinical variables e.g. previous stroke, side of stroke, neurological impairment (Johnston et al., 2004). Another study examined whether recovery locus of control influences the interactions of impairment, disability and handicap in the WHO model and found that significant moderation of the influence that disability exerts on handicap was affected by perception of control (Gottlieb, Golander, Bar-Tal, & Gottlieb, 2001).

The construct recovery locus of control has been shown to be positively related to indices of medical, psychological and behavioural well being (Scharloo & Kaptein, 1997). Results of this review by Scharloo (1997) showed that illness perceptions (especially perceived consequences and recovery locus of control) are important factors influencing medical (e.g., pain severity, glycaemic control), psychological (e.g., depression, self-esteem, anxiety, life satisfaction) and behavioural (e.g., working time, impairment, activity levels) outcome. Stroke studies that have investigated the

association between illness representations and depression have shown recovery locus of control to be associated with depression (Johnston et al., 1999; Morrison, Johnston, & Walter, 2000; Sinyor et al., 1986; Thomas & Lincoln, 2006). Sinyor et al. (1986) indicated that having little control over one's recovery (an external locus of control) was associated with feeling of hopelessness and Morrison et al. (2000) found that low internal locus of control one month after stroke was associated with depression at six months. A more external locus of control and communication impairment were shown to be related to depression but the regression models in this study only accounted for a small proportion of the variance in depression scores (Thomas & Lincoln, 2006). These findings indicate that control beliefs such as recovery locus of control following stroke have some influence on mood but there is no evidence to date of the predictive value of recovery locus of control determining mood in a stroke population.

Control beliefs may influence behaviours which directly affect disability levels such as the use of adaptive strategies in an attempt to cope with the consequences of disability from stroke. In Wade's (2000) description of the personal context as a focus for rehabilitation, he suggests that the patient's beliefs are a contextual factor that may impact upon disability in many ways and it is one that may not be given enough attention in the rehabilitation process and may not have been researched enough. Therefore the construct of recovery locus of control may be important to include in models of rehabilitation because of its potential to enhance recovery.

1.2.4.2 Perceived social support

For sometime, social support has been widely recognised for its benefits in promoting better health-related outcomes (Sarason, Sarason, Potter, & Antoni, 1985; Schaefer, Coyne, & Lazarus, 1981). Having greater social support is associated with a variety of positive health outcomes, including greater psychological well-being, greater physical well-being, faster recovery from illness and lower rates of mortality (Stroebe & Stroebe, 1996). A recent review examined the evidence linking social support to changes in cardiovascular, neuroendocrine, and immune function and consistent with epidemiological evidence, social support appears to be related to more positive biological profiles across these disease-relevant systems (Uchino, 2006).

Social support has been defined as the existence or quantity of social relationships, the amount of assistance individuals believe is available to them (perceived social support) and the amount of assistance individuals receive (received social support) (House & Kahn, 1985). This common distinction made is between perceived available social support and actual received social support. One of the main concerns with assessing received social support is that individuals are more likely to receive support during times of need such as following acute onset of illness or disability. Over time this type of social support may not be an accurate indicator of what support is available during times of less necessity, whereas perceived social support is the level of support the individual perceives is available at all times and this may be of greater use when determining an individual's progress over time. According to Cohen and Wills (1985), perceived support is a stronger predictor of well-being than received support.

In the stroke literature, studies have been concerned with the impact of social support on recovery from stroke (Friedland & McColl, 1987; Glass & Maddox, 1992). One of the main authors in relation to social support and stroke examined the impact of various types and amounts of social support on stroke recovery (Glass & Maddox, 1992) and also focused on the impact of social support in general on functional outcome (Glass, Matchar, Belyea, & Feussner, 1993). In this study, forty-six patients were followed for six months after their stroke. Recovery outcome was evaluated using functional status at one, three and six months after the onset of stroke. The types of perceived social support assessed were emotional, instrumental and informational. Findings indicated that high levels of all 3 types of social support were associated with faster and more extensive recovery of functional status. Patients who reported high levels of emotional support showed significant improvement in functional recovery despite having a low baseline functional status. The benefits of instrumental support are as a result of receiving this type of support in moderate amounts. The impact of informational support on functional recovery was conditional on disease severity. Patients with the least amount of social support available failed to maintain improvement and appeared to decline in functional status over time in comparison to patients receiving more support where continued improvement was observed well after the first 4-6 weeks of recovery. The study concluded that because high levels of social support were associated with faster and more extensive recovery of function.

Therefore after a stroke, social support may be an important prognostic factor in recovery.

An earlier study examined the effect of social support as a mediator between stressful life events experienced by stroke survivors and outcome measured by psychosocial dysfunction (Friedland & McColl, 1987). This cross-sectional study interviewed 85 stroke survivors from 2 to 24 months after discharge from rehabilitation. Only a small amount of the variance (14.5%) in psychosocial dysfunction was explained by social support and functional status. The study's findings did indicate that social support from friends, community and a close personal relative has a protective effect against poor psychosocial outcome.

A more recent systematic review identified which prognostic social factors in the subacute phase after stroke determine discharge destination from the hospital stroke unit (Meijer et al., 2004). In all studies, the social domain of the patient was of major importance. Social support, presence of a relative at home, and marital status predicted discharge residence. Larger social networks and living with someone else predicted risk of institutionalisation post-rehabilitation. Larger social networks and perceived social support also predicted better physical function. In conclusion, social support has been identified as a complex and multidimensional concept that alters or impacts on outcome in a population in the process of recovery from stroke.

1.2.5 Environmental factors

Environmental factors make up the physical, social and attitudinal environment in which people live and conduct their lives and include the contextual factors such as social attitudes, architectural characteristics, legal and social structures, as well as climate, terrain and so forth (World Health Organization, 2001). Environmental factors can refer also to marital status, living arrangements, socio-economic status and education. A wide range of factors relevant to stroke prevention have been identified, and although an association with, for example, lower education and socioeconomic status have been well established for stroke, it is possible that they are probable surrogates for exposure to traditional high-risk behaviours such as smoking, poor nutrition, lack of prenatal care, absence of preventive medical and dental care, and non-compliance of treatment of conditions such as hypertension (Bernal-Pacheco &

Román, 2007). Equally, these factors may be responsible for the less good outcome after stroke for those with lower income and socio-economic status, although there was some differential effect, with educational level a determinant of recovery during inpatient rehabilitation, while equivalent income played an important role after discharge (Putman et al., 2007). The effect of marital status and other social support is less clearly defined, and remains an area for future research (Meijer et al., 2004).

1.3 Adaptation and recovery post stroke

Traditionally research on stroke has focused primarily on the medical aspects of the condition (Bonita, Solomon, & Broad, 1997) and this is no different from the perspective of determining outcome after stroke. Empirical studies have tended to focus on clinical and neurological factors (Saxena, Ng, David, Fong, & Gerald, 2006). Therefore, predictors of stroke outcome have mainly been clinical variables such as the physical deficits caused by stroke. However, psychological variables may too have an important role to play in determining stroke outcome. Research to date that has addressed investigating psychological components in relation to outcome after stroke has generally lacked the use of theoretical frameworks (Donnellan, Hevey, Hickey, & O'Neill, 2006) and has been based on clinical experience.

The majority of studies that have investigated the determinants of stroke outcome have not clearly identified whether outcome is defined in terms of adaptation or recovery following stroke. In the majority of individuals with a stroke, there will not be complete recovery and therefore there is increasing emphasis on how individuals adjust or adapt to their condition rather than interpreting outcome in terms of recovery. The evidence suggests that in many cases gains come mainly from helping patients to adapt to impairments rather than solely by their reduction (Pomeroy & Tallis, 2000). In general, rehabilitation programmes aim to reduce levels of disability, handicap and burden, and improve quality of life to achieve these goals, treatments often aim to reduce, or substitute for, loss of physiological, psychological, or anatomical structure or function, collectively known as impairment (Academy of Medical Sciences, 2004). Despite this new emphasis in relation to stroke outcome, the literature predominantly defines stroke outcome level of recovery.

According to Duncan (1999), stroke recovery reflects three simultaneous and interrelated processes: (1) resolution of acute pathological sequelae of stroke, (2) resolution of intrinsic neuroplasticity and (3) behavioural compensation. The initial severity of stroke is highly predictive of eventual outcome and the time course of recovery. Ideally, recovery from stroke related impairments should lead to recovery from activity and participation limitations and ultimately, to premorbid levels of quality of life. Stroke is a difficult disease to study (e.g. differing aetiologies, heterogeneity of symptoms, variability in severity and in spontaneous recovery) and therefore this pattern of recovery does not necessary follow this format (Duncan, 1999).

Most of the research literature on recovery after stroke has focused on improvement in physical function (Jorgensen, Nakayama, Raaschou, & Olsen, ; Tilling et al., 2001; Wade & Hewer, 1987; Wade, Wood, & Hewer, 1985), although research into patients' experiences of stroke indicates that the process of recovery is gradual and tends not to be defined by patients in terms of physical activity alone (Hafsteinsdottir & Grypdonck, 1997). The important aspects to patients are their involvement in the wider social world, including their family roles and responsibilities, social activities, lifestyle and employment (Burton, 2000). Recovery from stroke is considered complex and multidimensional i.e. it is not known whether the physical, psychological and social facets are causally related or whether they are independent but coexistent (Dowswell et al., 2000). Evidence regarding recovery from stroke indicates that low levels of social and leisure activities have been recorded even when patients seem to have made a good physical recovery and have only minor physical disabilities (Evans & Northwood, 1983; Greveson & James, 1991). This decrease in socialisation has been attributed to decreased wellbeing (Feibel & Springer, 1982).

Several predictors of stroke recovery or adaptation have been evaluated in the literature with disability and mortality the most commonly used outcomes. Some of the common predictors shown to affect the rate of recovery include age, gender, prestroke disability, dysphasia, limb deficit and urinary incontinence (Tilling et al., 2001). Recovery can also be influenced by other factors such as premorbid personality, amount of social support, severity of cognitive change and psychological disturbances and behaviours, including depression, adjustment disorders, anxiety,

personality changes, aggression, and non-compliance (Remer-Osborn, 1998). Some recent developments in relation to stroke recovery and its predictors have involved designing prognostic models for recovery after stroke (Meijer et al., 2003; Tilling et al., 2001; Weimar, Konig, Kraywinkel, Ziegler, & Diener, 2004; Christian Weimar et al., 2002). Overall, the emphasis has been on using clinical and demographic measures to predict recovery predominantly in relation to functional improvement.

1.4 Chapter summary

In summary, the onset of stroke is traumatic with accompanying disability that constitutes a crisis in the life of the affected person. It can result in instant impairment of physical and/or cognitive function resulting in disability with additional psychological and social adverse effects that can follow shortly afterwards. Following stroke, an individual has to interpret the sudden onset of a traumatic illness and the residual disabilities that may be present as a result of the condition. Stroke can be explained in terms of being a stressor because of its physical and psychological impact (outlined in this chapter) on an individual's life. The issues to which people need to adapt e.g., changes in activities of daily living as a result of disability and psychosocial consequences, have been described in detail. This chapter has attempted to outline and highlight the overall burden and potential consequences stroke has on an individual's life. The literature shows that there are certain factors that can determine recovery following a stroke. The emphasis is now on adaptation rather than recovery as rehabilitation programmes aim to reduce levels of disability, handicap and burden, and improve quality of life. The next chapter will focus on how individuals cope with the magnitude of the physical, psychological and emotional consequences and how these behaviours constitute overall adaptation to stroke.

2 Psychosocial adaptation to stroke

Adjusting to the physical and psychosocial consequences after stroke is a major challenge for many individuals affected by stroke. The adaptation process involves physical, psychological and socio-cultural functioning. Adaptation may be conceived as a process of responding to the functional, psychological, and social changes that occur with the onset and experience of living with a disability, chronic illness, or associated treatments (Bishop, 2005). The emphasis in this chapter is on the psychosocial adaptation process after stroke. The process of physical adaptation has been examined extensively in explaining recovery after stroke (Dobkin, 2005) but less attention has been given to the psychological (Barton, 2007) and sociocultural areas (Mukherjee et al., 2006).

2.1 Theoretical concepts of psychosocial adaptation to illness and disability

Psychosocial adaptation to illness and disability has received much attention in the rehabilitation literature. Yet despite the decades of research committed to understanding the dynamics of psychosocial adaptation, a review of the literature suggests a surprising lack of conceptual clarity and limited consensus about such fundamental questions as the nature of the process of adaptation and the appropriate conceptualisation of outcome (Bishop, 2005; Frank & Elliott, 2000; Livneh & Antonak, 1997; Smart, 2001; Wright & Kirby, 1999). The literature on psychosocial adaptation to illness and disability has somewhat evolved over the last few decades. Its initial conceptualisation involved rehabilitation counselling established in the United States during the 1950's to convert the social expense associated with providing long-term care for wounded veterans of World War II into social benefits by transforming these veterans from "helpless cripples" into tax-paying, rather than tax-consuming, citizens or at least to accomplish independent living (Shontz, 2003). Wright (1960) was one of the earlier theorists to address the concept of adjustment to disability and described it in terms of reflecting the interaction between a person's value system, level of emotional maturity and acceptance of self, and mental health status. Some other early generic models of adaptation looked at the theoretical basis

of emotional reactions to change and loss and described acceptance and adaptation to death and dying (Kubler-Ross, 1969).

Sequential or stage theories or stage of psychosocial adaptation gained increasing acceptance in the 1970's and 1980's and described adaptation in terms of movement through a predictable and terminal series of stages of adjustment (Bishop, 2005). Some authors identified reaction phases such as shock, anxiety, denial, depression, internalised anger, externalised hostility, acknowledgement and final adjustment as the process of psychosocial adaptation to chronic diseases and disabilities (Dunn, 1975; Shontz, 1965). Overall, there is no general agreement on the total number of stages in this adjustment process but there are three general common stages. Most of these stage models describe an initial period of shock and/or denial which is followed by significant distress and concludes with acceptance of one's situation and according to this linear, developmental approach to adjustment, the appearance of later stages is predicted on the resolution of earlier stages (Kendall & Buys, 1998). Kendall and Buys (1998) have highlighted that stage models have a number of negative implications for the rehabilitation process. Psychosocial interventions may not be implemented because rehabilitation therapists may be waiting for the natural progression of time to heal their clients. The models do not comment on the factors that could be motivating or hindering movement through the stages. Responses such as denial and distress following acquired disability are normalised by the stage models, which may lead rehabilitation therapists to expect such responses. The most significant criticism of stage models of adjustment is that they do not adequately match the subjective experience of people with acquired disabilities (Yoshida, 1993). The limitations of the stage theories have led researchers to suggest that the process of adjustment following acquired disability can be described as chronic or recurrent in that adjustment is viewed as a gradual process of learning to tolerate an almost intolerable set of circumstances. Therefore, adjustment becomes a continuous life transition rather than a time-limited process (Taylor, 1983).

Some of the literature concerning psychosocial adaptation to different acute and chronic illnesses and disabilities (except stroke) was reviewed by Livneh and Antonak (1997). They recognised an indistinguishable use of the terms psychosocial adaptation

and psychosocial adjustment in the literature on disability and coping with crisis situations. Therefore, these authors distinguished and defined what they meant by the terms adaptation and adjustment. Psychosocial adaptation to chronic illness and disability is regarded as an evolving, dynamic, general process through which the individual gradually approaches an optimal state of person-environment congruence manifested by (1) active participation in social, vocational and vocational pursuits; (2) successful negotiation of the physical environment; and (3) awareness of remaining strengths and assets as well as existing functional limitations. Adjustment refers more specifically to a particular phase (i.e. set of experiences and reactions) of the psychosocial adaptation process. Adjustment can be described by terms such as reaching and maintaining psychosocial equilibrium; achieving a state of reintegration; positively striving to reach life goals; demonstrating positive self-esteem, self-concept, self-regard and the like; and experiencing positive attitudes toward oneself, others, and the disability. In Taylor's (1983) theory of cognitive adaptation, she indicates that successful adjustment requires adequate resolution of a search for meaning, the ability to retain mastery over one's life, and enhancement of self-esteem. Researchers have tried to indicate what constitutes positive adjustment to illness and/or disability. Outcomes of adjustment or adaptation have varied from adaptive functioning to health-related quality of life. Stanton et al. (2001) indicate that the literature reveals at least five conceptualisations of positive adjustment: successful performance of various adaptive tasks that accompany chronic disease, absence of psychological disorder, relatively low experience of negative effect and/or high experience of positive affect, behavioural/functional status, and appraisals of satisfaction or well-being in various life domains. Other conceptual frameworks regarding adjustment to chronic illness have identified determinants of adaptive outcomes e.g. personal resources, attributes of situation, cognitive appraisals and coping strategies (Lazarus & Folkman, 1984). The conceptualisations of adjustment and/or adaptation appear to be inconsistent as a result of the heterogeneity apparent between individuals and across the course of the disease trajectory (Stanton, Revenson, & Tennen, 2007). Some of the specific theories in relation to coping with disease and disability will be discuss in more detail throughout this chapter and adaptation in relation to successful ageing will be addressed in chapter 3.

2.2 The role of coping (theories and measures)

Understanding how people cope and adapt with loss or potential trauma has been one of the greatest challenges in the coping literature. The past 35 years have seen a dramatic proliferation of coping research across social and behavioural science, medicine, public health, and nursing (Folkman & Moskowitz, 2004). The term "coping" first appeared in the psychology literature in Psychology Abstracts in 1967 (Popplestone & McPherson, 1988) and since that time, there has been an enormous growth of interest in the concept. Over 20,000 articles on stress and coping processes have been published in the past two decades (Aldwin & Yancura, 2004). Two distinct literatures have contributed to this growth of interest in coping (Coyne & Racioppo, 2000). The first consists of descriptive studies, organised around theory and research concerning the role of coping in adaptation to stress e.g. the use of checklists to determine the quality of an individual's adaptation to adversity. The second literature consists of therapeutic and behavioural medicine interventions aimed at improving adaptation by enhancing coping.

In order to make sense of all the concepts and meanings that have been taken on coping, Aldwin and Yancura (2004) organised coping into three basic theoretical and methodological approaches: psychoanalytic approaches, personality approaches and the coping process approach. The psychoanalytic approach to coping stems from the influence of Sigmund Freud's work on the use of defense mechanisms during the first half of the 20th century (Freud, 1962). Conscious and attentional processes then attracted more attention in the field of psychology than defense mechanisms. Cramer (2000) recently reviewed the use of defense mechanisms for adaptation concluding with an inconclusive judgement as to whether they are adaptive or maladaptive. The personality approach focuses on coping styles or dispositional characteristics whereas the coping process/contextual approach draws upon cognitive behavioural models and is more likely to emphasize environmental/situational demands and influences on coping.

2.2.1 Coping theories and dimensions

2.2.1.1 Theoretical frameworks

There is a vast literature explaining the different theoretical approaches that have been taken in defining coping as either adaptive or maladaptive. The most prominent theoretical framework on coping proposed by Lazarus and Folkman's (1966; 1984) is the Transactional Model of Stress and Coping and is considered the foundation of much of the research literature on coping and adaptation to illness (Finset & Andersson, 2000; Lyon, 2002). Coping has been defined by Lazarus and Folkman (Lazarus & Folkman, 1984) as constantly changing cognitive and behavioural efforts to manage the specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person. This Transactional Model of Stress developed by Lazarus and colleagues (Affleck & Tennen, 1996; Folkman & Lazarus, 1980, 1985; Lazarus & Folkman, 1984), has had the most profound impact on the conceptualization of coping (de Ridder, 1997), and has become widely accepted (Tennen, Affleck, Armeli, & Carney, 2000).

This model posits that stress consists of three processes, i.e. primary appraisal (the process of perceiving a threat to oneself), secondary appraisal (the process of bringing to mind a potential response to that threat) and coping (the process of executing that response). The coping response should aim at reducing the demands placed upon the individual i.e. the coping strategy the person uses takes account of the level of threat in relation to the resources they have available. Situations are continually re-appraised in light of further information and perceptions and as a result, coping behaviour may change according to the reappraisal. The model links stress-related variables to health-related outcomes. Lazarus and Folkman (1984) proposed three types of health outcomes: (a) functioning in work and social living, (b) morale or life satisfaction, and (c) somatic health. They viewed the concept of health as encompassing physical (somatic conditions including illness and physical functioning), psychological (cognitive functional ability and morale, including positive and negative effects regarding how people feel about themselves and their life), and social (social functioning) areas.

Some limitations of the transactional model of stress have been highlighted (De Ridder, 1997). The model functions more as a general frame of reference than a theory and this may be due to the fact that key concepts are not well defined e.g. the model does not specify a particular time period for coping efforts, neglecting the question whether it entails only immediate responses, or whether these can persist over a longer period – see Stone (1991). The conceptualisation of coping as a reaction to a stressful situation, neglects the impact of other determinants of coping, such as one's actual goals and commitments, or other personal and social resources that may also shape the coping response (Lazarus, 1991; Moos & Schaefer, 1993). However, these are variables that the model can accommodate, thereby supplementing the model for more specific use when examining responses to specific events and stressors.

Taylor and colleagues examined ways in which individuals adjust to threatening events (Taylor, 1983; Taylor, Lichtman, & Wood, 1984). They proposed a theory of cognitive adaptation and argued that the adjustment process centres around three themes: a search for meaning in the experience, an attempt to regain mastery over the event in particular and over one's life more generally and an effort to restore self-esteem through self-enhancing evaluations. A search for meaning can be defined by understanding why a crisis or trauma happens (i.e., causal attributions) and the impact this negative event has on an individual's life (i.e., implications of illness). According to attribution theory, individuals will make causal attributions so as to understand, predict and control their environment, following a threatening or dramatic event (Wong & Weiner, 1981). In devising this model of coping, Taylor (1983) interviewed a cohort of women who had recently had breast cancer and 95% of the respondents offered some explanation for why their cancer occurred. The conclusions made from the causal attributions are that no one perception is better than any other in general terms but rather, the search for any cause is important for the process of cognitive adaptation. The second theme of this model, gaining a sense of mastery, is gaining a feeling of control over the threatening event so as to manage it or keep it from occurring again. This can be achieved by having a belief sense of control over the illness. One of the most common manifestations in Taylor's (1983) study was a belief that a positive attitude would keep the cancer from coming back. The third theme

suggests that following illness, individuals make efforts to improve their self-esteem through a process of self-enhancement. The theory of social comparison (Festinger, 1954) is incorporated as an explanatory framework for this facet of the model. The findings reported in developing this model demonstrated that individuals make downward comparisons regardless of the threat of their own illness. In a threatening event, individuals will usually make self-enhancing comparisons in an apparent effort to bolster self-esteem. Fundamental to this model is that illusions are essential to normal cognitive functioning. The processes meaning, mastery and self-enhancement involve developing illusions and reality orientation may actually be detrimental to adjustment. Therefore, the theory maintains that successful adjustment depends, in a large part, on the ability to sustain and modify illusions that buffer not only against present threats but also against possible future setbacks.

An alternative perspective on coping with illness was taken by Moos and Tsu (1977) and Moos and Schaefer (1984). They applied 'crisis theory', which has generally been used to examine the impact of any form of disruption on an individual's established personal and social identity, to the crisis of physical illness. The changes that can occur as a result of an illness were outlined in developing the model, e.g., changes in identity, location, role, social support and in the future and therefore physical illness was conceptualised as a crisis. Crisis theory suggests that psychological systems are driven towards maintaining homeostasis and equilibrium in the same way as physical systems. According to Moos and Schaefer (1984), a sudden serious illness often results in disequilibrium, and adaptive processes are triggered to restore equilibrium. The coping process, initiated to restore equilibrium (adaptation), includes cognitive appraisal of the significance of the illness, identification of adaptive tasks, and coping skills (appraisal-focused coping, problem-focused coping & emotion-focused coping) (King, Shade-Zeldow, Carlson, Feldman, & Philip, 2002). The cognitive appraisal stage is similar in meaning to that of the appraisal process of Lazarus and Folkman's (1966; 1984) Transactional Model of Stress, in that an individual initially appraises the seriousness and significance of the illness. The second part of the coping process is the identification of adaptive tasks and these are divided into illness specific and general tasks. The third process involves the use of coping skills and these are categorised into appraisal-focused coping, problem-focused coping and emotion-

focused coping. Crisis theory differentiates between healthy adaptation which can result in maturation and a maladaptive response resulting in deterioration.

The commonality between these conceptual frameworks of coping collectively, include the influences of the environmental system (e.g. life stressors, social resources), the personal system (e.g. demographic and personal attributes), life crises and transitions (i.e. event-related factors), and cognitive appraisals and coping processes on each other and on health and well-being (Stanton et al., 2001). The frameworks provided for understanding coping highlight that coping is not a stand-alone phenomenon but is embedded in a complex, dynamic stress process that involves the person, the environment, and the relationship between them (Folkman & Moskowitz, 2004). It remains unclear as to how well these coping frameworks actually serve the purpose of explaining the individual's coping process over time as there appears to be some limitations regarding the quantity of longitudinal studies within the field of coping.

2.2.1.2 Coping dimensions

Coping strategies refer to the specific efforts, both behavioral and psychological, that people employ to master, tolerate, reduce, or minimize stressful events. Lazarus and Folkman (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984) distinguished two general coping strategies: problem-solving strategies (efforts to do something active to alleviate stressful circumstances) and emotion-focused coping strategies (efforts to regulate the emotional consequences of stressful or potentially stressful events). There is general agreement in the coping literature on these two coping dimensions (Billings & Moos, 1981; Moos & Schaefer, 1984; Pearlin & Schooler, 1978).

People who use problem-focused coping have shown better adjustment in relation to coping with cancer in terms of reducing emotional distress (Dunkel-Schetter, Feinstein, Taylor, & Falke, 1992). In comparison, emotion-focused coping is associated with negative adjustment, in part because denying or avoiding thinking about problems can actually lead to negative psychological and physical well-being (Aldwin & Revenson, 1987; Carver et al., 1993; Kelley, Lumley, & Leisen, 1997). Some researchers believe that both problem-focused and emotion-focused coping can be effective, depending on the situation (Terry & Hynes, 1998). From a theoretical

perspective, problem-focused coping is very effective in the case of stressors that can be changed by actively confronting them (Roth & Cohen, 1986) whereas emotion-focused coping may be more effective when a stressor is unchangeable (Vitaliano, DeWolfe, Maiuro, Russo, & Katon, 1990). A recent alternative to the latter is the main-effects hypothesis, which states that problem-focused coping is generally more effective in reducing distress regardless of appraisal of the situation in question (Zakowski, Hall, Cousino Klein, & Baum, 2001).

The theoretical distinction between problem-focused and emotion-focused coping provides a useful way of considering different aspects of coping in broad brushstrokes and it is used extensively in the literature (Folkman & Moskowitz, 2004). However, some authors have argued the existence of other dimensions to problem-focused and emotion-focused coping. Some researchers have suggested that problem-focused and emotion-focused coping categories can be subsumed under the higher order classification of approach versus avoidance oriented coping mechanism (Tobin, Holroyd, Reynolds, & Wigal, 1989). Approach coping strategies are either behavioural or psychological responses designed to change the nature of the stressor itself or how one thinks about it, whereas avoidant coping strategies lead people into activities (such as alcohol use) or mental states (such as withdrawal) that keep them from directly addressing stressful events. Generally speaking, active coping strategies, whether behavioural or emotional, are thought to be better ways to deal with stressful events, and avoidant coping strategies appear to be a psychological risk factor or marker for adverse responses to stressful life events (Holahan & Moos, 1987).

Billings and Moos (1981) proposed a three-factor conceptualisation of coping consisting of active cognitive (e.g. tried to see the positive side; considered several alternatives) and active behavioural (e.g. talked with a friend, tried to find out more about the situation), which are problem-focused coping, and avoidance (e.g. tried to keep busy to avoid thinking about the problem, reduced tension by eating more), which is a form of emotion-focused coping. Pearlin and Schooler (1978) identified meaning-focused coping as a different type of coping in which cognitive strategies are used to manage the meaning of a situation. They included the responses of positive comparisons or selective ignoring in this category. Endler and Parker (1990)

constructed a multidimensional coping inventory identifying three types of coping styles (task-oriented, emotion-oriented, and avoidance-oriented coping) because many of the previous coping measures suffered from a variety of psychometric weaknesses – some of these weaknesses will be discussed in the next section 2.2.2.

Coping has also been subdivided into two alternative approaches called dispositional and situational and sometimes referred to as the inter-individual approach and intraindividual approach (Endler, Parker, & Summerfeldt, 1993). The dispositional approach looks at specific coping strategies or styles used by individuals across situations. Self-report measures taking this approach typically ask the individual how they generally react to stressful situations (Endler et al., 1993). The situational approach looks at the process of coping and whether there are specific strategies that are useful in different situations. Self-report measures adopting this approach typically ask the individual to report how they reacted to a specific stressful situation. In this situational approach, coping is defined as a dynamic, situation-specific reaction to stress, i.e., the behaviours and cognitions of the same group of people across different types of situations. Although researchers generally agree on the theoretical value of this approach, the focus of assessment favours the dispositional approach in an attempt to reduce the complexity of coping assessment and this has the disadvantage of omitting what situational variability can tell us in the study of coping (De Ridder, 1997). Empirical evidence is scarce on situational variability in coping and according to De Ridder (1997) the data that is available would suggest that people apply different responses depending on the type of stressful situations confronting them and that the impact of the situation depends on the type of coping. Therefore according to De Ridder (1997) coping does mediate stressor and outcome as a result of that stressor.

As described, the conceptualization of the structure of coping to date has been very complex and varied in terms of measurement as a result of the broad and various dimensions regarding coping processes that currently exist in the literature. A recent development that has attempted to review the broad structure of coping has been the hierarchical conceptualization of coping by Skinner and colleagues (2003). Skinner et al. (2003) assert that the structure of coping spans the conceptual space between

instances of coping and adaptive processes. This hierarchy operates (from the bottom up) on four levels: 1.) instances of coping, e.g., "I wore my lucky t-shirt the day of the exam; 2.) ways of coping, e.g., problem-solving, rumination, venting, escape; 3.) dimensions of coping, e.g., problem, emotion, avoidance-focused coping and; 4.) strategy of adaptation, i.e., continuing to secure adequate information about the environment or escaping from a potentially dangerous transaction. This conceptualization of the structure of coping puts some organization on the various coping items and domains identified by the various coping measures in the literature but structurally ordering coping concepts in a hierarchical manner. It provides category systems for classifying ways of coping. This type of framework is likely to prove useful when assessing coping with various different coping measures and should allow researchers, within the field of coping, to come to some general consensus on coping as the levels within this framework provide a more clear categorisation of coping strategies.

2.2.2 Coping measurement

Over the past two decades, self report coping measures have been the method of choice for most researchers studying coping and numerous coping instruments have been developed that assess a variety of different coping dimensions. The Ways of Coping Questionnaire (WOCQ) scale was developed by Folkman and Lazarus (1980, 1985) and is one of the most commonly used generic measures. This measure consists of a series of predicates, each of which portrays a coping thought or action that people sometimes engage in when under stress e.g. confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem solving, and positive reappraisal. A distinction is made between the two general types of coping problem–focused coping and emotion – focused coping. Although most stressors elicit both types of coping, problem-focused tends to predominate when people feel that something constructive can be done, whereas emotion-focused coping tends to predominate when people feel the stressor is something that must be endured (Folkman & Lazarus, 1980). Another common measure is the COPE (Carver, Scheier, & Weintraub, 1989) and incorporates thirteen conceptually distinct scales to solve problems or to regulate emotions. Several of the scales were based on specific theoretical arguments about functional and potentially less functional properties of coping strategies.

There are two forms of the COPE assessing dispositional (how participants usually respond to a stressful situation) and situational (participants respond on the basis of their most stressful recent event) coping. Other popular measures include the Coping Response's Inventory (Moos & Schaefer, 1993); the Coping Strategy Indicator (Amirkhan, 1990); the Coping with Health, Injuries and Problems and Coping Inventory for Stressful Situations (Endler & Parker, 1990).

There is general agreement about the questionable reliability and validity of available coping measures (Auerbach, 1989; de Ridder, 1997; Endler & Parker, 1990; Endler et al., 1993; Folkman & Moskowitz, 2004; Lazarus, 2000; Somerfield & McCrae, 2000; Stone et al., 1991). Most of the existing coping scales suffer from one or more critical psychometric inadequacies: non-existent empirical validation of the coping subscales; unstable or unsubstantiated factor structure; inadequate or non-existent construct validity; no reports or test/retest reliability (Parker & Endler, 1992).

The validity of coping measurements is compromised frequently by the way in which they are developed. Many coping instruments are typically developed using a single homogeneous population (e.g. college students) with lack of attention to potential age and gender differences (Endler et al., 1993). Therefore, the construct validity is particularly questionable, due to the bias towards coping responses which are typical of the young, healthy and well educated section of the population (Endler et al., 1993). This makes comparisons and generalisations to other populations problematic, especially in medically-ill samples. The validity of a measure will only be known in the population in which it is tested, and such measures need to be validated in a range of conditions.

According to De Ridder (1997), attempts to enhance the psychometric quality of coping measures alone will not eradicate the methodological shortcomings of coping measures because of their underlying conceptual problems. Livneh (1999) summarised global conceptual and methodological concerns with coping assessment, identifying those stemming from the hierarchical nature of coping (coping assessed as ranging from a global, dispositional level, through intermediate level strategies, to specific, behavioural-level coping acts); the contextual level of coping (i.e. coping as assessed trans-situationally versus coping as geared toward specific situational

demands); the dimensionality of coping (i.e. the dimensions or groups of coping strategies have been conceived as ranging from 2 to almost 30 separate classes or scales); and treating the measurement of coping strategies as representing raw scores (i.e. effort frequencies) versus adopting an ipsative scoring system (i.e. relativeness or percentage of efforts of coping strategies).

The different approaches to coping (psychoanalytic approaches, personality approaches and the coping process approach) have created conceptual difficulties. The study of coping lacks clarity on the dimensions of coping, resulting in development of a vast number of instruments where many address coping differently. Many coping measures were developed from the results of exploratory factor analysis, critiqued by De Ridder (1997) as not the most adequate strategy to develop valid coping measures because factor analysis and other classical psychometric analyses were designed for evaluating stable constructs like personality traits or attitudes and depart from a number of assumptions which may render them undesirable for use in the coping area, a phenomenon that is inherently variable. Lazarus (2000) suggests that within-subjects prospective longitudinal research is required to measure coping as this allows researchers to identify psychological structures, that is, stable personality dispositions and changes (or processes) in psychological reactions over time and diverse conditions.

2.3 Positive psychology and coping strategies

Since the turn of this century, the emerging science of positive psychology has come to the forefront of psychological research. Positive psychology is an umbrella term for the study of positive emotions, positive character traits, and enabling institutions (Seligman, Steen, Park, & Peterson, 2005). The aim of positive psychology is to begin to catalyze a change in the focus of psychology from preoccupation only with repairing the worst things in life to also building positive qualities (Seligman & Csikszentmihalyi, 2000). Over the past few decades, an evolution towards positive psychology is a result of psychologists becoming concerned with prevention of problems by amplifying strengths instead of repairing weaknesses.

Traditionally, the approach to coping has tended to focus on more negative aspects and components of the coping process because coping processes have usually been associated measuring responses to a negative type stressor (e.g. coping with illness or a loss). However some scales have also included positive strategies to be assessed. A new development in the field of coping is focusing on the growing interest in the use of positive emotions and illusions in the face of adversity. Psychological coping research is showing a recent shift towards the use of positive beliefs during adverse situations resulting in better adaptation. Folkman and Moskowitz (2004) report a number of studies that have documented positive emotion to occur with relatively high frequency, even in the most stressful context, and can occur during periods when depression and distress are significantly elevated. The evidence from these studies concludes that although some coping strategies affect both positive and negative emotion, a number of strategies are related to just one or the other.

Personal changes and benefits that can result from a stressful event have been explored in a positive manner. One of the earliest approaches on positive emotions in adverse situations was a theory of cognitive adaptation by Taylor (1983). This theory proposes that when people experience personal tragedies or setbacks, they respond with cognitively adaptive efforts that may enable them to return to or exceed their previous level of psychological functioning. The themes of this theory or adaptive efforts as described earlier include a search for meaning in the experience, an effort to regain a sense of mastery, and a sense to restore a positive sense of self. Further work based around this theory shows that positive illusions are also commonly associated with successful adjustment to stressful events including conditions of extreme adversity (Taylor, 1983). For example, when faced with threatening information or stressful events, people often respond with mildly distorted positive perceptions of themselves (self-aggrandizement), an exaggerated sense of personal control, and overly optimistic expectations about the future. Taylor and colleagues tested the implications of cognitive adaptation theory and research on positive illusions for the relation of positive beliefs to disease progression among men infected with HIV. Their findings revealed that even unrealistically optimistic beliefs about the future may be health protective and the ability to find meaning in the experience is also associated with a less rapid course of illness (Taylor & Armor, 1996).

Another aspect that has been researched in the positive coping literature is perceiving benefit as a coping strategy meaning that individuals who have experienced a severe stressful event, often report something positive has come out of the experience (Folkman & Moskowitz, 2004). Affleck and Tennen (1996) reviewed the literature on the psychological aspects of a wide array of medical problems for research participants' responses describing any gains, benefits, or advantages they found after weeks to years of contending with these problems. Nearly all or more than a majority of informants cited benefits or gains from their adversity. They also provide evidence of studies that show positive adaptational outcomes of benefit finding e.g. benefit finding relates to less depression and greater meaningfulness in life in stroke victims (Thompson, 1991). An extension to benefit finding is a coping response called benefit reminding, which Affleck and Tennen (1996) define as effortful cognitions in which the individual reminds him/herself of the possible benefits stemming from the stressful experience and can only be used by those who have already found some benefit from the or perceived some positive consequences from the stressor. In a study of women with fibromyalgia (illness associated with chronic pain), Tennen & Affleck (2002) demonstrated that benefit reminding was associated with increased pleasant mood regardless of pain intensity i.e. benefit reminding was as prevalent on high-pain days as on low-pain days. Overall there has been a major shift towards positive psychology and the emphasis is now on exploring and examining theoretical frameworks that incorporate positive beliefs and behaviours. The perspective of this "turn the corner" period in psychological investigation is to view human beings as self-organising, self-directed, adaptive entities (Seligman & Csikszentmihalyi, 2000; Seligman et al., 2005). This view should apply even when investigating behaviours and beliefs in an ill-health state e.g. when adapting to an illness. Therefore, the next chapter will focus on examining and evaluating one such model of adaptive behaviour that functions to maximise gains and minimise losses i.e. the Selection, Optimization and Compensation model by Baltes and Colleagues (Baltes & Baltes, 1990; Freund & Baltes, 2000).

For the purposes of this thesis, it was important to establish whether the same inherent problems such as the multi-complexities regarding coping theories, dimension and

measures that have been outlined in relation to the general coping literature exist within the context of coping after stroke. Therefore a systematic review of quantitative measurement of coping after stroke was conducted in order to address the issues regarding coping in the stroke literature.

2.4 Coping and stroke

There is an abundant research literature on coping in the context of a wide range of illnesses (Abbott, 2003; Dunkel-Schetter et al., 1992; Hillman, 1996; Muthny, 1988; Newman & Revenson, 1993; Petticrew, Bell, & Hunter, 2002). In the context of stroke, there has been some relatively recent attention to the issue of coping (King et al., 2002; Lyon, 2002). However, to date, research findings have not quantified what consistent coping strategies are commonly adopted in the aftermath of stroke. The aim of reviewing this literature is to evaluate measures that quantified coping strategies in studies addressing psychological adaptation to stroke. This review will examine the conceptual basis and the specific coping domains of the coping measures used to assess coping post stroke. It will also evaluate the findings in relation to the pattern(s) of coping strategies used in stroke populations, with a view to identifying if there is a 'typical' profile of coping response in the context of an acute, debilitating condition such as stroke. Psychometric properties of the coping measures will be reviewed with consideration for a stroke population, as certain stroke sequelae such as cognitive and language impairments may affect participation in coping assessments, or in the process of coping. Identifying adaptive coping strategies that individuals employ following a stroke may facilitate the development of more effective rehabilitation strategies. Coping skills may be considered key psychological resources necessary to rebuild patients disrupted lives cause by the residual deficits of stroke.

2.4.1 Methods

2.4.1.1 Search strategy

A review of standardised measures of coping used in studies of patients with stroke was conducted. A computer search was performed on databases: MEDLINE (1966 – Feb 2006), PsychINFO (1887 – Feb 2006), CINAHL (1967 – Feb 2006) and the Cochrane Systematic Reviews (1993 – Feb 2006). The following key words were used: (stroke OR cerebrovascular accident) AND (coping OR adaptation,

psychological OR adaptive behaviours OR reintegration OR psychological adjustment). Selected articles were obtained and reference lists in articles were reviewed by the main author to identify additional citations.

2.4.1.2 Inclusion criteria

Articles were included in the review if they fulfilled the following criteria: a) published peer reviewed research; b) used standardised questionnaires and measures in cross-sectional, longitudinal, and intervention studies; c) the sample population was stroke patients or included patients with stroke and d) data from an instrument quantifying coping was reported.

2.4.2 Analysis of Psychometric Criteria

2.4.2.1 Reliability

Two types of reliability were examined in this review: internal consistency and test-retest. Internal consistency is the most common estimate of reliability reported, estimated using Cronbach's alpha, which should not fall below .7 for research purposes (Kline, 1999). While establishing test-retest reliability in the context of coping research is problematic due to the inherent potential for variability in coping responses over time, we assessed for the presence (or absence) of data on test-retest reliability: if present, a correlation value of .7 or higher was considered of value (Kline, 1999).

2.4.2.2 Validity

We reported on evidence of construct validity, the extent to which a measure is related to other measures in ways that are consistent with the hypothesised direction (Hogan & Agnello, 2004). A number of different specific categories used to classify types of validity information, e.g., correlations with specified variables, correlations with unspecified variables, correlations with other measures, inter-correlations among parts of a measure, comparison of scores between two or more groups and any type of factor analysis, were used as a guideline to report validity of the coping measures in the present review.

Table 2-1 Quantitative studies (n = 14) assessing coping in stroke patients

Study reference	Study aim	Coping definition	Coping measure	Study population (a) sample size (b) age in years and gender (c) time of assessment	Findings
Time of assessment < 6 months post stroke					
(Eccles, House, & Knapp, 1999)	To explore psychological characteristics of stroke patients with emotionalism	ND	The Mental Adjustment to Stroke Scale (Eccles et al., 1999)	(a) N = 65 stroke patients (b) mean age = 71.8 years 29 male, 36 female (c) 1 month post stroke	Association between emotionalism and the strategies helplessness/hopelessness and anxiety preoccupation.
(Wahl, Martin, Minnemann, Martin, & Oster, 2001)	To explore changes between predictors (i.e., sociodemographics, subjective health, social support, anxiety and coping) and outcome measures (i.e., subjective well-being and autonomy) before and after rehabilitation treatment.	ND	Trier Scales on Coping with Illness (Klauer & Filipp, 1993)	(a) Patient sample N = 34 (stroke), 44 (fractures), 22 (other) (b) mean age = 78.1 (c) between 1 and 3 months	No findings specific to stroke patients.
(Fitchett, Rybarczyk, DeMarco, & Nicholas, 1999)	To investigate the relationship between religion and health outcomes in medical rehabilitation patients	Positive religious coping provides a sense of meaning that may aid in coping with stressful life events or on a cognitive level, religious beliefs may provide a sense of self-efficacy in the face of stress or a way to positively reframe negative events. Negative religious coping interprets a stressful event as a sign of abandonment or punishment by god.	Brief Religious Coping Scale (Brief RCOPE) (Pargament, 1997)	(a) Patient sample N = 114 (17% stroke, 49% hip & knee joint replacement, 17% amputation, 17% other) (b) mean age = 65.2 (c) admission, discharge and 4 months follow-up	No findings specific to stroke patients.

(King et al., 2002)	To describe the natural history of adaptation to stroke and to identify survivor and caregiver predictors of depressive symptoms.	The coping process, initiated to restore equilibrium (adaptation), includes cognitive appraisal of the significance of the illness, identification of adaptive tasks, and coping skills.	Ways of Coping Questionnaire (WCQ) (S. Folkman & Lazarus, 1988)	(a) N = 53 stroke patients (b) mean age = 58.4 17 male, 36 female (c) prior to discharge, 6-10 weeks, 1 year and 2 years post discharge from acute rehabilitation	Less frequent use of finding meaning and more frequent use of avoidance coping correlated with greater depressive symptoms prior to discharge. Most coping process variables did not change significantly over time.
(Easton, Rawl, Zemen, Kwiatkowski, & Burczyk, 1995)	To examine effects of nursing follow-up on coping strategies used by rehabilitation patients after discharge.	Efforts to master conditions of harm, threat or challenge when a routine or automatic response is not readily available.	Jalowiec Coping Scale (Jalowiec, Murphy, & Powers, 1984)	(a) N = 46 (stroke), 33 (orthopaedic) and 21 (other) (b) mean age = 69 (c) at discharge and at 4 months post discharge from rehabilitation	No findings specific to stroke patients.
(Rochette & Desrosiers, 2002)	To explore type of coping strategies used following stroke; to verify if coping strategies change over time, and are related to age, gender, actualisation of potential, handicap level and depression.	Ongoing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person.	Ways of Coping Questionnaire (WCQ) (S. Folkman & Lazarus, 1988)	(a) N = 76 stroke patients (b) mean age = 68.3 (c) 2 weeks and 6 months post discharge from rehabilitation	Problem solving and magical thinking were most used and escape avoidance was least used. Women used more coping strategies and obtained higher scores on the magical thinking subscale. Positive-reappraisal strategies were related to handicap level whereas the magical-thinking and escape-avoidance strategies were related to depression levels.
(Sinyor et al., 1986)	To examine relationships between post stroke depression, functional status and rehabilitation outcome.	ND	Coping Scale (COPE) (Billings & Moos, 1981)	(a) N = 64 stroke patients (30 depressed, 34 non-depressed) (b) mean age = 68.8 (depressed group), 65.7 (non-depressed group) male 53% (depressed), 68% (non-depressed) (c) mean days post stroke = 58.6 (depressed group), 55.5 (non-depressed group).	Depressed patients used less behavioural action and rational cognition strategies.

Time of assessment ≥ 6 months post stroke					
(M. Herrmann, Britz, Bartels, & Wallesch, 1995a)	To describe determining factors of coping strategies and possible related factors in patients with aphasia and their relatives in the first year post stroke.	Based on results, defined coping as not a form of behaviour specific to the actual situation, but reflects pre-morbidly acquired attitudes and modes of behaviour (trait rather than state factors).	Freiburg Questionnaire of Coping with Illness (FQCI) (Muthny, 1988)	(a) N = 58 stroke patients (b) age < 75, median = 64 (c) 1 week, 1, 6 and 12 months post stroke	6 months post stroke, active and problem-oriented styles of coping dominated in aphasic and nonaphasic patients. 12 months post stroke, active, problem-oriented strategies continued to dominate the coping styles of nonaphasic patients, whereas the strategy "distraction and self reorganisation" dominated as a coping style by aphasic patients.
(Johnson & Pearson, 2000)	To measure effects of a structured educational course on stroke survivors' response to living with their stroke-related disabilities and how it can contribute to the rehabilitation process of stroke survivors who have returned to living in the community	ND	Ways of Coping – Cardiovascular Accident (WCQ-CVA)(Johnson & Pearson, 2000)	(a) N =41 community dwelling stroke survivors (b) Treatment group (8 male, 13 female, mean age = 64.2) control group (10 male, 10 female, mean age = 63.9) (c) between 6 months and 3 years post stroke	No significant differences pre and post intervention in the scores on coping between the treatment and control groups. Females, subjects ≤ 60 yrs and left hemisphere deficits had higher coping scores.
(Finset & Andersson , 2000)	To investigate coping strategies in patients with acquired brain injuries	The person's cognitive and behavioural efforts to manage (reduce, minimise, master or tolerate) the internal and external demands of the person-environment transaction that is appraised as taxing or exceeding the resources of the person (Transactional theory of stress and coping)	COPE questionnaire(C. S. Carver et al., 1989)	(a) Patient sample N = 30 (CVA), 27 (TBI) and 13 (HBI) Comparison group N = 71 students (b) mean age = 38.6 (patient group), 25.2 (student group) (c) mean time from injury to participation in study = 12.7 months	Approach-oriented strategies-active coping and positive reinterpretation gained higher scores than strategies expressing avoidance -denial and behavioral disengagement. Association between lack of approach oriented coping with apathy and avoidant coping was associated with depression.

(Gillespie, 1997)	To investigate relationships between post stroke symptoms of anxiety, coping activity, and stage of recovery	The function of coping has been taken to be the attenuation of distressing psychological outcomes such as anxiety and depression (Transactional theory of stress and coping)	Ways of Coping Checklist (WCC) (MacCarthy & Brown, 1989)	(a) N = 44 stroke patients (b) mean age = 68.6, male 66% (c) Early group < 6.95 months post stroke, late group > 6.95 months post stroke	Anxiety was associated with more frequent use of avoidant coping strategies
(M. Herrmann et al., 2000)	To investigate coping styles in patients with different brain disorders	ND	Freiburg Questionnaire of Coping with Illness (FQCI)(Muthny, 1988)	(a) Patient sample N = 21 (MBT), 30 (CVA), 58 (TBI) and 54 (PD) (b) Stroke group mean age = 59 (c) stroke group 12 months after stroke	Stroke patients used fewer active, problem-oriented coping than did participants with other brain disorders.
(M. Herrmann, Freyholdt, Fuchs, & Wallesch, 1997)	To investigate coping strategies and psychosocial alterations in patients with Parkinson's disease (PD) and stroke (CVA) and their relatives.	ND	Freiburg Questionnaire of Coping with Illness (FQCI)(Muthny, 1988)	(a) Patient sample N = 50 (CVA) and 54 (PD) (b) mean age: CVA = 61, PD = 64 (c) mean time (months) post illness onset: CVA = 26, PD = 96	Active problem-oriented coping and distraction predominated as coping styles for the stroke group and the degree of motor impairment correlated with a depressive coping style.
(De Sepulveda & Chang, 1994)	To examine relationships among social support, appraisals of stroke disability, method of coping with disability in the community and effectiveness of coping strategies	Coping behaviour was defined as constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person Transactional theory of stress and coping	Ways of Coping Questionnaire (WCQ)(S. Folkman & Lazarus, 1988)	(a) N=75 community dwelling stroke survivors (b) age > 62, mean = 75 (c) disabled by stroke within the last 3 years	Emotion focused coping behaviours were used more frequently than problem focused behaviours. Functional disability reduced coping effectiveness.

ND = no definition of coping, CVA = cerebral vascular accident, MBT = malignant brain tumour, TBI = traumatic brain injury, PD = parkinson's disease, HBI = hypoxic brain injury

2.4.3 Results

Of 102 studies identified, 14 studies met the inclusion criteria. A summary of the studies reviewed is presented in Table 2-1. Seven studies were cross sectional in design, (De Sepulveda & Chang, 1994; Eccles et al., 1999; Finset & Andersson, 2000; Gillespie, 1997; Herrmann et al., 2000; Herrmann et al., 1997; Sinyor et al., 1986), five were longitudinal (Fitchett et al., 1999; Herrmann et al., 1995; King et al., 2002; Rochette & Desrosiers, 2002; Wahl et al., 2001), and two were intervention studies (Easton et al., 1995; Johnson & Pearson, 2000). The sample type and size varied in different studies. Six studies researched a stroke population alongside other patient groups (Easton et al., 1995; Finset & Andersson, 2000; Fitchett et al., 1999; Herrmann et al., 2000; M. Herrmann et al., 1997; Wahl et al., 2001). The remaining eight studies examined coping in stroke patients only. Seven of the studies were primarily descriptions of the profiles of coping strategies, a further three examined the stability of this profile over time (Herrmann et al., 1995; King et al., 2002; Rochette & Desrosiers, 2002). Five of the studies examined the association of various factors (emotionalism, nursing follow-up, depression, training of patient and anxiety) with coping behaviour and two investigated coping as a predictor of outcome. Most of the studies had modest sample sizes, ranging from 30 to 76 participants. The timing of coping assessment post stroke also varied, ranging from 1 week to 3 years. The mean age (average of reported means) was 65 (SD = 8.6), with 2 means identified as outliers (38.6 and 78.1). The studies where mean ages were outliers were not constituted entirely of a stroke population (Finset & Andersson, 2000; Wahl et al., 2001).

2.4.3.1 Conceptual basis

Five studies defined what they meant by the term "coping" (De Sepulveda & Chang, 1994; Finset & Andersson, 2000; Gillespie, 1997; King et al., 2002; Rochette & Desrosiers, 2002) and four made reference to a coping theory or model (De Sepulveda & Chang, 1994; Finset & Andersson, 2000; Gillespie, 1997; King et al., 2002). The only consistent definition of coping used in three of the studies (De Sepulveda & Chang, 1994; Finset & Andersson, 2000; Rochette & Desrosiers, 2002) was that by Lazarus and Folkman (e.g., Lazarus & Folkman, (Lazarus & Folkman, 1984); Folkman and Lazarus (Folkman & Lazarus, 1980, 1985)). Two other studies

(Gillespie, 1997; King et al., 2002) used definitions that have some resemblance to the Lazarus and Folkman definition. Of the studies that used a model of coping, three (De Sepulveda & Chang, 1994; Finset & Andersson, 2000; Gillespie, 1997) used the Transactional Theory of Stress and Coping (S. Folkman & Lazarus, 1980, 1985; Lazarus & Folkman, 1984) and one study (King et al., 2002) used the Moos and Tsu model of the crisis of physical illness (Moos & Tsu, 1977a).

2.4.3.2 Coping measures and domains

Ten different coping measures were identified in the fourteen studies reviewed, with some measures used in more than one study e.g., the Ways of Coping Questionnaire (WCQ) (Folkman & Lazarus, 1988). An overview of the measures used is presented in table 2-2 and includes the coping domains assessed by each of the coping measures, and the psychometric properties of each measure provided in the studies reviewed. The WCQ was the most commonly used of the coping measures, used in five studies. The full 66-item WCQ (Folkman & Lazarus, 1988), however, was used in only one study (De Sepulveda & Chang, 1994) with modified versions of the scale used in the remaining three studies reviewed (Gillespie, 1997; King et al., 2002; Rochette & Desrosiers, 2002). The next most utilised coping measure in the studies was the Freiburg Questionnaire on Coping with Illness (FQCI) (Muthny, 1988), represented in three of the studies (Herrmann et al., 1995; Herrmann et al., 2000; Herrmann et al., 1997). The FQCI is an instrument widely used in German speaking countries in comparison to the internationally used WCQ. There were two condition-specific measures of coping used in two studies. One study (Eccles et al., 1999) used a modified version of the Mental Adjustment to Cancer Scale (MAC) (Watson, Greer, & Bliss, 1989) and titled their version the Mental Adjustment to Stroke Scale (MASS). The second condition-specific measure was a revised version of the Ways of Coping-Cancer (WOC-CA) scale (Dunkel-Schetter et al., 1992). This revised version was called the Ways of Coping-Cardiovascular Accident scale (WOC-CVA) (Johnson & Pearson, 2000).

Table 2-2 Psychometric characteristics of coping scales used in stroke studies for assessing coping

Coping Scale	Coping domains and strategies	Items	Study reference	Reliability		Validity
				Consistency Cronbach's alpha	Stability test re-test	
Generic Coping Measures						
Ways of Coping Questionnaire - WCQ(S. Folkman & Lazarus, 1988)	**Problem-focused** -confrontive -seeking social support -planful problem-solving **Emotion-focused** -self-control, -acceptance of responsibility -escape-avoidance behaviour -positive reappraisal	66	(De Sepulveda & Chang, 1994)	.63 (emotion-focused) .73 (problem-focused)	NDI	Emotion-focused coping correlated with social support, ($r = .20$, $P = .05$) and with income, ($r = .22$, $P = .05$).
A Shortened version Ways of Coping Questionnaire - WCQ(S. Folkman & Lazarus, 1988)	-Finding meaning -Compromising - Cautious -Active problem-solving -Seeking social support -Avoidance	40	(King et al., 2002)	Revised scales ranged from .59 (compromising) to .72 (avoidance) at T1, .60 (active problem solving) to .83 (finding meaning) at T4. .59 (active problem solving), .61 (compromising) at T2 and .41 (compromising) at T3. .62 to .90 for other remaining scales	NDI	Frequency of seeking social support decreased over time, $F(3, 105) = 6.0$, $p = .001$. Predictors of depression at T1 were less frequent use of finding meaning, $r = -.30$, $p < .05$ and more frequent use of avoidant coping, $r = .38$, $p < .01$

A Shortened version Ways of Coping Questionnaire – WCQ (S. Folkman & Lazarus, 1988)	-Magical thinking -Distancing -Self-controlling -Seeking social support -Escape-avoidance -Positive reappraisal -Problem solving (confrontive coping excluded)	28	(Rochette & Desrosiers, 2002)	Reported internal consistency .61 to .79 for the original scale(S. Folkman & Lazarus, 1985) NDI for this 28-item shortened version	NDI	Gender correlated with the total coping scale, (r = .29, p = .01) and with magical thinking, (r = .36, p = .002). Actualisation of potential correlated with total coping scale, (r = .33, p = .003); seeking social support, (r = .31, p = .007); positive reappraisal, (r = .50, p < .001) and problem solving, (r = .43, p < .001). Handicap level correlated with positive reappraisal, (r = .34, p = .003). Depression correlated with magical thinking, (r = .33, p = .004) and escape-avoidance, (r = .45, p < .001).
Modified version of Ways of Coping Checklist (MacCarthy & Brown, 1989)	-Acting and distraction -Distancing -Problem-solving	28	(Gillespie, 1997)	NDI	NDI	Anxiety correlated with the coping strategy "acting out and distaction" in the more than 6 months post stroke group (r = .46, p < .05).

Freiburg Questionnaire on Coping with Illness (short version) FQCI (Muthny, 1988)	-Depressive coping -Active, problem-oriented coping -Distraction and self re-organisation -Religious relief/quest for sense -Minimisation and wishful thinking	35	49	NDI	NDI	6 months post stroke, active and problem-oriented styles of coping dominate in aphasic and non-aphasic groups, more pronounced in the non-aphasic group (mann-whitney U – test; $p = .014$). Only significant change found between 6 and 12 months, was an increase of the distraction and self-reorganisation strategies of the relatives (Wilcoxon matched-pairs signed-ranks test; $p = .05$).
		35	(M. Herrmann et al., 1997)	NDI	NDI	PD patients exhibited active strategies (median PD: 3.2, CVA: 2.4, $p < .05$, U-test) and religious relief and quest for sense (median PD: 3.0, CVA: 2.4; $p < .01$, U-test) more strongly than CVA patients. Degree of motor impairment correlated with a depressive coping style only in the CVA patients ($r = -.57$, $p < .001$).
		35	(M. Herrmann et al., 2000)	NDI	NDI	Active problem-oriented coping significantly different between study groups ($x^2 = 11.5$, d.f. = 3, $p = .009$), CVA with lowest values. Significant positive correlation between depressive coping and motor impairment in patients with stroke ($r = .30$, $p = 0.01$).

Brief Religious Coping Scale – Brief RCOPE (Pargament, 1997)	-Positive religious coping -Negative religious coping	21	(Fitchett et al., 1999)	.89 (positive religious coping) .45 (negative religious coping)	Positive and negative religious coping had moderate to high correlations between baseline and the 4-month follow-up (r = .82 and .66, $p < .001$).	Positive (r = .28, $p < .01$) and negative religious coping (r = -.22, $p \leq .05$) at admission correlated with life satisfaction at follow-up. Positive religious coping correlated with life satisfaction (r = .24, $p \leq .05$) and negative religious coping correlated with depression (r = .21, $p \leq .05$) at follow-up. Participants whose mobility control had not changed or had worsened (n = 30) had higher positive religious coping scores than those whose mobility control had improved (Ms = 18.41 and 14.57, respectively, t (92) = 2.15, $p = .03$).
COPE Questionnaire(C. S. Carver et al., 1989)	**Active Approach:** - Active coping - Planning - Suppression - Restraint coping - Seeking social support (instrumental & emotional) - Positive reinterpretation - Acceptance **Avoidance:** - Focus on emotion - Denial - Behavioural and mental disengagement	52	(Finset & Andersson, 2000)	The internal reliability of the 12 indexes varied from .56 to .80, 3 indexes falling below .60.	NDI	Significant positive relationship between approach sum score and somatic symptoms score of the MADRS (r = .26, $p < .05$) in a partial correlation with apathy controlled. Avoidance coping correlated with behavioral/affective apathy (r = .34, $p < .01$) and with all measures of depression including total depression (r = .44, $p < .01$). A trend for HBI patients to have higher avoidance coping than CVA patients, with TBI patients in between.

Modified version of the Coping Scale – COPE(Billings & Moos, 1981) (Kaloupek, White, & Wong, 1984)	-Worry -Suppression -Behavioural action -Rational cognition -Denial	19	(Sinyor et al., 1986)	NDI	NDI	Depression was associated with less endorsement of both behavioural action (SDS: r = -.26, p< .05) and rational cognitions (CDI: r = .27, p < .05) strategies.
The Trier Scales on Coping with Illness(Klauer & Filipp, 1993)	**Cognitive** -Rumination -Search for meaning in religion -Threat minimization **Behavioural** -Information seeking -Search for affiliation	37	(Wahl et al., 2001)	.74 (rumination), .76 (search for affiliation), .73 (threat minimisation), .84 (information seeking) and .80 (search for meaning in religion)	NDI	Information seeking correlated with subjective wellbeing at T1 and T[1] (r = .83 and .85, respectively), with autonomy at T1 and T[1] (r = .87). Search for affiliation correlated with subjective well-being at T1 and T[1] (r = .96 and .97, respectively) and autonomy at T1 and T[1] (r = .94 and .96, respectively).
Jalowiec Coping Scale(Jalowiec et al., 1984)	- Confrontive - Evasive - Optimistic - Fatalistic - Emotive - Palliative - Supportant - Self-Reliant	60	(Easton et al., 1995)	Coping effectiveness scores at discharge and at 4 months (r = .77 and r = .93)	NDI	Mean scores for optimistic and fatalistic coping styles were significant (p<.05) at discharge and for evasive, fatalistic, palliative and supportant coping styles (p<.05, p<.01, p<.001) at 4 months post discharge for experimental group.

Stroke-specific Coping Measures						
Ways of Coping – Cardiovascular accident (WOC-CVA)(Johnson & Pearson, 2000)	-Distancing -Focusing on the positive -Seek and use social support	31	(Johnson & Pearson, 2000)	NDI	NDI	No significant difference in the score on coping either before ($F = 1.34$, $p < .55$) or after the treatment intervention ($F = 1.19$, $p < .73$). Ways of coping approached significance pre and post treatment ($t = -2.05$, $p < .055$).
Mental Adjustment to Stroke Scale – MASS(Eccles et al., 1999)	-Fighting spirit -Hopelessness/ helpness -Anxious preoccupation -Fatalism -Avoidance	40	(Eccles et al., 1999)	NDI	NDI	There was an association between the MASS subscales helplessness/hopelessness ($F=11.71$, $P = .001$) and anxious preoccupation ($F = 8.05$, $p = .006$). The associations with fatalism ($F = 14.79$, $p = .052$) and avoidance ($F = .06$, $p = .80$) were not significant after adjustment for the General Health Questionnaire.

NDI = no data identified, T1 = time 1, T2 = time 2, T3 = time 3, T4 = time 4, CVA = cerebral vascular accident, MBT = malignant brain tumour, TBI = traumatic brain injury, PD = parkinson's disease, HBI = hypoxic brain injury, MADRS = Montgomery and Asberg Depression Rating Scale, SDS = Zung Self-rating Depression Scale, CDI = Composite Depression Index

2.4.3.3 Coping strategies used following a stroke

Two studies (Finset & Andersson, 2000; Herrmann et al., 1997) reported greater use of active problem oriented coping in stroke patients than in other populations tested, whereas another study (Herrmann et al., 2000) reported that stroke patients used fewer active problem-oriented coping strategies than participants with other brain disorders. There were conflicting findings for the use of problem-focused as opposed to emotion-focused strategies. One study reported greater use of emotion-focused coping behaviours than problem-focused coping (De Sepulveda & Chang, 1994), whereas another study reported greater use of problem-focused coping strategies (Rochette & Desrosiers, 2002). Avoidance type coping strategies were the least used in two of the studies (De Sepulveda & Chang, 1994; Finset & Andersson, 2000). The four studies that examined stability of coping over time found that the coping strategies used did not change significantly at the different time points assessed (Easton et al., 1995; Herrmann et al., 1995; King et al., 2002; Rochette & Desrosiers, 2002).

On the Mental Adjustment to Stroke Scale 'emotionalism' was found to correlate with helplessness/hopelessness and anxious preoccupation. However, the term emotionalism was not defined in the study utilising this measure (Eccles et al., 1999). Anxiety was associated with more frequent use of avoidant coping strategies (Gillespie, 1997), while depressed patients in comparison to non-depressed patients with stroke used less behavioural action and rational cognition strategies (Sinyor et al., 1986). Depression was associated with avoidant coping (Finset & Andersson, 2000) and was specifically associated with greater utilisation of escape avoidance, and utilisation of magic thinking coping domains (Rochette & Desrosiers, 2002). Patient training had no impact on coping behaviours on the condition-specific WOC-CVA (Johnson & Pearson, 2000). Physical ability was associated with coping effectiveness and coping behaviour in two studies. De Sepulveda and Chang (1994) reported that functional disability reduced coping effectiveness and Herrmann et al. (1997) found that the degree of motor impairment correlated with a depressive coping style. Less frequent use of finding meaning and more frequent use of avoidance coping were predictors of depression prior to discharge from rehabilitation (King et al., 2002).

2.4.3.4 Psychometric properties

Psychometric properties of the coping scales are presented also in table 2-2. Internal consistency data were reported for coping subscales in seven studies. Therefore, in seven studies no psychometric data were reported. One study reported internal consistency values for the original WCQ measure and no data was identified for the modified version of the scale that was used (Rochette & Desrosiers, 2002). Where reported, Cronbach's alphas ranged from .41 to .90 (see table 2-2). Only one coping measure (The Trier Scales on Coping with Illness) (Klauer & Filipp, 1993) reported internal consistency reliabilities with Cronbach's alpha of .7 or higher for all subscales. Of note, test-retest reliabilities were identified by one study that reported moderate to high correlations of the Brief Religious Coping Scale's coping strategies over time (Fitchett et al., 1999).

The main type of validity data reported in nine studies was r-specified values, where the coping subscales were correlated with other specified variables. In five of these studies, the r values reported were less than .5, demonstrating that the strength of correlations between variables was generally weak to moderate. One study reported high correlations between the Trier Scales on Coping with Illness subscales and other variables, with r values greater than .8 (Wahl et al., 2001). The coping domains of information seeking and search for affiliation correlated highly with subjective well-being and autonomy, providing some supporting evidence of the validity of this scale. Overall, there was little evidence of construct validity for the coping scales used in the studies reviewed and the correlations between the coping scales' subscales and other variables reported were generally weak.

2.4.4 Discussion of the coping and stroke literature

The aim of this literature review was to evaluate quantitative coping research in stroke populations. Overall, a modest number of papers met the search criteria highlighting the scarcity of quantitative research on the processes of coping and adaptation within the stroke literature. Although, over the past decade, psychosocial aspects of recovery in stroke are beginning to receive attention, much of the literature continues to focus on physical abilities. Not all studies reviewed had a full compliment of stroke patients, but included other vascular and cerebral diseases, making comparisons

between studies complex and reducing the possibility of finding consistencies between studies. A further reason for the small number of studies identified in this review may result from reporting bias, in that only the studies with statistically significant findings could have been published. In addition, given that the median sample size for stroke patients reported in table 2-1 is 55, the values reported in the current review may be overestimates of the size of relationships between coping strategies and other variables. Routine reporting of confidence intervals for sample correlations would provide greater insight into the plausible range of correlation values and facilitate more definitive conclusions regarding the strength of relationship between coping strategies and other variables.

2.4.4.1 Conceptual basis

The review illustrated some of the major conceptual issues that exist in the literature with regard to coping measurement post stroke. These issues include the lack of consistent definitions throughout studies and the deficiency of coping theoretical frameworks. Eight of the studies defined what they meant by the term "coping" (De Sepulveda & Chang, 1994; Easton et al., 1995; Finset & Andersson, 2000; Fitchett et al., 1999; Gillespie, 1997; Herrmann et al., 1995; King et al., 2002; Rochette & Desrosiers, 2002) with a consistent definition used in three of the studies (De Sepulveda & Chang, 1994; Finset & Andersson, 2000; Rochette & Desrosiers, 2002). The conceptual shortcoming of inconsistent definitions shares some commonality with the general coping literature. Only a small number of studies outlined a theoretical framework of coping, the most frequently used being the Transactional Model (Lazarus & Folkman, 1984) and Moos and Tsu's model of coping with physical illness (Moos & Tsu, 1977) was also identified in the review, but this model is not quoted as frequently as the Transactional Theory in the general literature. A large number of coping questionnaires, each proposing different dimensions, exists within the general coping literature. This was reflected in the current review, where ten different coping measures were used in the fourteen studies reviewed. The heterogeneity of coping measures in the studies reviewed creates challenges for detecting trends or drawing conclusions regarding the use of coping strategies following stroke.

2.4.4.2 Coping measures, domains and strategies

There was very little overlap in the measures used in the studies included in this review and the coping strategies used by stroke patients varied across studies. Overall, it was not possible to identify conclusively what specific coping strategies individuals were using in either the acute phase post stroke (i.e., within the first 6 months) or in the longer term (after 6 months). However, there were some general trends reported and a certain amount of recurrent findings. The use of approach and active problem-oriented coping strategies were reported more frequently than were emotion-focused coping strategies. However, the results did not indicate which coping strategies were more or less effective in terms of stroke outcome. In the general coping literature, most negative life events appear to elicit both types of coping strategies, although individuals with more personal and environmental resources may rely more on approach and active problem-oriented coping and less on avoidance emotional coping (Holahan & Moos, 1987b). A long standing issue in the individual differences perspective is whether avoidant/emotional responses or problem-solving coping methods are superior (Taylor, 1990). Avoidant responses may be more effective for managing short-term threats (Suls & Fletcher, 1985) but for long-term threats problem-solving coping may manage stress more effectively. It is therefore imperative to examine the coping process over longer durations in stroke patients to determine what strategies are consistently utilised in the long term. This review suggests that, in fact, strategies do not change over time, with considerable stability in use of coping strategies, longitudinal studies failed to detect statistically significant changes in coping strategies over time. However, this apparent lack of change may simply reflect low levels of statistical power. Future research examining the stability of coping strategies over time could use latent growth analysis to explore this issue.

Combining findings of this review - i.e., that coping strategies patients adopt in the acute phase post stroke are unlikely to change in the longer term (Herrmann et al., 1995a; Johnson & Pearson, 2000; King et al., 2002) - with evidence in post stroke coping research indicating higher levels of psychological distress in those using less active, problem-oriented coping strategies and more avoidance strategies (Finset & Andersson, 2000; Gillespie, 1997; Sinyor et al., 1986), suggests that an intervention targeted at coping strategies typically associated with distress may significantly

enhance patient recovery. The general literature has shown similar findings in a variety of studies with diverse populations where emotion-oriented coping style has been positively linked, for both men and women, with negative health variables such as anxiety, depression and poor recovery from illness (Endler et al., 1993). The evidence in the literature is generally lacking regarding coping and recovery of physical function post stroke. Studies to date have focused on the relationship between physical function and depression (Herrmann et al., 1997) (Clark & Smith, 1999; van de Weg et al., 1999). Further studies assessing depression and physical function should incorporate the coping process to identify if there is a significant predictive relationship between variables. Furthermore, nearly half of the studies reviewed had sample populations consisting of brain pathologies other than stroke. In some of these studies, no specific inferences could be made in relation to the type of coping strategies relevant to a stroke population.

2.4.4.3 Psychometric properties

In a majority of the studies reviewed, psychometric properties of the coping measures used were under-reported or were not reported at all (Herrmann et al., 2000; Johnson & Pearson, 2000). The internal consistency reliabilities of the coping subscales, where reported, were generally less than the value considered acceptable (Cronbach's alphas of .7 or higher) and test-retest reliability was reported in only one of the studies reviewed (Fitchett et al., 1999). One study reported internal consistency coefficients from the original psychometric data of the coping measure and reported no data for the modified version of the scale used in the researchers' own study (Rochette & Desrosiers, 2002). There are specific concerns in the context of stroke, such as stroke sequelae (e.g., cognitive, language or visual deficits) that may affect reliable measurement in a stroke population. Of note, only one study described a cognitive screening method (De Sepulveda & Chang, 1994). Many generic measures of coping may be less applicable in a population coping with health problems. For this reason, many researchers who use scales such as the WCC or the WCQ have modified the instruments when studying medical populations by dropping or adding items, or by changing the scoring system (Endler et al., 1993). Although these modified scales may remove some of the problems associated with inapplicable items, according to Parker and Endler (1992) new inadequacies are produced. These include difficulty

with generalising results from one sample or health problem to another and frequently poor reporting of psychometric data on these modified scales. In terms of validity, only one category was represented in the results, i.e., coping subscales' correlations with other specified variables (construct validity). This finding is in keeping with that of Hogan and Agnello (2004). In an investigation of current research practice concerning reporting measurement validity evidence, they reported that only 55% of research reports included any type of validity evidence and of those reporting validity information, the vast majority reported correlations with other variables. The Behavioral Subscales of the Trier Scales on Coping with Illness showed very strong correlations (r = .83 - .97) with well-being (Wahl et al., 2001). However, in general, the correlations between coping subscales and other specified variables reported in table 2-2 are weak (e.g., r = .2) to moderate (e.g., r =.5). These methodological limitations, like the conceptual issues discussed earlier, are similar to deficiencies identified in the general coping literature (De Ridder, 1997). Researchers in the field of coping have described in detail the conceptual and methodological difficulties regarding coping measurement (Coyne & Gottlieb, 1996; De Ridder, 1997; Folkman & Moskowitz, 2004; Somerfield & McCrae, 2000).

2.4.5 Further directions and conclusions

Literature measuring coping quantitatively in a stroke population remains scarce, allowing both researchers and clinicians to draw few inferences on the type of coping strategies individuals actually use in both the acute and chronic stages post stroke. No unique coping strategies are used at different time points across the adaptive recovery period but coping strategies appear to remain consistent over time. This is supportive of a dispositional approach which assumes that people bring to a given context a relatively stable coping "disposition" that is minimally influenced by situational contingencies (Endler et al., 1993). The majority of coping measures used within the studies reviewed suffer from one or more psychometric limitations, e.g., weak correlations with other variables or inadequate psychometric reporting of the measures employed in the studies and a failure to account for difficulties with measuring due to stroke sequelae, such as communication difficulties or cognitive impairment.

There is significant potential for further investigation on this topic but it is imperative for authors to state their definition and framework of coping. The limited number of follow-up studies in stroke should encourage more longitudinal studies assessing coping over time, with particular attention to assessment of coping within the initial acute phase of stroke, i.e., within the first month, as a marker to determine what individuals are likely to use in the long term. It remains to be clarified whether maladaptive strategies can be identified by examining associated variables such as quality of life, mood and level of disability, i.e., what the patient is able to do for him/herself outside of the clinical setting.

From this review, there are no inferences that can be made as to the type of coping strategies used in a stroke population. Further studies are required that consistently use coping measures with similar coping domains to ensure identification of broadly successful and unsuccessful strategies in the context of stroke. Consideration and specification of adaptation models relevant to the adaptation process post stroke will further enhance the utility of findings from research studies of coping and adaptation post stroke.

Summary points

1. Limited number of studies address coping as part of the psychological adaptation process post stroke
2. Definitions of coping are heterogenous and absent in some studies
3. Lack of theoretical frameworks to support operational coping models
4. Psychometric properties of coping measures under-reported in relation to both reliability and validity
5. Findings identify scope for further exploration of the coping process post stroke

3 Successful ageing and the use of the SOC model

There is a strong association between the incidence of stroke and ageing, and the stroke incidence will increase as a result of the longevity extension in our population over the years ahead (Bagg, Pombo, & Hopman, 2002; Rothwell et al., 2004). Therefore it may be important to explore the adaptational processes individuals undergo following the onset of stroke within the context of a successful ageing theoretical model. This chapter will highlight and outline how healthy ageing individuals adapt to everyday life situations by illustrating the operationalisation of the successful ageing model of selection, optimization and compensation (SOC). The model will then be discussed further in relation to any potential declines and losses imposed by illness or disease e.g. the consequences of stroke. Prior to describing the literature regarding the SOC model of successful ageing and adaptation, a brief overview of its theoretical background i.e. the concepts of successful ageing and lifespan developmental psychology, are described.

3.1 Successful Ageing

The substantial increases in life expectancy at birth achieved over the previous century, combined with medical advances, escalating health and social care costs, and higher expectations for older age, have led to international interest in how to promote a healthier old age and how to age "successfully" (Bowling & Dieppe, 2005). The concept of successful ageing dates back to the 1960s (Havighurst, 1963) and included the elements life satisfaction and active engagement with life. The goal of successful ageing is now more realistic in today's ageing society as a result of more effective interventions to control and reduce disability and health risks. It has recently been proposed as a field of interest in gerontological research and as a challenge for the design of social policy (Baltes & Baltes, 1990). According to Rowe and Kahn (1997), successful ageing is multidimensional encompassing the avoidance of disease and disability, the maintenance of high physical and cognitive function and sustained engagement in social and productive activities. Bowling and Dieppe (2005) outline the main theoretical approaches that define successful ageing: psychosocial and biomedical and also include additional lay definitions. The biomedical model focuses on the absence of disease and the maintenance of physical and mental functioning

whereas psychosocial models focus on life satisfaction, social participation and functioning, and psychological resources, including personal growth. Psychological resources are required for successful ageing and according to Bowling (2005), these include a positive outlook and self worth, self efficacy or sense of control over life, autonomy and independence, and effective coping and adaptive strategies in the face of changing circumstances. Psychosocial researchers generally agree on defining successful ageing as subjective well-being, life satisfaction, and longevity (Freund & Riediger, 2003; Jopp & Smith, 2006). As a result of longevity, people are now living longer with physical impairments whether acquired for the first time in old age or at a younger stage in life.

3.1.1 Coping with Ageing

The adaptational challenges that older people are faced with in later life are well documented (Ensel, 1991; Foster, 1997; Menninger, 1999; Pearlin & Skaff, 1996). Health-related events such as chronic illness and disability are key challenges that have been reported to account for increased distress in older people (Ensel, 1991; Murrell & Norris, 1984). However, the specific type and severity of the health-related event must be taken into account (e.g. a stroke vs angina). There is some empirical evidence of age differences in stress and coping processes but these processes remain poorly understood (Folkman, Lazarus, Pimley, & Novacek, 1987). Folkman et al. (1987) found that older individuals reported a much higher proportion of health encounters as recently experienced specific stressful encounters compared to a younger group of individuals. The older individuals also used proportionately more passive, intrapersonal emotion-focused forms of coping than did the younger group who used more active, interpersonal, problem-focused forms of coping. However, there appears to be no overall consensus on how young and old adults differ in the ways in which they experience and cope with stress and this may be a result of the conceptual frameworks and methodological techniques used (Aldwin, Sutton, Chiara, & Spiro, 1996). It is important to note, although research into the stress process and into the life course is concerned with changing lives, the conceptual paradigms that guide the work of these two fields are largely segregated (Pearlin & Skaff, 1996). The life course framework may serve as a background for observing and making sense of the kinds of stressors to which people are likely to be exposed (Pearlin & Skaff,

1996), particularly a major life event such as an abrupt onset of an illness that is considered an extreme stressor during middle to later life.

3.2 Lifespan developmental Psychology

Lifespan psychology is the science of describing and explaining constancy and changes in human behaviour throughout the life course (ontogenesis – the development of an individual organism) from birth to death (Baltes, 1987; Li & Freund, 2005). Baltes (1987) proposes that ontogenetic development is a life-long process where no age period holds supremacy in regulating the nature of development. During development, and at all stages of the lifespan, both continuous and discontinuous processes are at work. Developmental change involves gains and losses in different functional and life domains, and efforts to keep this balance favourable represent an essential aspect of human action and the momentum of personal development over the life span (Brandtstadter & Renner, 1990). The developmental dynamic of positive (gains) and negative (losses) change led to Baltes and colleagues' life span work on specifying a general process of adaptation that would represent the life long nature of development as a gain/loss relation. This dynamic relation between gain and loss in development has been outlined in a theoretical framework describing successful ageing known as the Selection, Optimization and Compensation (SOC) model. Other lifespan theories of development include the Life-span Theory of Control (Heckhausen & Schulz, 1995) and Assimilative and Accommodative Coping (Brandtstadter & Renner, 1990). Within the field of coping, these lifespan psychology theories have been referred to as action theories and are based on the idea that the natural unit of analysis for conceptualising transactions between people and their social contexts is not behaviour but action (Skinner et al., 2003). According to Brandtstadter (1998), actions describe flexible, integrated motor programs with characteristic patterns of behaviours, attention and emotion, organised according to their goals, which individuals assemble and deploy in response to their appreciation of current internal and external demands. The SOC model is considered as one of the leading models of successful ageing because the model's authors (Baltes & Baltes, 1990) were among the first to describe the processes of successful ageing instead of solely defining the end points

(Ouwehand, de Ridder, & Bensing, 2007). The use of the SOC model within the context of stroke will be discussed under section 3.8.1.

3.3 Baltes SOC model of Successful Ageing

The selection, optimization and compensation (SOC) model, first presented by Baltes and Baltes (1990), provides a general theory for conceptualising processes of successful development in general and in ageing in particular (Li & Freund, 2005). The metamodel of SOC evaluates cognitive-motivational processes regulating human development across the life span. The SOC model has been applied mainly to the process of successful ageing and successful life management. It was originally designed and developed as an explanatory framework for adaptation to ageing.

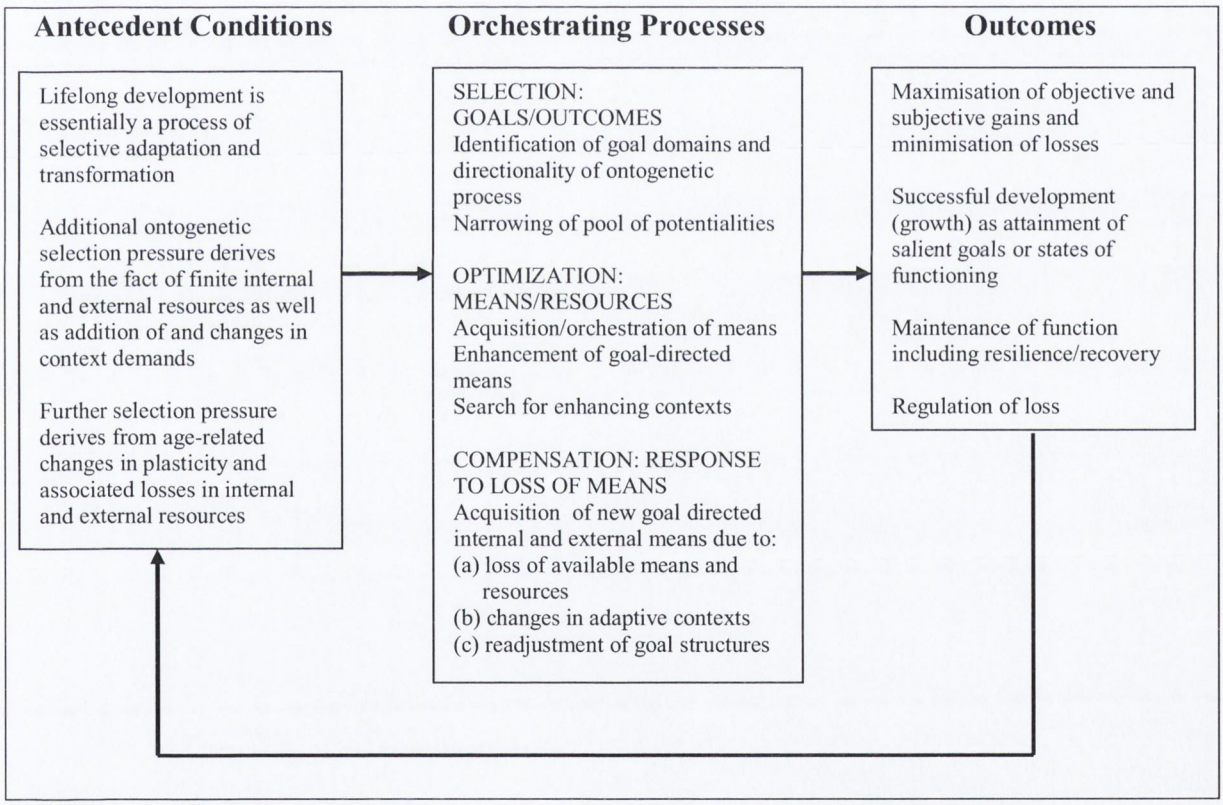

Figure 3-1 The lifespan model of selection, optimization and compensation(SOC).
The essentials of the model are proposed to be universal, but specific phenotypic manifestations will vary by domain, individual, socio-cultural context, and theoretical perspective (adapted from PB Baltes 1987, 1997, PB Baltes & Baltes 1990, Marsiske et al 1995).

The key concept of SOC describes a general process of adaptation that individuals are likely to engage in throughout life and is essential for the achievement of higher levels of functioning (Baltes & Baltes, 1990). Baltes' (1990) definition of adaptation is that

"in the psychological realm, adaptation is a measure of the quality of an individual's memory and cognition in order to conduct everyday activities and ability to cope and deal with a variety of demands including stressful events using adaptive strategies". Therefore adaptation outcomes can be reflected in an individual's ability to perform their everyday tasks, determine better wellbeing and an overall better quality of life. They believe, however, that the process of SOC takes on a new significance and dynamic in old age because of the loss of biological, mental, and social reserves. Therefore, this process is a life-long phenomenon that is amplified in old age.

The SOC model takes the global view that at all stages of human development individuals manage their lives successfully through the developmental regulation processes of selection, optimization and compensation. Successful development involves the orchestration of these three processes (selection, optimization and compensation) which in turn, regulate the maximisation of gains and minimisation of losses over time. According to the SOC model, the developmental gains and losses are the result of the interaction between a person and his or her environment (Li & Freund, 2005). Selection refers to an individual focusing attention on fewer, more important goals e.g. rescaling/reconstructing goals. Optimization involves engaging in goal-directed actions and means; examples include investing time and energy into the acquisition, refinement and application of goal-relevant means, seizing the right moment, persistence, acquisition of new skills/resources, and practice of skills. Compensation maintains a given level of functioning in the face of loss and decline in goal-relevant means by individuals investing in compensatory means. These strategies acknowledge and address the declines and losses which occur; examples include modifying behaviours, the use of external aids (zimmer frame, tripod) and activating unused resources (e.g. help from others). Selection, optimization and compensation can occur at various levels of analysis or integration ranging from the macro-level (e.g. societies) to the micro-level (e.g. biological cells) (Baltes & Freund, 2002). At a macro level, it has been shown that SOC can be conceptualised involving dyads or groups of people as a collective process of successful development (Baltes & Carstensen, 1998). An example at a micro-level, is where SOC can be applied to the investigation of cognitive performance in dual-task conditions (Li, Lindenberger, Freund, & Baltes, 2001). Overall, the theory posits that across the life span,

individuals further their development adaptively by maximising their potential gains and minimising losses. In other words there is optimal use of resources. On a general level, the SOC model describes fundamental developmental processes associated with selection, optimization and compensation that underlie successful adaptation to the shifting balance of growth and decline across the life span. The processes can also be specified in an action-theoretical framework, describing strategies of goal selection and pursuit (Jopp & Smith, 2006).

3.3.1 The Role of Resources

The SOC model assumes that all three processes (selection, optimization and compensation) depend on the availability of internal and external resources, create access to new resources and help maintain resources and this can be conceptualised as regulating resources while requiring resources (Li & Freund, 2005). Resources can be defined as those entities that either are centrally valued in their own right (e.g. self-esteem, close-attachments, health and inner peace) or act as a means to obtain centrally valued ends (e.g. educational system, financial set-up and cultural heritage) (Hobfoll, 2002) and are actual or potential means that help one achieve one's goals (Li & Freund, 2005). Resources have also been divided between those that are distal and proximal to the self, internal and external, and biological and cultural (Hobfoll, 2002). Within the SOC model, resources tend to be defined as either internal (i.e. lie within the person) or external (i.e. are located in the material, social, cultural, historical, and physical environment). The SOC processes regulate losses by responding to the limitation of resources particularly in later life and regulate gains by contributing to the acquisition and maintenance of new resources.

SOC theory is a dynamic process by which it can be understood that people select goals, attempt to gain and optimise resources to meet those goals, and direct special efforts to toward manipulating resources to continue to maintain their goals when resource loss occurs or when environment no longer support their previous resource fit (Hobfoll, 2002). Li and Freund (2006) point out that the SOC processes are dependent on the need and availability of resources and this is evident in age-related differences in the self-reported use of SOC. The decrease of SOC, especially optimization and compensation, reported in old age (Freund & Baltes, 2002) may be

due to the fact that these processes require resources and that these, generally decrease in old age (Baltes & Smith, 2003; Jopp & Smith, 2006) although the empirical evidence to support this claim remains limited because no studies to date have shown this to be the case. Overall, SOC builds on the assumption that throughout the entire life span, people encounter certain opportunity structures (e.g. education) as well as limitations in resources (e.g. illnesses) that can be mastered adaptively by the orchestration of the three components selection, optimization and compensation (Freund & Baltes, 1998).

According to Baltes and Lang (1997), how well individuals can adapt to functional loss depends on the availability of resources in the sensorimotor, cognitive, personality and social domains of functioning. In their study, a resource-rich group was compared with a resource-poor group to determine negative age effects in terms of resources. Resource-rich versus resource-poor older adults were identified on a total of 11 indicators from four domains of resources: sensorimotor, cognitive, personality and social resources. They reported that individuals who are rich in resources are better functioning in everyday life as a result of investing more time and effort in selected domains of everyday functioning and exhibit fewer negative age differences than resource-poor individuals. In resource-poor individuals, everyday functioning seems to be characterised by a general concentration on basic-levels of everyday competence (Baltes & Lang, 1997). A longitudinal study by Lang, Rieckman and Baltes (2002) compared the use of SOC strategies among resource-rich individuals with resource-poor individuals over a time interval of four years. Overall, findings showed a greater use of Selection, Compensation and Optimization strategies in everyday functioning among resource-rich individuals compared to resource-poor individuals. Jopp and Smith (2006) investigated the specific and shared impact of personal resources and SOC strategies on subjective well-being in two separate studies. The first study focused on the interactive relationship of resources and SOC use with ageing satisfaction and asked whether it differed for young-old (age range 71-80 years) and old-old (age range 80-91 years) individuals. Young-old individuals' well-being was predicted independently by resources and, whereas SOC buffered the effect of restricted resources in old-old individuals. The second study compared SOC use in a resource-rich and resource-poor individuals and ageing satisfaction on two

occasions separated by 1 year. The results replicated the findings from the first study and indicated that a higher use of SOC was related to more positive and less negative change in ageing satisfaction when resources are limited. Therefore this supports the previous findings that SOC has a protective function by buffering the impact of low resources on changes in ageing satisfaction. Successful ageing requires a high level of functioning that in turn requires the availability of resources in the biological, psychological, and the social domains of functioning (Margret M. Baltes & Lang, 1997).

3.4 SOC strategies[1]

Selection, optimization and compensationcan be conceived of as one single "integrative" process of adaptive mastery and also on a lower or more microlevel of aggregation, the facets of SOC can be viewed as separate processes, each contributing to successful development (Freund & Baltes, 1998). Each of the SOC processes will be interpreted individually in this section.

3.4.1 Selection

The role of Selection refers to increasing restriction to fewer domains of functioning because of an ageing loss in the range of adaptive potential. It involves the choosing of certain goals and directions over others to fit resource availability and capabilities. Selection is further divided into two elements: elective selection and loss-based selection. Elective selection involves restricting or narrowing (canalization) one's range of activities or goals to fewer, more important domains where there are choices and may be guided by individual preferences. Loss-based selection is triggered by loss experience or is a response to losses (decline of resources or loss of previously available goal-relevant means) and involves restructuring one's goals in favour of goals that can still be accomplished. Selection therefore, involves focusing one's resources on a subset of potentially available options, either in response to new demands or tasks (Elective selection) or in response to actual or anticipated losses (Loss-based selection). Typical instances of elective selection are specification of

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[1] SOC strategies generally are described as adaptive strategies and the current study will be examining how adaptive SOC strategies are in relation to adaptation after stroke but nevertheless SOC strategies will be termed as adaptive strategies interchangeably throughout this thesis.

goals, prioritisation of goals, contextualisation of goals and goal commitment. Typical instances of Loss-based selection are focusing on most important goals, reconstruction of goal hierarchy, adaptation of standards and searching for new goals.

3.4.2 Optimization

Optimization involves a process of acquiring, refining, co-ordinating and applying the relevant means or resources to attain goals in the selected goal domains, thereby achieving higher levels of functioning. The SOC model posits that people need to act on their goals i.e. they need to develop goal-relevant means in order to optimise their level of functioning and promote successful development (Freund, Li, & Baltes, 1999). Typical examples of optimization are acquiring and practicing new skills, seizing the right moment, persistence, using time and effort and modelling successful others.

3.4.3 Compensation

Compensation involves the creative use of alternative means to reach one's initial goals despite limited capacities, and typically involves using external means to maintain a given level of functioning. In the SOC model, compensation is confined to instances of mismatch between skill and demand that are due to loss in goal-relevant means (Freund et al., 1999). Key processes related to compensation involve the substitution of means either by acquiring new ones (e.g. a wheelchair to compensate for loss in mobility) or by activating unused internal resources (e.g. asking friends for help when walking) (Baltes & Freund, 2002). Typical instances of Compensation are substitution of means, use of external aids or help from others, use of therapeutic intervention, increased effort, energy and time allocation.

The following everyday example given by Baltes and Baltes (1990) for all three processes was one of their earlier illustrations of SOC. It is in relation to one of the great concert pianists of the 20th Century, Arthur Rubinstein, as an 80-year old, once described how he conquers weaknesses of ageing in his piano playing. First he introduces his repertoire and plays smaller number of pieces – this refers to selection. He then practices these pieces more often – this refers to optimization. Finally he slows down his speed of playing prior to fast movements, thereby producing a

contrast that enhances the impression of speed in the fast movements – this refers to compensation. See figure 3-1 of other examples for each of the SOC regulatory processes.

3.5 Basic assumptions underlying the SOC model

The SOC model operates within the context of human development based on some assumptions as interpreted by its authors (Baltes, 1987, 1997; Baltes & Baltes, 1990). The basic assumptions underlying the SOC model as outlined by Freund et al (1999) are as follows:

(1) Development is the interplay of individuals' proactive creation of and reaction to their environments meaning that development occurs as an interaction of a person with his or her environment. People create their development by actively shaping their environments and placing themselves into certain contexts. However, at the same time, people have to also constantly react and adapt to predetermined physical, cultural, social and historical contexts. Development evolves when individuals with their specific abilities and temperaments, proactively and reactively respond and interact with what ever given contexts come their way.

(2) Throughout the life span, and particularly in old age, internal and external resources are limited. The SOC model recognises that internal and external resources are limited throughout the life span although these limitations may increase in old age. According to Baltes (1987, 1997) the increase in the limitations of resources may be because fewer resources are available in old age (e.g. time to death becomes shorter, cognitive and physical abilities decline) and the efficiency of available resources decreases (e.g. cognitive intervention appears to show less effect in old compared with younger adults (Kliegl, Smith, & Baltes, 1989)). The balance of gains and losses can be expected to become more negative in old age (Baltes, 1987; Heckhausen, Dixon, & Baltes, 1989).

(3) Development is multidirectional and multifunctional meaning it addresses both growth (gain) and decline (loss). Multi-directionality refers to development comprising of trajectories of growth but also trajectories of decline. Multi-functionality refers to development as have multiple adaptive consequential outcomes meaning that there is no gain without loss or no loss without gain. However, the losses tend to outweigh the gains in old age. One of the consequences of such an

unfavourable balance of gains to losses in old age is that more resources need to be invested in the maintenance of given levels of functioning (compensation) than in optimization of functioning.

The SOC model has been based on the premise of these assumptions and the empirical work that has followed on since the development of the model has included some efforts in providing evidence for the basis of the assumptions given. In the following section 3.6, how SOC has been operationalised is discussed.

3.6 SOC measurement

SOC has been measured experimentally in studies that involved dual-task performance (patterns of task priority (Li et al., 2001) and qualitatively using content analysis (behavioural adaptation interview responses categorised as selection, optimization and compensation (Gignac, Cott, & Badley, 2002). Baltes and colleagues developed two quantitative SOC measures: the SOC-12 (Baltes, Baltes, Freund, & Lang, 1995) and the SOC-48 (Baltes, Baltes, Freund, & Lang, 1999). The SOC-12 was the first self-report measure of SOC and the SOC-48 was then developed to improve the psychometric qualities of SOC-12. The SOC-48 was developed by Baltes and colleagues from data stemming form the Berlin Ageing Study (Freund & Baltes, 1998). Originally a German questionnaire, the SOC-48 was recently translated to English and reduced to 15 items through pilot work (O'Hanlon, submitted). This shortened version was developed because of the length and potential burden for participants to complete the SOC-48. This pilot work was conducted in a large survey of over 2,000 Irish community older adults. The SOC-15 has comparable psychometric properties to the SOC-48 when tested in a general ageing population (O'Hanlon, Barker, McGee, Hickey, & Conroy, Submitted). This current study will be the first application of the SOC-15 in an acutely ill patient sample. Figure 3-1 presents examples of items from the SOC-15 measures and how these equate from the actual individual SOC processes. The psychometric properties of the SOC-15 will be discussed briefly in the methods chapter under section 5.3.5.

As mentioned earlier, SOC can be conceived of as one single process of adaptive mastery or viewed as separate processes, each contributing to successful development.

Therefore in terms of measuring SOC in a quantitative questionnaire, SOC can be scored as one composite SOC score and/or as distinct processes e.g. elective selection, loss-based selection, optimization and compensation.

The SOC-48 was also translated into a Chinese version and demonstrated acceptable psychometrics when used in a Chinese ageing population (≥ 60 years) (Chou & Chi, 2001). This version contains only 36 items and no rationale has been given as to why the SOC construct loss-based selection has been excluded. A more recent shorter version of the original SOC-48 was developed for the purposes of examining intentional self-regulation in early adolescence (Gestsdottir & Lerner, 2007). This shortened version consisted of 9 SOC items with very low internal reliability consistencies for each of the SOC subscales.

Table 3-1 SOC-15 item examples for each of the SOC regulatory processes

SOC Process	Brief Description	SOC-15 Item Examples
Selection		
- Elective	Specification of goals, goal system (hierarchy), contextualisation of goals and goal commitment	"When I think about what I want in life, I commit myself to one or two important goals"
- Loss-based	Focusing on most important goals, reconstruction of goal hierarchy, adaptation of standards, search for new goals	"When things don't go as well as before, I drop some goals to concentrate on the more important ones"
Optimization	Attentional focus, seizing the right moment, persistence, acquiring new skills/resources, practice of skills, modelling successful others	"I keep trying until I succeed at a goal"
Compensation	Substitution of means; use of external aids/help of others; use of therapeutic intervention,; increased effort, energy and time allocation; modelling successful others who compensate	"When I can't do something as well as before then I find out about other ways and means to achieve it"

3.7 Uses of SOC

The empirical evidence for the use of the SOC model has mainly been applied in life-span developmental psychology, e.g., life management strategies in a general ageing context (Freund & Baltes, 1998, 2002) and in industrial-organisational psychology, e.g., life management strategies and human performance in a work place setting (Abraham & Hansson, 1995; Bajor & Baltes, 2003; Wiese, Freund, & Baltes, 2000, 2002). There is currently less empirical evidence of the use of SOC within the context of health-related conditions although the use of SOC theoretical frameworks have been applied in some instances (Collins & Smyer, 2006; Ireland & Arthur, 2006; Volicer & Simard, 2006). The use of SOC within the context of health-related conditions will be reviewed under section 3.9.

3.7.1 SOC and age-related differences and physical functioning

Age-related decline in resources may place a constraint on engaging in SOC-related behaviours. The execution of SOC-related behaviours require resources such as effort, skills, organisational meta-strategies and these resources can be more limited in advancing old age. Theoretically the argument has been that because of ageing-related adaptive pressures and reduced plasticity, there should be more involvement of SOC-related behaviours (Baltes, 1997). However, the empirical evidence has shown that decline in resources is associated with reduced endorsement of SOC-related behaviours. Freund and Baltes (1998) found that with increasing age, there was a tendency to report less engagement in SOC-related behaviours. They argue that the range of alternative goals and domains of functioning become more and more restricted by a limitation of internal or external resources. Their findings indicated that the significant negative relationship still existed between SOC and chronological age even after controlling for subjective physical health and was therefore not solely attributed to declining health. Freund and Baltes (2002) examined age differences in more detail and spilt their sample into three age groups (young, middle and old adulthood). Middle aged adults showed higher endorsement of SOC than younger and older adults. Endorsement of Loss-based selection, Optimization and Compensation increased from young to middle adulthood and decreased again in older adulthood. Endorsement of Elective selection increased all the way through from young to older adulthood. This may be because young adults experience a high sense of need to

explore many different possible pathways of development, whereas in middle and especially during older adulthood people come to realise their special pathways of life and therefore focus more and more on selected priorities (Freund & Baltes, 2002).

Abraham and Hansson (1995) found no age-related differences in their sample (age range 40-69 years) and engagement in selection, optimization and compensation in the work domain. Freund (2006) investigated age-related differences in relation to goal focus in younger and older adults. Younger adults were more persistent in a task aimed at optimizing gains when compared with a task aimed at compensating for a loss. In contrast older adults worked longer in a task aimed at counteracting the loss than when it aimed at optimizing levels of functioning. For older adults, compensating for losses is more motivating in terms of persistence than attempting to achieve higher levels of functioning. Younger adults arguably are mainly concerned with acquiring new skills, improving performance and promoting their position in society from a monetary and life satisfaction perspective. It is therefore not surprising that younger adults will have a tendency to use more optimization type strategies in comparison to older adults who are more inclined to use compensation type strategies.

In summary, there are two different hypotheses regarding the age trajectory of SOC beyond adulthood into old age (Freund & Baltes, 2002). The first of these is that adults, as they age, become better at the use of SOC because of accumulated life experiences (Baltes & Baltes, 1990) . The other argument is that the use of SOC itself is resource dependent and because of age-related losses in resources and plasticity, the physical, social and cognitive resources available to individuals in old age may not be sufficient for them to engage in SOC resulting in a decline in SOC-related behaviours. Despite this decline in the frequency of use of self-reported SOC, it is expected that older people continue to use SOC and that if they succeed in doing so, they display better states of functioning (Baltes & Lang, 1997).

3.7.2 SOC and gender

Some of the findings in relation to the endorsement of SOC strategies and gender differences have been inconsistent although there have been some gender preferences indicated in the studies that have examined the existence of any differences. Wiese,

Freund and Baltes (2000) found significant gender differences for the general SOC tendency as well as for the work-related and the partnership-related uses of SOC. There was greater use of compensatory means by women [in general, work-related and partnership-related domains]. Women also reported using more optimization in the partnership domain. In Abraham and Hansson's study (1995), there was greater use of selection strategies by men whereas women tended to use more optimization and compensation strategies. These authors have only tentatively speculated that women may be socialised to cope with loss experiences. There is not sufficient empirical evidence to suggest why gender differences may occur in some studies that have measured the use of SOC strategies.

3.7.3 SOC and wellbeing

Freund and Baltes (1998) reported that those who used SOC–related behaviours had higher scores on subjective well-being, positive emotions and absence of feelings of loneliness. In a later study (Freund & Baltes, 2002), they also found similar associations in that SOC–related behaviours were associated with subjective wellbeing and positive emotions. Each of the SOC components was significantly and positively related to these subjective indicators of successful management even after other rival constructs such as assimilative and accommodative coping, action versus state orientation, personality variables, social desirability, intellectual functioning and cognitive style were statistically controlled for separately. However, elective selection had the lowest correlations with outcomes of wellbeing. The rationale given for this is that elective selection focuses on the most important goals and domains of functioning thereby implying some loss aspect. This would exclude alternative options and pathways that would be more associated with subjective feelings of wellbeing.

Wiese, Freund and Baltes (2000) investigated if the use of SOC related positively to satisfaction with function in the two domains of partnership and work as well as to satisfaction with life in general. They found that individuals who reported using SOC behaviours scored higher on multiple subjective indicators of global and domain-specific success. There were significant positive associations between overall SOC scores and the three categories of well-being (general, work and partnership). The SOC construct optimization had the greater association compared to the other SOC

constructs with general and work-related wellbeing whereas compensation had greater association regarding well-being in the partnership domain. In their follow-up longitudinal study (Wiese et al., 2002), they investigated whether the use of SOC predicted general well-being as well as satisfaction and subjective attainment in the work domain over an interval of three years. Results were consistent with the previous cross-sectional findings in that SOC behaviours did predict global and work-specific subjective well-being.

3.8 Application of SOC in health-related conditions

The SOC model was developed by Baltes and colleagues in search for a general process of systemic functioning (use of selection, optimization and compensation) that would serve as an effective strategy for the basic life span architectural frame. The model formulated is considered highly general, hence it has been described as a meta-theory of development. Because it does not designate the specific content and mechanisms of developmental processes and outcomes, it is applicable to a large range of variations in goals and means (Baltes, 1997). Therefore it may well be applicable within the context of adaptation to health-related conditions although the empirical evidence in relation to SOC use in health-related conditions is limited to date. SOC has been theorised to explain changes over time and this may explain why the model has not been operationalised in any acute condition or illness to date. However, SOC may be applicable to measure changes in an acute condition that becomes chronic over a period of time i.e. in studies that use longitudinal methodologies.

SOC has been applied as a framework in some studies that have aimed to explain adaptive behaviours in certain health-related conditions (Gignac et al., 2002; Ryan, Anas, Beamer, & Bajorek, 2003; Wilhite, Keller, Hodges, & Caldwell, 2004). The use of SOC in a health-related condition was first applied by Gignac et al. (2002) to investigate the adaptation of individuals with osteoarthritis to disability. Their findings were that compensation adaptive behaviours were the mostly frequently reported by the older adults to manage disability followed by optimization adaptive

behaviours[2]. Selection adaptive behaviours were the least reported efforts used. The rationale given for greater reported compensation behaviours is that there is likely to be more compensations (e.g. modify activities; substitute one activity with another; use assistive devices, gadgets, or furniture or equipment) available for this patient population and they may be more limited in using optimization (plan activities, expend more time and effort, use movement to avoid pain or stiffness) and selection (restrict or limit activity, perform less often, give up or avoid activity) adaptive behaviours. Selection was associated with having fewer social resources, greater perceptions of changed capacity, and personal care disability. Optimization was associated with those patients who reported more mobility difficulties and compensation was associated with having surgery and with reporting greater difficulty with personal care and mobility. The three SOC adaptive categories (selection, optimization and compensation) were all associated with age in that the young-older patients reported more SOC behaviours than the old-older spectrum of the sample. The explanation given for this by the authors is that older adults may view having arthritis as normative and therefore report the use of less efforts to manage their disability. This pattern of results fits in with some of the earlier empirical findings in relation to the SOC framework. For example, compensation behaviours have been shown to be used by women more than men (Wiese, Freund, & Baltes, 2000) and with increasing age, there was a tendency to report less engagement in SOC-related behaviours (Freund & Baltes, 1998). However, findings in relation to the use of selection behaviours are not consistent with more recent reports of the use of this SOC strategy in that the endorsement of elective selection has been shown to increase in older adults compared to younger and middle-aged adults (Freund & Baltes, 2002).

Ryan, Anas, Beamer and Bajorek (2003) aimed to analyse the specific strategies that older adults with macular degeneration used to cope with reading-related barriers in terms of the SOC framework. In fact the results reported the use of the SOC framework when describing the adaptive behaviours this sample used for coping with instrumental activities of daily living. Selection was referred to when participants were faced with continuing decisions about when to maintain goals and when to

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[2] In Gignac et al's (2001) study, 85% of the study sample were women, therefore findings cannot be generalised to both men and women.

modify them and appropriate goal selection was evident in that most participants aimed for challenging and potentially achievable goals. Optimization was referred to when participants relied more on new learning and memory and for compensation, there was effective use of devices and reliance on others to be as independent as possible. Wilhite et al. (2004) used the SOC framework to explain the adaptive processes individuals with multiple sclerosis use to achieve optimal health and well-being. The sample size involved in the study was small (n=13) but the translation of adaptive behaviours into the SOC framework were described for each individual participant and no summarised or consistent explanations of selection, optimization or compensation were reported.

Ziegelmann, Lippke and Schwarzer (2006) conducted an intervention study in young, middle-aged and older orthopaedic rehabilitation outpatients (n=368) and investigated whether plans of behavioural adaptations (i.e. coping plans) are embedded within the SOC framework. However, the main aim of the study examined how individuals from different age groups can be best supported in physical activity planning during rehabilitation and how effective interviewer-assisted planning versus self-administered planning is regarding the enactment of plans. Coping planning was interpreted as the specification of plans in the face of barriers (i.e. loss in goal relevant means) and rated regarding the presence and instances of loss-based selection or compensation. Loss-based selection and compensation were the SOC-related behaviours used in this study because these behaviours refer to the adaptive mastery of losses, which might be adaptive when it comes to the adoption and maintenance of health behaviours in individuals with a compromised health status (Ziegelmann, Lippke, & Schwarzer, 2006). The study findings were that coping planning plays an important role in relation to the maintenance of exercise behaviour. From this, the authors concluded that coping planning can be conceptually embedded into the SOC framework. Coping plans in terms of loss-based selection and compensation proved to be adaptive in this study (Ziegelmann et al., 2006).

Using the same orthopaedic rehabilitation outpatient sample, Ziegelmann and Lippke (2007) investigated the interplay of exercise strategy use and perceived loss of exercise resources with engagement in physical exercise. For this analyses, exercise

strategy use was measured using a SOC domain-specific questionnaire in the context of physical exercise (Cronbach's α =.90). Other outcomes variables assessed as part of this study were orthopaedic functional outcome and subjective well-being. Findings from this analyses showed there were no age associated changes in the endorsement of exercise-specific SOC strategy use and availability of resources. However perceived loss of exercise resources were negatively associated to exercise-specific SOC strategy use, indicating the endorsement of SOC strategies is also resource dependent in the exercise domain. Overall, exercise-specific SOC strategy use was associated with engagement in physical exercise. All four exercise-specific SOC strategies (i.e. elective selection, loss-based selection, optimization and compensation) predicted orthopaedic functional outcome whereas only two of the strategies (elective selection and optimization) predicted subjective well-being. Some of these findings were contrary to previous studies regarding the endorsement of SOC strategies. For example, Freund & Baltes (2002) did find an age-related increase using a domain-general SOC questionnaire from young to middle adulthood and a decrease in late adulthood. Also findings in relation to subjective well-being are also inconsistent from earlier work (Freund & Baltes, 1998), where optimization and compensation were found to be the stronger predictors of subjective well-being. The inconsistencies between studies may be due to the fact that Ziegelmann et al. (2006,2007) has been the first study using a domain-specific SOC measure to predict domain-specific as well as global outcomes.

Rapp, Krampe and Baltes (2006) conducted the only experimental study investigating the SOC model that has included a patient population. Young and older adults and patients with alzheimer's disease were assessed for their performance on a dual-task paradigm that combined working memory with a postural control task. The older adults, especially those with alzheimer's disease maintained a higher level of functioning in postural control i.e. allocate resources towards the task of higher immediate value, as compared to working memory. The SOC model posits that older adults will allocate resources towards tasks of higher immediate value and the findings from this study extends one of the assumptions of the theory to pathological ageing (Rapp et al., 2006).

The SOC model has been suggested as a framework for the delivery of care in patients with advanced dementia (Volicer & Simard, 2006) and to implement behavioural risk-reduction programs for patients in secondary stroke prevention clinics (Ireland & Arthur, 2006). Volicer and Simard (2006) describe how dementia care can be improved by the appropriate use of the SOC constructs. For example, the selection of appropriate strategies for management of medical issues is necessary for maintaining quality of life of individuals with dementia. The care should be optimised according to the remaining functional abilities of the individual with dementia. Compensation is required in two areas: functional deficit and executive dysfunction. Ireland and Arthur (2006) state that an understanding of the SOC process at the collective (for a client group assessment) and individual (for an individual assessment) level has potential to create an age-sensitive environment for effective and supportive behavioural risk-reduction care within current resources. However, there is no evidence in the literature to support the integration of SOC and self-efficacy models to inform the development of behavioural risk-reduction intervention programs.

In an overview by Collins and Smyer (2006), they describe the ecology of disability and long-term care as being consistent with the SOC model in that the ecological approach removes the full burden of responsibility of successful ageing from the individual while illuminating the tools that individuals and their social structures can use to manage and optimise opportunities for successful ageing. They reviewed the individual aspects and differences for older Americans aged 50 years and older at risk for disability and consequent need for long-term care. Examining the tools that individuals and their social structure can use helps to manage and optimise opportunities for successful ageing.

The empirical evidence and other additional interpretations regarding the use of the SOC model in health-related conditions provides some support regarding SOC's potential to serve as an explanatory model for understanding adaptation in relation to illness. The predominant support comes from the studies by Gignac et al. (2002) and Ziegelmann et al. (2007; 2006). However, in Gignac et al's study, the associations of differing combinations of illness and disability variables, psychosocial variables, age

and gender with SOC were examined but the associations of SOC with outcomes of adaptation to disability such as health-related quality of life, levels of activity and participation in everyday functioning were not assessed. Although this study has been very informative in terms of disability factors that are associated with SOC behaviours, SOC as a potential predictor of disability has yet to be determined. Ziegelmann et al's work (2006, 2007) has provided more rigorous support for the use of SOC in the context of rehabilitation. This study involving orthopaedic outpatients has demonstrated that plans of behavioural adaptations (i.e. use of loss-based selection and compensation) can be embedded in the SOC framework and that SOC domain-specific strategies are predictive of outcomes in terms of functional domains and subjective well-being.

3.8.1 Use of SOC in the context of stroke

The SOC model has been shown to be a framework used for explaining the challenges to successful ageing (Baltes & Lang, 1997; Freund & Baltes, 1998, 2002). However, whether SOC is a useful framework in predicting successful adaptation to the challenges of a sudden illness remains to be answered. The literature in general on how individuals experience disruptions caused by chronic illness late in life has been surprisingly limited (Becker, 1993) and further advancement has yet to be achieved in this under developed area in relation to stroke (Kirkevold, 2002; Pound, Gompertz, & Ebrahim, 1998). The contribution of the SOC model to date has been in relation to addressing improvement, maintenance and reorientation in terms of coping with major life change and loss. Because stroke has increased incidence predominantly affecting the older population, from the onset it would seem appropriate to apply a model that explains adaptation to the challenges of older age to also explain adapting to the challenges following stroke. The stroke experience may be considered as an acceleration of some of the challenges that can occur in the ageing process, especially in terms of the consequential physical and psychosocial impairments.

The potential validation as to why use the SOC model to explain adaptation outcomes after stroke firstly may be in line with the core assumptions of the model. As outline earlier in this chapter, the SOC model has major emphasis on the notion of development in that development evolves when individuals with their specific

abilities and temperaments, proactively and reactively respond and interact with what ever given contexts come their way. This would be of enormous value in relation to individuals after stroke in that the orchestration of the SOC processes may potentially encourage these individuals to reactively respond and interact in the hope of adapting to the negative consequences that can be experienced following stroke. Because the SOC model recognises that internal and external resources are limited throughout the life span although these limitations may increase in old age, the recognition of limited resources following acute and chronic illness especially in terms of physical, psychological and social resources would be of enormous value in relation to adaptation following stroke. As a third assumption, the SOC theory emphasises the regulation of losses and gains in that there is counteracting for losses. This would be very important in terms of balancing for the losses following a stroke. Therefore, the SOC model puts great emphasis on the allocation of resources and this would be of major importance when evaluating the impairments and deficits that can occur following stroke and assist in the process of understanding how resources may be used effectively in determining outcome.

Further potential validation for its use in stroke stems from the previous evidence that have found positive findings in terms of SOC behaviours and preferable adaptation outcomes. In summary, the endorsement of SOC processes in general ageing populations have been associated with better physical functioning (Baltes & Lang, 1997), subjective wellbeing and positive emotions (Freund & Baltes, 1998, 2002), and ageing satisfaction (Jopp & Smith, 2006). In health-related conditions, behavioural adaptations of individuals with osteoarthritis, visual impairments and multiple sclerosis have been demonstrated to be conceptually integrated in the SOC theoretical framework (Gignac et al., 2002; Ryan et al., 2003; Wilhite et al., 2004). The predictive value of SOC processes have been shown in orthopaedic outpatients following rehabilitation.

Other researchers are stressing the potential use of SOC for example in terms of a framework of care (Collins & Smyer, 2006; Ireland & Arthur, 2006; Volicer & Simard, 2006) however, its potential use has yet to be assessed empirically in health-related conditions. In line with previous empirical evidence, it may be of great

importance to examine if the endorsement of SOC in a stroke population has any association with improved physical functioning or life satisfaction as have been found in general ageing populations. Other potential uses of SOC may be to examine its association with depression as the evidence to date supports that SOC is associated with improving well-being and has correlated negatively with depression in one study (Chou & Chi, 2001). This would be a very important finding if the endorsement of SOC strategies were to be associated with depression in a stroke population, as outlined in the first chapter one of the major influences on recovery post stroke is the degree of depression. Another potential use of SOC may be in relation to rehabilitation as rehabilitation is a process of retraining and education, the patient must have the capacity to learn new ways of doing things (Kelly-Hayes & Paige, 1995). The use of SOC strategies would be of an imperative value in a rehabilitation setting where goal pursuit and attainment are of primary importance.

The SOC model, to date, has never been investigated or empirically tested in a stroke population. Therefore this study will be the first of its kind to examine the endorsement i.e. the use of SOC strategies in a stroke population and the influence of such strategies on outcome after stroke.

3.9 Chapter summary

This chapter has described the SOC model in detail and has outlined its uses in the context of successful ageing in terms of managing everyday life stressors and in circumstances when resources are limited. However, there has been limited use of the SOC model in the literature and it's individual components in health-related conditions, although its potential use has been stressed.

4 Study aim, objectives and hypotheses

The purpose of this research is to examine the Baltes' SOC model in the context of stroke and to investigate the effectiveness of SOC strategies as adaptive coping strategies after stroke. The aim of the current study is to examine the use of the SOC model in the context of an acute health condition where resources, both physical and psychological, are suddenly reduced necessitating a process of rapid adaptation in order to maximise potential outcome. The study will examine adaptive strategies along with other predictor variables that may lead to enhanced outcome for patients in the first year after stroke thus adding to the body of knowledge relating to stroke rehabilitation and recovery.

4.1 Rationale for study hypotheses

From reviewing the respective literature, relating to adaptation following stroke and the SOC model, the following framework was devised to represent the relationships to be examined in this study (see figure 4-1). The model primarily explores the use of SOC strategies in determining stroke outcome at two separate time points, one year apart, and over time from one time point to the other. The framework presents the direction of relationships expected within one month and one year after stroke. The same variables (with the exception of stroke severity which is replaced by functional status at one year after stroke) will be measured and examined at both time points. In tandem with examining the relationships between resources and SOC, resources and biographical details will be adjusted for when determining the predictive value of SOC strategies in determining outcome over time.

This study is interested in determining the influence that age has on SOC use in determining stroke outcome. As discussed in the previous chapter, previous studies' findings that have examined age-related changes regarding the endorsement of SOC strategies remain inconsistent. The SOC model was based on the premise that SOC processes represent adaptive processes of coping with major life change and loss keeping a favourable balance of gains and losses throughout the lifespan but more significantly during later life. Therefore, it is an important component of this research to examine if this premise holds in a stroke population balancing challenges of sudden

illness in tandem with the challenges of ageing. There empirical evidence regarding the use of coping strategies and what other variables influence the use of coping following stroke remains limited. As the endorsement of SOC strategies within the context of stroke is a new area for investigation, this study will therefore examine the influence that such strategies may have on the relationship between stroke severity and outcomes.

The construct recovery locus of control and especially recovery locus of control in terms of stroke has been shown to be an important factor in determining health outcomes. In line with previous studies' enquiry, this study is interested in examining the relationship between recovery locus of control and outcomes but also in determining how other constructs such as the use of SOC strategies may influence that relationship. There remains to be limited evidence in the literature regarding the influence that recovery locus of control has on the relationships between illness severity and health outcomes. Therefore, this study is interested in determining if recovery locus of control exerts any influence on the relationship between stroke severity and stroke outcomes. The relationship time point of interest is between recovery locus of recovery following acute stroke determining outcome one year later. This is because this study is interested in establishing how psychological constructs in the early stages after stroke determine outcome in the long-term. In gaining knowledge and understanding of the psychological constructs during the early period after stroke may allow further studies to examine and explore potential early interventions that may enhance long-term outcome after stroke.

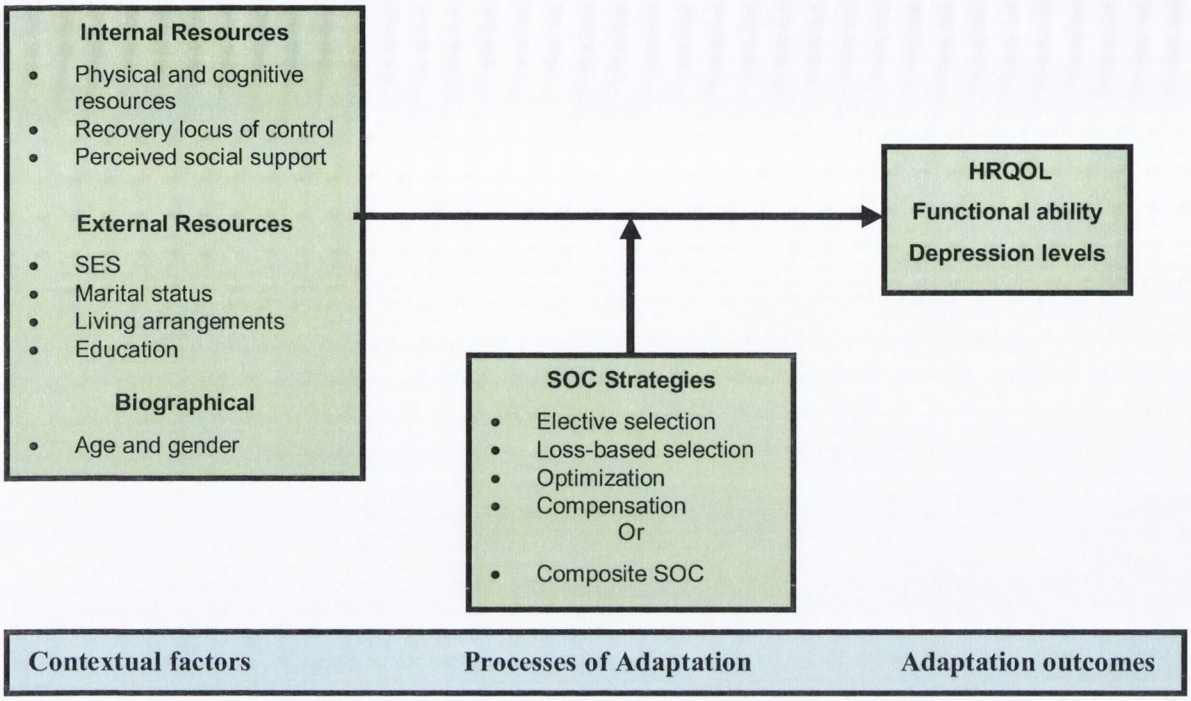


Figure 4-1 Adapted version of the SOC model determining adaptation after stroke

4.2 Study Aim

The primary aim of this study is to examine whether SOC strategies predict how people adapt following stroke. The research will examine the extent to which individuals, following the impact of an acute physical condition, engage in SOC strategies and the relationship of the SOC strategies with functional ability, health-related quality of life (HRQOL) and depression one year later. Greater use of adaptive strategies in chronic illness and disability have been shown to be associated with reduced levels of psychological distress but less is known about the use of adaptive strategies on functional ability and HRQOL.

4.3 General objective:

To examine the contribution of SOC strategies along with other predictor variables (stroke severity, socio-demographics and other psychological variables) to HRQOL, functional ability and depression in stroke patients.

4.3.1 Specific objectives:

1. To investigate the relationships between resources (internal and external) and the use of SOC strategies in the short-term (one month) and longitudinally (one year) after stroke.
2. To investigate the relationships between the use of SOC strategies and HRQOL, functional ability and depression in the short-term (one month) and longitudinally (one year) after stroke.
3. To ascertain whether there are any changes in SOC strategy use over time.
4. To establish whether the use of SOC differs between younger and older age groups in a stroke population.
5. To explore if age moderates the relationship between SOC strategy use and HRQOL, functional ability and depression.
6. To explore if SOC strategy use moderates the relationship between stroke severity and HRQOL, functional ability and depression.
7. To explore if SOC strategy use moderates the relationship between recovery locus of control and HRQOL, functional ability and depression.
8. To explore if recovery locus of control moderates the relationship between stroke severity and HRQOL, functional ability and depression.

4.4 Study hypotheses

The study hypotheses are outlined for, the two separate time points (at one month and at one year after stroke), and over time from one time point to the other (from one month to one year after stroke).

4.4.1 One month after stroke – Time 1 (T1)

Hypothesis 1a

Greater use of SOC strategies will be associated with better HRQOL one month post stroke after adjusting for resources (internal and external) and biographical details.

Hypothesis 1b

Greater use of SOC strategies will be associated with improved functional ability one month post stroke after adjusting for resources (internal and external) and biographical details.

Hypothesis 1c

Greater use of SOC strategies will be associated with lower levels of depression one month post stroke after adjusting for resources (internal and external) and biographical details.

4.4.2 One year after stroke – Time 2 (T2)

Hypothesis 2a

Greater use of SOC strategies will be associated with better HRQOL one year post stroke after adjusting for resources (internal and external) and biographical details.

Hypothesis 2b

Greater use of SOC strategies will be associated with improved functional ability one year post stroke after adjusting for resources (internal and external) and biographical details.

Hypothesis 2c

Greater use of SOC strategies will be associated with lower levels of depression one year post stroke after adjusting for resources (internal and external) and biographical details.

4.4.3 One month to one year after stroke – T1 to T2

Hypothesis 3

There will be no change in the use of SOC strategies from T1 to T2.

Hypothesis 4a

Greater use of SOC strategies one month post stroke will be predictive of better HRQOL one year later.

Hypothesis 4b

Greater use of SOC strategies one month post stroke will be predictive of improved functional ability one year later.

Hypothesis 4c

Greater use of SOC strategies one month post stroke will be predictive of lower levels of depression one year later.

Hypothesis 5

There will be similar use of SOC strategies between younger and older stroke groups. Exploratory analyses include examining if age moderates the relationship between the

use of SOC strategies and the core outcomes (HRQOL, functional ability and depression).

Hypothesis 6a

SOC at T1 will act as a moderator between stroke severity and HRQOL at T2.

Hypothesis 6b

SOC at T1 will act as a moderator between stroke severity and functional ability at T2.

Hypothesis 6c

SOC at T1 will act as a moderator between stroke severity and depression at T2.

Hypothesis 7a

SOC at T1 will act as a moderator between recovery locus of control at T1 and HRQOL at T2.

Hypothesis 7b

SOC at T1 will act as a moderator between recovery locus of control at T1 and functional ability at T2.

Hypothesis 7c

SOC at T1 will act as a moderator between recovery locus of control at T1 and depression at T2.

Hypothesis 8a

Recovery locus of control at T1 will act as a moderator between stroke severity and HRQOL at T2.

Hypothesis 8b

Recovery locus of control at T1 will act as a moderator between stroke severity and functional ability at T2.

Hypothesis 8c

Recovery locus of control at T1 will act as a moderator between stroke severity and depression at T2.

5 Method

Empirically, this thesis is situated within the context of a larger programme of research called the Healthy Ageing Research Programme (HARP). HARP is a multidisciplinary inter-institutional research programme funded for five years by the Health Research Board (the major health-related research funding agency in the Republic of Ireland). The overall aim of this research programme is to address the challenges of ageing in an all-Ireland context, i.e. the Republic of Ireland (RoI) and Northern Ireland (NI). The HARP research involved three populations: A general ageing community-based population and two patient populations (stroke and chronic heart failure), being the major causes of morbidity and mortality for older people in Ireland. The main objective of HARP was to examine the experience of health and illness for older people in Ireland considering three facets: ageing and adaptation, quality of life and quality of care. This thesis primarily focused on adaptation after stroke using a successful ageing model (Selection, Optimization and Compensation [SOC]) in an Irish stroke population. The aim of this chapter is to describe the research design and procedure involved in conducting this study. The chapter has been organized into the following sections: (1) patient selection and recruitment (2) measures used (3) procedure and timeframes and (4) statistical analyses.

5.1 Patient selection and recruitment

Patients were recruited from two large urban teaching hospitals in Northern Ireland and one large teaching hospital and one small district general hospital in the Republic of Ireland. All consecutive admissions with a diagnosis of stroke were considered for eligibility into the study and were tracked at least twice a week through the accident and emergency departments in all hospitals. Recruitment took place over 14 months from July 2004 to September 2005.

5.1.1 Inclusion/exclusion criteria

Patients were assessed in accordance with the following inclusion/exclusion criteria designed to determine their eligibility for the study:

Inclusion Criteria

- Confirmed diagnosis of stroke (defined as symptoms of rapid onset lasting more than 24 hours and of presumed vascular origin reflecting a focal disturbance of cerebral function, excluding isolated impairment of higher function) by a medical physician in accordance with the ICD-10 diagnostic criteria
- First ever and recurrent stroke
- Obtained consent
- Age 18 years and older
- Abbreviated Mental Test (AMT) score ≥ 8
- Frenchay Aphasia Screening Test (FAST) Score ≥ 14
- Interview within 2-6 weeks post stroke

Exclusion Criteria

- Transient cerebral ischaemic attacks and related syndromes
- Traumatic haemorrhage – intracranial or subarchnoid
- Pre-stroke vascular dementia
- Less than 18 years old
- Deemed unsuitable by the consultant/medical team responsible for patient care to be invited to participate
- Refused consent
- Proxy consent refused by family member/relative
- Death

5.2 Measures

Each of the measures and variables assessed in the study will be described in the following sections.

5.2.1 Pilot study of measures

All measures were first piloted in a small sample of stroke inpatients (n = 10) prior to the final selection of measures used in the study. The following characteristics of each measure were taken into consideration: ease of administration, time taken to administer, comprehensibility and appropriateness of use in a stroke sample. As a

result of this pilot study, the Frenchay Aphasia Screening Test (FAST) was reduced to the shortened version that includes the comprehension and expression sections only in order to reduce interview administration time. The SOC-15 items were reordered as the first item was long and considered a difficult item to begin the questionnaire with for comprehension reasons. Therefore item 1 of the SOC-15 questionnaire was exchanged with item 13.

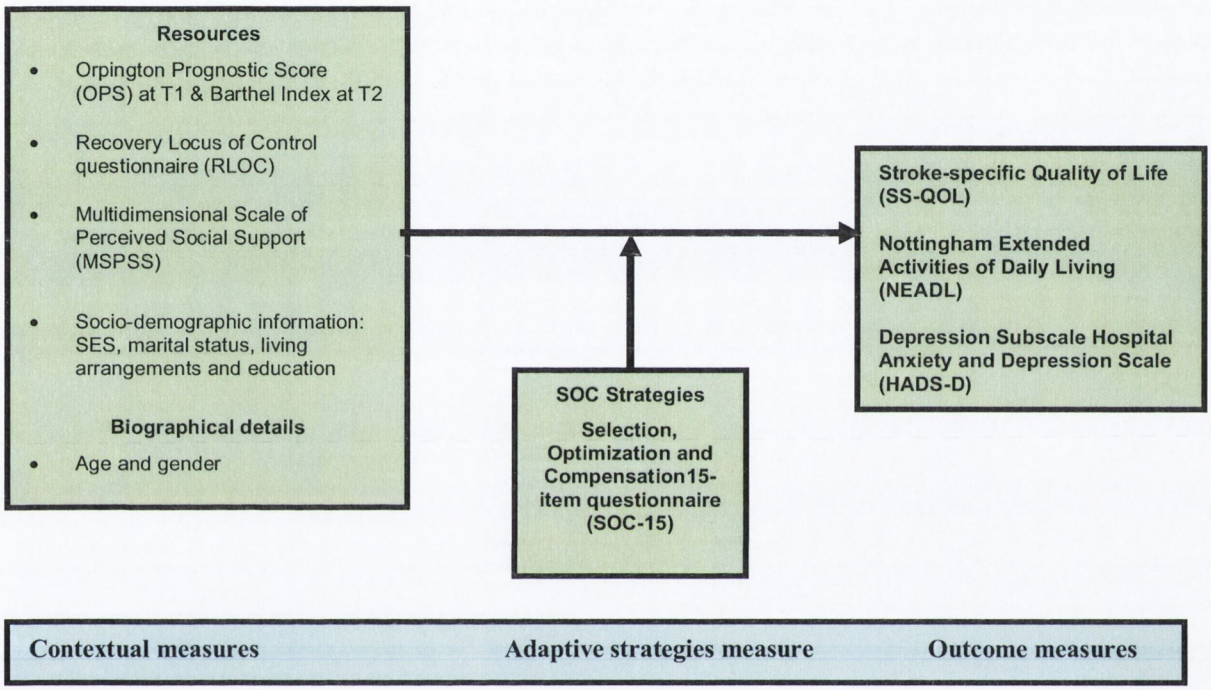


Figure 5-1 Measures used to assess specific variables

5.2.2 Socio-demographic and clinical details

Patient socio-demographic and clinical background information was recorded as part of the initial assessment and updated, as necessary, as part of the second assessment. Data collected on initial assessment included age, gender, marital status, living arrangements, socio-economic status, past medical history, other co-morbidities during this admission, stroke subtype, lesion location and length of stay in hospital on this occasion. Age was divided into younger and older groups for the purpose of some analyses in the study. The younger age group were defined as ≤ 65 years and the older group were defined as > 65 years. This age spilt was primarily based on the age for retirement in this country. Stroke subtypes were classified as total anterior circulatory infarction (TACI), partial anterior circulatory infarction (PACI), lacunar infarction

(LACI), posterior circulatory infarction (POCI) and primary intracerebral haemorrhage (PICH) in accordance with the Oxford Community Stroke Project (OCSP) (Bamford, Sandercock, Dennis, Warlow, & Burn, 1991).

5.2.3 Screening assessment

All patients identified with the diagnosis of stroke were first screened for language and cognitive deficits to determine their eligibility for the study in accordance with the inclusion/exclusion criteria.

5.2.3.1 Cognitive Assessment

Memory and cognitive function were assessed using the Hodkinson's Mental Test Score, more commonly known as the Abbreviated Mental Test (AMT) (Qureshi & Hodkinson, 1974). The AMT comprises ten questions that probe orientation in time and space, attention and memory, scoring one point for each correct answer. It is used widely in both clinical and research settings and has been recommended for routine assessment of cognitive function (Jitapunkul, Pillay, & Ebrahim, 1991). The recommended 'cut-off' score of < 8 was used in the current study as a score less than 8 suggests a significant cognitive deficit amongst patients in acute geriatric medicine (Jitapunkul et al., 1991). The AMT is tolerated well by participants and is especially suited for use with older people because it requires no reading, writing or drawing on their part (Incalzi, Cesari, Pedone, Carosella, & Carbonin, 2003; Swain, O'Brien, & Nightingale, 1999). The AMT's reliability and validity have been established in older patients (Incalzi et al., 2003; Jitapunkul et al., 1991). It is also reported to be a valid instrument for dementia screening (Sarasqueta et al., 2001). The AMT is already included in the Orpington Prognostic Score (OPS) to incorporate a measure of cognitive impairment (Kalra, Dale, & Crome, 1994).

5.2.3.2 Language Assessment

The Frenchay Aphasia Screening Test (FAST) was used to classify language and communication problems. The FAST is a brief test specifically developed to screen for aphasia among stroke patients (Enderby, Wood, Wade, & Hewer, 1987). It was designed to cover four aspects of language which may be disturbed in an aphasic patient: comprehension, expression, reading and writing. It was developed to be used with patients seen within days of an acute stroke. The shorter version of the FAST

was used to assess comprehension and expression. In the expression domain, there is an assessment on verbal fluency i.e. "Name as many animals as you can in 1 minute" and this also examines executive function. The shortened version of the FAST is a valid, reliable and sensitive method of detecting aphasia with a cut-off score of 13 or less identifying true aphasia (Enderby et al., 1987). The FAST has established validity and has been indicated for use where a screening procedure is desirable (Enderby & Crow, 1996). Therefore, the FAST is a useful tool in research to screen for aphasia before administering other tests which rely upon good linguistic function.

5.2.4 Resources

In the current study, resources were identified as either internal (i.e. located within the person) or external (i.e. are located in the material, social, cultural, historical, and physical environment) in keeping with the SOC model.

5.2.4.1 Internal Resources

Internal resources referred to stroke severity (as stroke severity is a combined sensorimotor resource measurement of motor ability, proprioception, balance and cognition), functional status, recovery locus of control over recovery and perceived social support.

5.2.4.2 External resources

External resources referred to marital status, education, socio-economic status (SES) and living arrangements and were recorded as part of patient demographical and clinical details. Marital status was recorded as married, single, widowed and divorced or separated; education as primary, secondary or third level; and living arrangements as either living alone or living with others.

Socio-economic status was classified into 2 categories using the following process:
The respondent's occupation was coded using the International Standard Classification of Occupations 1988 (ISCO-88). This coding was then combined with information on employment status (employed or self-employed) and supervisory role (supervised less or more than 25 people) to produce the Erikson-Goldthorpe (EG) social class schema (Erikson & Goldthorpe, 1992). The EG schema produces twelve social class positions:

1. Service Class Higher
2. Service Class Lower
3. Higher Routine Non-Manual class
4. Lower Routine Non-Manual class
5. Self-employed with Employees
6. Self-employed without Employees
7. Small Holders (farmers)
8. Technical and Supervisory Employees
9. Skilled Manual Workers
10. Semi-Skilled Manual Workers
11. Unskilled Manual Workers
12. Agricultural Labourer

Given the relatively small sample in this study in comparison to the number of classes, these classes were collapsed into two categories: manual (includes class 4 and 8 to 12) and other social classes i.e. non manual and self-employed (includes classes 1 to 3 and 5 to 7).

5.2.4.2.1 Stroke Severity

Stroke severity was assessed using the Orpington Prognostic Score (OPS) (Kalra & Crome, 1993). The OPS provides an accurate assessment of the severity of impairment and prediction of prognosis following stroke. It is a clinically derived score that incorporates measures of motor deficit, proprioception, balance and cognition. It was designed to be used at two weeks post stroke when it has highest predictive power for future stroke outcome. The OPS is a quick and straight-forward tool to administer where a best possible score is 1.6 and the worst score is 6.0. The OPS score can be used to stratify patients into different severity groups on the basis of the following score cut-offs (Kalra & Crome, 1993).

Table 5-1 Orpington Prognostic Scoring for stroke severity

Deficit	Prognosis	Score
Mild – moderate	'Best'	< 3.2
Moderate – severe	'Intermediate'	3.2 – 5.2
Severe – very severe	'Poor'	> 5.2

The scoring provides an estimation of those patients eligible for inclusion to the study at approximately two weeks post stroke, patients scoring > 5.2, for example, would not be ready to take part in the study at the two week post stroke period. Although stroke severity provides an indication of the severity of how stroke affects an individual, it also provides an estimation of the resultant physiological resources an individual now has access to. Therefore stroke severity has been referred to as internal resources in this study.

5.2.4.2.2 Functional status

The Barthel Index (BI) (Mahoney & Barthel, 1965) was used in this study to assess functional status. The BI is probably the most widely used and best standard measure of activities of daily living (ADL) in stroke patients with established reliability and validity (Collin, Wade, Davies, & Horne, 1988; D'Olhaberriague, Litvan, Mitsias, & Mansbach, 1996; Granger, Dewis, Peters, Sherwood, & Barrett, 1979). It includes ten most common areas included within ADL scales, and specifically covers continence of bowels and bladder, which some indices omit. The BI is a disability measure that concentrates upon actual, observed behaviour and not potential abilities. The BI can be scored from 0 to 20 or 0 to 100 where 20 and 100 indicate functional independence although not necessary 'normal' function (Collin et al., 1988; Shah, Vanclay, & Cooper, 1989). In the current study, both scoring systems were used. The 0 to 100 scoring was used to divide the BI into 3 grades of dependency for descriptive purposes only: Independent (BI 95-100), Moderate dependency (BI 60-90) and Major dependency (BI 0-55) (Granger et al., 1979; Jonsson et al., 2005) and the 0 to 20 scoring was used for all other analyses. As is inherent to any ADL index, the BI's sensitivity is limited due to floor and ceiling effects and therefore an assessment of Instrumental Activities if Daily Living is required to further assess higher level physical functioning. Duncan, Jorgensen and Wade (2000) recommend that stroke

outcome measures should be at the level of activities, capturing not only basic ADL but also including instrumental activities of daily living and advanced mobility. Therefore an instrumental activities of daily living measure, the Nottingham Extended Activities of Daily Living Scale (NEADL) was used to assess the outcome of functional ability in the current study. Further detail on the NEADL is presented in section 5.2.7. Functional status was recorded in this study from a descriptive perspective and also to allow control of physical function in the analyses.

5.2.4.2.3 Recovery Locus of control

Recovery locus of control was assessed using the Recovery Locus of Control Scale (RLOC) (Partridge & Johnston, 1989). RLOC is a nine-item scale that gives a single score and provides a measure of the internality/externality of the person's perceptions of control over his or her recovery. Five items are worded to reflect internal beliefs and four items reflect external beliefs. The individual responses to each using a five-point Likert-type scale from 1 (strongly agree) to 5 (strongly disagree). The scale is scored in the direction of internality reflecting the strength of the respondent's internal recovery locus of control belief. A low score indicates a strong external locus of control and a high score reflects a strong internal locus of control. The scale was found to predict recovery from residual disability in stroke patients after controlling for initial levels of disability and was also shown to have satisfactory psychometric properties (Johnston et al., 1999; Partridge & Johnston, 1989).

5.2.4.2.4 Perceived Social Support

The Multidimensional Scale of Perceived Social Support (MSPSS) was used to measure perceived social support and is a brief 12-item measure which divides perceived social support into 3 subscales - family, friends and significant other support (Zimet, Dahlem, Zimet, & Farley, 1988). Each item is rated by the patient on a seven point likert scale ranging from "Very Strongly Disagree" to "Very Strongly Agree" (scored 1 to 7). The results reported in several studies regarding the psychometric characteristics of the MPSS have supported the use of the instrument for assessing the structure of perceived social support in a variety of samples (Clara, Cox, Enns, Murray, & Torgrudc, 2003; Zimet et al., 1988; Zimet, Powell, Farley, Werkman, & Berkoff, 1990).

5.2.5 Adaptive strategies

Strategies of adaptation – selection, optimization and compensation (SOC) were assessed using a modified version of Baltes original SOC- 48 questionnaire (Baltes et al., 1999) called the SOC-15 (O'Hanlon et al., Submitted). This shortened version of SOC is similar in structure to the SOC-48 in that it has two response options, the SOC item and a distracter item. Participants are asked to decide which of the two response options describes them better. The sum of affirmative responses to the SOC items is then calculated and higher scores indicate that participants endorse the use of more SOC strategies. The SOC-15 includes items that assess all 4 types of strategies of the SOC model (4 elective selection items, 4 loss-based selection items, 4 optimization items and 3 compensation items). It was developed to circumvent potential burden for participants in completing the longer SOC-48. Other limitations of the SOC-48 were the paucity of research in lower socio-economic groups, use in cultures other than Germany or in samples defined by ill-health. The SOC-15 was used to assess adaptation in a general ageing population (n=2,033, mean age 74.1 years, SD 6.8) and was found to have adequate internal reliability similar to the SOC-48 (O'Hanlon et al., Submitted). The internal reliability scores (alpha coefficients) for elective selection, loss-based selection, optimization and compensation were .55, .60, .64 and .62 respectively; these scores are similar or better than subscales for the SOC-48 (Baltes et al., 1999). Confirmatory factor analyses also indicated that the four subscales of the SOC-15 provided a good fit for the data (x^2 = 755, DF = 81, CFI=.90, IFI = .90, GFI .94, RMSEA = .06, p<.001) with just 3 items cross loading, i.e. one of the items from each of the optimization and compensation subscales loaded onto the other subscales; this finding is not unreasonable given both subscales reflect attempts to achieve goal choices, albeit under different conditions. A loss-based item (under difficult conditions goal choices can be related to the attempts individuals make to achieve their goals) also cross loaded onto a compensation subscale. Construct validity was tested to explore how SOC-15 may relate to health. There was less use of SOC strategies for those participants with greater physical impairment and higher depression scores and greater use of SOC strategies was associated with higher self-esteem, generativity (degree to which people feel connected to others and capable of passing on their skills and experience) and positive perceptions of ageing.

Further analyses in a smaller general ageing population (n=108) indicated moderate to good test-retest reliability scores for all subscales (O'Hanlon et al., Submitted). Elective selection correlated at the two time points ($r = 0.72$, $p < 0.001$), as did loss based-selection ($r = 0.63$, $p < 0.001$), optimization ($r = 0.59$, $p < 0.001$), compensation($r = 0.49$, $p < 0.001$) and composite SOC ($r = 0.76$, $p < 0.001$). SOC-15 was also compared with the TenFlex questionnaire that assesses tenacious goal pursuit and flexible goal adjustment (Brandtstadter & Renner, 1990) and with the Brief COPE (Carver et al., 1989) in this sample. SOC-15 had a positive correlation with TenFlex ($r = 0.33$, $p < 0.001$) and most of its components especially with tenacious goal pursuit ($0.22 \leq r \leq 0.55$) where the results were all statistically significant ($p < 0.01$). There were also significant associations between SOC-15 and the following coping behaviours of the Brief COPE: active coping, planning, positive reframing, religion, denial and behavioural disengagement.

5.2.6 Health-related quality of life (HRQOL)

The Stroke-Specific Quality of Life (SS-QOL) scale was used to assess health-related quality of life (HRQOL). SS-QOL has been reported to be valid, reliable and responsive in assessing HRQOL in acute stroke trials (Salter et al., 2005; L. S. Williams, Weinberger, Harris, Clark, & Biller, 1999). The version of SS-QOL used in this study is a 7-domain version with 35 items. The 7 domains include physical function, mood, role function, vision, language, thinking and energy. Each item is rated on a 5-point Likert scale on one of two keyed response sets. The first 18 items are assessed using the response sets "amount of trouble experienced when attempting tasks" ranging from "unable to do it" to "no trouble at all" on a 5-point likert scale. The remaining 17 items use the response set "degree of agreement with statements regarding their functioning, ranging from "strongly agree" to "strongly disagree" also on a 5-point Likert scale. Scores range from 1 to 5 with higher scores indicating better health-related quality of life (HRQOL) i.e. 1=poor, 2=fair, 3=average, 4=good and 5=very good. The SS-QOL yields both domain scores and an overall SS-QOL summary score. The domain scores are unweighted averages of the associated items while the summary score is an unweighted average of all 7 domain scores (Linda S. Williams et al., 2006). The point of reference for all items was the past week. The SS-QoL demonstrates good reliability and validity and the underlying scale structure

supports the concept of the SS-QoL as a measure tapping stroke-specific HRQOL (Williams et al., 2006; Williams et al., 1999). The SS-QoL domains tap the full impairment/activity/participation continuum and the frequently omitted areas of language, cognition, and hand function (Duncan et al., 2000).

5.2.7 Functional ability

The Nottingham Extended Activities of Daily Living Scale (NEADL) was used to assess functional ability (Nouri & Lincoln, 1987). Instrumental or extended functional activities of daily living include those more complex activities that move away from personal activities of daily living and include mobility, household activities and other social activities. The Nottingham Extended ADL Index has four subsections (mobility, domestic, kitchen and leisure), each of which was found to form a hierarchical (Guttmann) scale with stroke patients (Wade, 1992). There are 22 items in total and each item measures level of activity actually performed. Scoring is hierarchical with 4 possible responses e.g. 0 = can do with help or cannot do, and 1 = do on my own or do on my own with difficulty. The NEADL has well established psychometric characteristics in both stroke and other rehabilitative populations (Gladman, Lincoln, & Adams, 1993; Gompertz, Pound, & Ebrahim, 1993; Green, Forster, & Young, 2001; Harwood & Ebrahim, 2002; Nicholl, Lincoln, & Playford, 2002).

5.2.8 Depression

Depression was assessed using the depression subscale as part of the Hospital Anxiety Depression Scale (HADS) (Zigmond & Snaith, 1983). The HADS was designed for use with medically ill, hospitalised patients to detect the presence of possible and probable anxiety and depression. This scale attempts to overcome bias caused by somatic complaints which feature in most other inventories. All symptoms of anxiety and depression relating to physical illness were excluded by the authors and as a result the scale is considered to be unbiased by coexisting general medical conditions (Snaith, 1987). The HADS-D is a 7 item subscale that measures depression with a maximum score of 21. The cut-off recommended for possible clinical depression is ≥ 8 and this has been validated in a stroke population (Aben et al., 2002). Scores ≥ 11 are considered probable clinical depression. The HADS-D is a well established and widely used in stroke studies (Aben et al., 2002; MacHale, O'Rourke, Wardlaw, &

Dennis, 1998) and is considered one of the best validated self-report scales for depression screening in stroke survivors (Bennett & Lincoln, 2006).

5.3 Feasibility Study from the urban teaching hospital in the Republic of Ireland

A feasibility study of stroke patients' activity was carried out during the month of November 2003 at the urban teaching hospital in the Republic of Ireland. The objective of this study was to ascertain the number of stroke patients at a given time point in this hospital. The exercise was employed as part of the preparation for the stroke study component of the Healthy Ageing Research Programme (HARP). This urban teaching hospital has an acute stroke service directed by a consultant gerontologist. The service is multidisciplinary in nature consisting of a registrar, an intern, therapists and nursing staff. The majority of patients that are referred to the Stroke Service are admitted to an age-related department that has a rehabilitative environment that facilitates patients to regain their maximum function and independence. The specific aims of the feasibility study were to: gain information about the population of patients diagnosed with stroke during one month; identify what wards stroke patients are admitted to in the hospital; and to estimate the number of patients that would be eligible for the HARP Stroke study.

5.3.1 Method

Attaining information for patients referred to the Stroke Service was relatively straightforward. It was possible to view the number of admissions, discharges, inpatients and deaths of all the patients in the Stroke Service on a daily basis using the Hospital's computer software programme Patient Information Management System (PIMS). Further information was taken from the patients' medical notes along with attending the Stroke Service Team's weekly case conference and ward round. Information on the patients not referred to the Stroke Service was gathered from the Accident and Emergency records. All patients with a presenting condition of stroke, transient ischaemic attack (TIA), collapse and seizure were noted and further details were viewed on the Accident and Emergency computer software programme "Footman Walker". This process facilitated the elimination of those patients to be

considered for eligibility into the study because they initially presented with symptoms similar to stroke but were not diagnosed as stroke.

5.3.2 Results

General descriptive statistics were used to present the findings.

Table 5-2 Number of patients with a diagnosis of stroke during the month of November 2003

Age	Inpatients	Admissions	Discharges	Deaths
< 65 yrs	4	6	5	0
≥ 65 yrs	8	11	6	4
Total	12	17	11	4

Table 5-3 Number of patients that were suitable for interviewing as part of the HARP study

	Suitable for interview	
Age	Yes	No
< 65 yrs	8	2
≥ 65 yrs	10	9
Total	18	11

The findings from this feasibility study showed that 24 patients were referred to the Stroke Service for the month of November 2003 and an additional 5 patients were diagnosed with stroke from the A & E records that were not referred to the Stroke Service.

5.3.3 Conclusions

The feasibility study confirmed that there was a direct and convenient method in identifying patients who were referred to the Stroke Service. The accident and emergency records appeared very accurate and it was possible to track those patients not referred to the Stroke Service by monitoring these records twice a week.

5.4 Procedure and Timeframes

This was a longitudinal study, with each patient interviewed at two time points. The initial assessment took place within 2-6 weeks post stroke in hospital. The majority of patients were interviewed at 4 weeks and stroke severity was recorded on all patients within 2 weeks following admission to hospital. This time point was called Time 1 (T1). The second assessment took place one year later in the hospital outpatients department or in the patient's home. All patients that participated in the study following their stroke were contacted by telephone a year later to arrange an appointment for the second assessment. This time point was called Time 2 (T2).

Within each hospital, the medical consultants involved were provided with an overview of the proposed protocol and permission was then requested to approach patients under their care. The researchers in both regions (ROI and NI) were granted permission to approach patients by a majority of the consultants and this accounted for 90% of all patients admitted with stroke. Informed consent was obtained from each patient prior to being interviewed by the researcher. Each patient was given a verbal description initially of what the study involved. An information sheet was then provided outlining the nature of the study and guaranteeing confidentiality (Appendix x). Any questions or concerns were answered prior to obtaining written consent. In circumstances where the patient was unable to give written consent (e.g. as a result of paresis or literacy problems), a separate consent form for verbal consent was used (Appendix I). A witness (usually a family member) was present if the patient had to verbally consent to taking part in the study. In circumstances where the patient was unable to consent as a result of cognitive and language problems, the person closest to the patient or next of kin was approached to take part in the study as a proxy on the patient's behalf. A detailed protocol with specific guidelines was developed to explain the process in this situation. All patients were advised that they could withdraw from the study at any time and that their participation in the study would in no way influence their ongoing medical care. There were two researchers involved in the data gathering process. Both researchers used identical measures and assessments on all patients recruited at the four hospitals. Each researcher spent an appropriate amount of time in the other researcher's environment to ensure that both parties were using the same procedure when interviewing and collecting data. Both researchers

performed the measures that require a rating i.e. the OPS, FAST and BI on the same patients for training purposes and to ensure consistency of administration.

Table 5.4: Schedule and timing of measures

Measures	T1: 4 weeks	T2: 12 months
Patient Details and Clinical Background Sheet	•	•
Orpington Prognostic Score (OPS) – AMT included	•	
Abbreviated Mental Test (AMT)	•	•
Frenchay Aphasia Screening Test (FAST)	•	
Barthel Index (BI)	•	•
SOC -15	•	•
HADS Depression Scale - (HADS-D)	•	•
Stroke-Specific Quality of Life Scale (SS-QoL)	•	•
Recovery Locus of Control Scale (RLOC)	•	•
Nottingham Extended ADL Index (NEADL)	•	•
The Multidimensional Scale of Perceived Social Support (MPSS)	•	•

5.5 Ethical Approval and Consent

Formal applications for ethical approval to conduct the study were submitted to the relevant hospitals' and universities' ethics committees including an application to the Clinical Governance Committee in Northern Ireland (See Appendix III for copies of ethics approval).

5.6 Data handling and entry

Data quality checks were an ongoing part of the stroke study. A protocol manual was developed by the researchers including input from the study's steering group members to ensure consistency in data collection across regions and hospitals. A codebook was developed to clarify units of measurement or the meaning of labels for response options in all measures and sub-items. Checks were carried out to ensure no errors in the entry or merging of data, e.g. examining 'before' and 'after' data for anomalies in integration, and by cross checking the participant identity imported with

each scale which had to remain consistent. Training sessions were scheduled for the researchers to ensure cross-region consistency in data coding, analyses and management, including the writing, sharing and storage of syntax files.

5.6.1 Database Development

All questionnaires were recreated using the software FileMaker Pro 5.5 for Windows (File Maker Pro, 2005) (Baron & Peck, 2001). The data were then directly entered using this application thus ensuring consistency of data entry by the individual researchers. FileMaker Pro also has the advantage of being compatible with most statistical packages i.e. SPSS for direct importing of data.

5.6.2 Quality checks: Completeness, Accuracy and Consistency

When datasets from the Republic of Ireland (ROI) and Northern Ireland (NI) were merged, additional checks for completeness, accuracy and consistency were carried out.

Completeness: Errors in completeness can be twofold: firstly, that interviews are not complete (participants are not asked or did not answer all questions), or secondly, that data is available but not entered into the FileMaker programme. Checks were made on both these issues. Where data was missing in FileMaker, efforts were made to retrieve it from the original documents, and only when this was not possible was the data marked missing. Results indicate that there were very few incomplete interviews, and all datasets for each measure were typically complete, i.e. missing cells of data within each subscale were counted, and summed scores typically were zero.

Accuracy: In any data quality check, it is important to know that the data entered is accurate and reliable. To determine specifically accuracy in data entry, a random subset of 10% of data from each region was double entered. Anomalies were cross checked with the original dataset and corrected. High levels of agreement were found in each region indicating high levels of accuracy in data entry (910 instances of 922 data points). Discrepancies were resolved with 100% agreement.

Consistency: The use of established protocols ensured that data was gathered in the

same way in each region. A further check of mean and categorical data sought to determine whether data in each region was behaving in ways consistent with expectations, which includes comparisons between regions, and across time points.

5.7 Statistical Analyses

Analysis of data was conducted using SPSS, for Windows version 14. To address the research questions of this study, a series of bivariate and multivariate analyses were performed. Parametric statistical tests were mainly used for analyses, even when there were occasional non-normality distributions of data. The sample size was > 100 and the Central Limit Theorem asserts that with sufficiently large sample sizes, sampling distributions of means are normally distributed regardless of the distributions of variables (Tabachnick & Fidell, 2007).

5.7.1 Response rates

Response rates were calculated at regular intervals throughout the recruitment and follow-up periods. A protocol was written and adhered to regarding the recruitment and retention of the study sample to ensure response rates remained medium to high.

5.7.2 Normal distribution analysis

The assumption of normality was assessed because the appropriate statistical tests were decided as a result of the sample size (n >100) and by considering the spread of the data. For each variable used in the analyses, the variable distribution was considered normal when the mean, trimmed mean, and median were nearly equal, and the skewness and kurtosis statistics were close to zero. In a larger sample size, the significance level of skewness is not as important as its actual size (worse farther from zero) and the visual appearance of the distribution. The impact of departure from zero kurtosis also diminishes e.g. underestimates of variance associated with positive kurtosis disappear with samples of 100 or more cases (Tabachnick & Fidell, 2007). If the value of skewness or kurtosis (ignoring any minus sign) is greater than twice the standard error, then the distribution is normal and a value less 1.0 is not a problem whereas a value greater than 2.0 is a cause for concern (Miles & Shelvin, 2005). The objective test Kolmogorov-Smirnov was performed in some instances on the data to confirm descriptive exploration of the data. This test compares the set of scores in the sample to a normally distributed set of scores with

the same mean and standard deviation. If the test is non-significant ($p > .05$), then the distribution of the sample is not different from a normal distribution (i.e. it is probably normal).

5.7.3 Reliability analysis

Cronbach's alpha was used to examine and determine the internal consistency of all measures. Internal consistency is the most common estimate of reliability reported and it should not fall below 0.7 for research purposes (Kline, 1999).

5.7.4 Significance levels

For all statistical analyses, the significance level was generally set at .05. However for exploratory subgroup comparisons, the Bonferroni correction was used in order to reduce the type I error rate.

5.7.5 Outliers and missing data

The dataset was screened thoroughly for outliers and missing data. Outliers are sometimes more technically defined as values whose distance from the nearest quartile is greater than 1.5 times the interquartile range drawing the mean in their direction. Therefore box plots were used to inspect for outliers and if present, their distance from the nearest quartile was assessed. In circumstances where extreme outliers were present, statistical analyses were conducted with and without the extreme outliers to check for differences and if present, they were removed. Missing Values Analysis (MVA) was performed to detect any missing values. Mean substitution was a method considered if there were more than 5% of missing data for any individual variable (Tabachnick & Fidell, 2007).

5.7.6 Descriptive statistics

Frequencies, means and standard deviations were used to describe the sample's condition-related characteristics, demographic status, clinical and psychological variables at Time 1 (T1) and Time 2 (T2).

5.7.7 Bivariate analyses

Bivariate analyses included the Chi-square statistic to examine associations in categorical data, Pearson's Correlation to examine relationships between continuous

variables and t-tests were used to examine mean differences between two groups. and Analysis of Variance (ANOVA) where there were more the two levels in the Independent Variable. Eta squared (η^2), the coefficient of nonlinear correlation, was used to examine the relationship between categorical variables with more than 2 levels and continuous variables.

5.7.8 Hierarchical Multiple Linear Regression Analysis

Hierarchical multiple linear regression analysis was conducted to examine further relationships between independent and dependent variables and to test for the associations and predictions between independent variables and dependent variables. The hierarchical entry method was employed. Multiple linear regression analysis allows the linear relationships between several independent variables (IV, or predictor variables) and a single dependent variable (DV, or predicted variable) to be quantified. The extent to which each individual IV is uniquely related to the DV can be determined, as can the overall variance in the DV attributable to the combination of IVs. General assumptions of multiple regression analysis are that the DV should be normally distributed at all points along the regression line i.e. the residuals should be normally distributed, the relationship is linear between the IV or predictor variables and the DV and that the variance in the residuals should not be associated with the predicted value of the DV i.e. the residuals should be homoscedastic. These assumptions of normality, linearity and homoscedasticity were checked by inspecting standardised residuals against the standardised predicted values using cumulative normal probability plots and scatterplots. Another assumption of regression is that residual errors of prediction are independent of one another. The Durbin-Watson statistic (value close to 2 if errors are independent) was used to measure any autocorrelation of errors that may occur. For any two cases the expected correlation between the residuals should be equal to zero (Miles & Shelvin, 2005).

The data were also inspected for existence of outliers, skewness and multicollinearity for each regression model. Scatterplots were used to inspect for outliers and multicollinearity diagnostic tests used were Variance Inflation Factor (VIF) and tolerance (Miles and Shelvin, 2005). Other considerations were the number of predictors per sample size. Green (1991) proposed the minimum sample size should be greater than 50 +8k, where k is equal to the number of independent variables. This

study adhered to Green's proposed method where possible when entering independent variables into the regression models. Finally, the best measure of explained variance is not R^2 but the adjusted R^2, R calculated from a sample tends to overestimate the population value of R and this bias increases as the ratio of independent variables to sample size increases. Adjusted R^2 takes this bias into account, to produce an estimate that is closer to the population value (Hankins, French, & Horne, 2000). All recommendations outlined for conducting regression analysis were adhered to where possible in the statistical data analyses for this study.

5.7.9 Moderation analysis

Interaction or moderation effects between variables predicting outcomes were examined using a similar methodology as that described by Aiken and West (1991). One predictor variable can moderate the effect that another predictor variable has on the outcome variable. A moderator variable is one that affects the relationship between two variables, so that the nature of the impact of the predictor on the criterion (outcome variable) varies according to the level or value of the moderator. A moderator interacts with a predictor variable in such a way as to have an impact on the level of a dependent variable (Holmbeck, 1997). The single predictor variables (e.g. composite SOC and stroke severity) are first centred (i.e. put in deviation score form so that their means are zero) and the interaction term (composite SOC*stroke severity) is then formed by multiplying together the two centred predictors (Aiken & West, 1991). If a significant interaction has been obtained, primary techniques used for probing of this term are plotting the interaction and then using t-tests to examine whether the simple slopes differ from zero.

6 Results I: Use of SOC strategies one month after stroke

The aims of this chapter are to present study findings for the first phase of the study at one month after stroke (Time 1 [T1]) and to examine the relationship of SOC strategies with Health Related Quality of Life (HRQOL), functional ability and depression at this time point. This chapter describes the use of SOC strategies by patients during the acute period following stroke and how other psychological and clinical variables may be associated with their use at this time. Descriptive statistics are used to provide a profile of the sample recruited and included in this study. SOC is then described both as separate subscales and as a composite score. Bivariate and hierarchical regression statistical methods are used to analyse the associations of SOC with clinical and psychological variables.

6.1 Patient Recruitment Results: Response Rate

Patients with a diagnosis of stroke admitted via accident and emergency departments were recruited from four hospitals – three large urban teaching hospitals and one small district general hospital. From July 2004 to September 2005, a total of 431 patients were identified as having an initial diagnosis of stroke in the Republic of Ireland (ROI) and Northern Ireland (NI) hospitals. There were 303 referrals deemed eligible to be included in the study. Patients deemed not to be eligible were patients who died within four weeks of admission, patients who were too ill, whose diagnosis was not stroke following further investigation, had pre-stroke vascular dementia, were non-English speaking or were diagnosed with stroke for more than four weeks. Of those eligible, some patients were not invited to participate in the study (n=59) because they were discharged before the researcher could obtain their consent. Following refusals to participate and those not invited, a total of 203 patients were recruited to the study. These patients were screened for cognitive and language deficits. Over 75% (n=153) of the recruited sample scored within and above the cut-off levels on the FAST and AMT (outlined in the Inclusion/Exclusion criteria in Chapter 5). Therefore these patients (n=153) completed all measures used in the study.

Table 6-1 Screening measures

Measure	(%) Above cut-off score	No of items	Range	Mean (SD)	Cronbach's Alpha α
FAST	145 (71)*	20	0-20	17.3 (2.5)	.68
AMT	153 (75)	10	0-10	7.6 (3.2)	.93

*Some patients (n = 8) did not comply with the FAST assessment (felt it was too simplistic) and AMT scores of 10 were obtained on these individuals

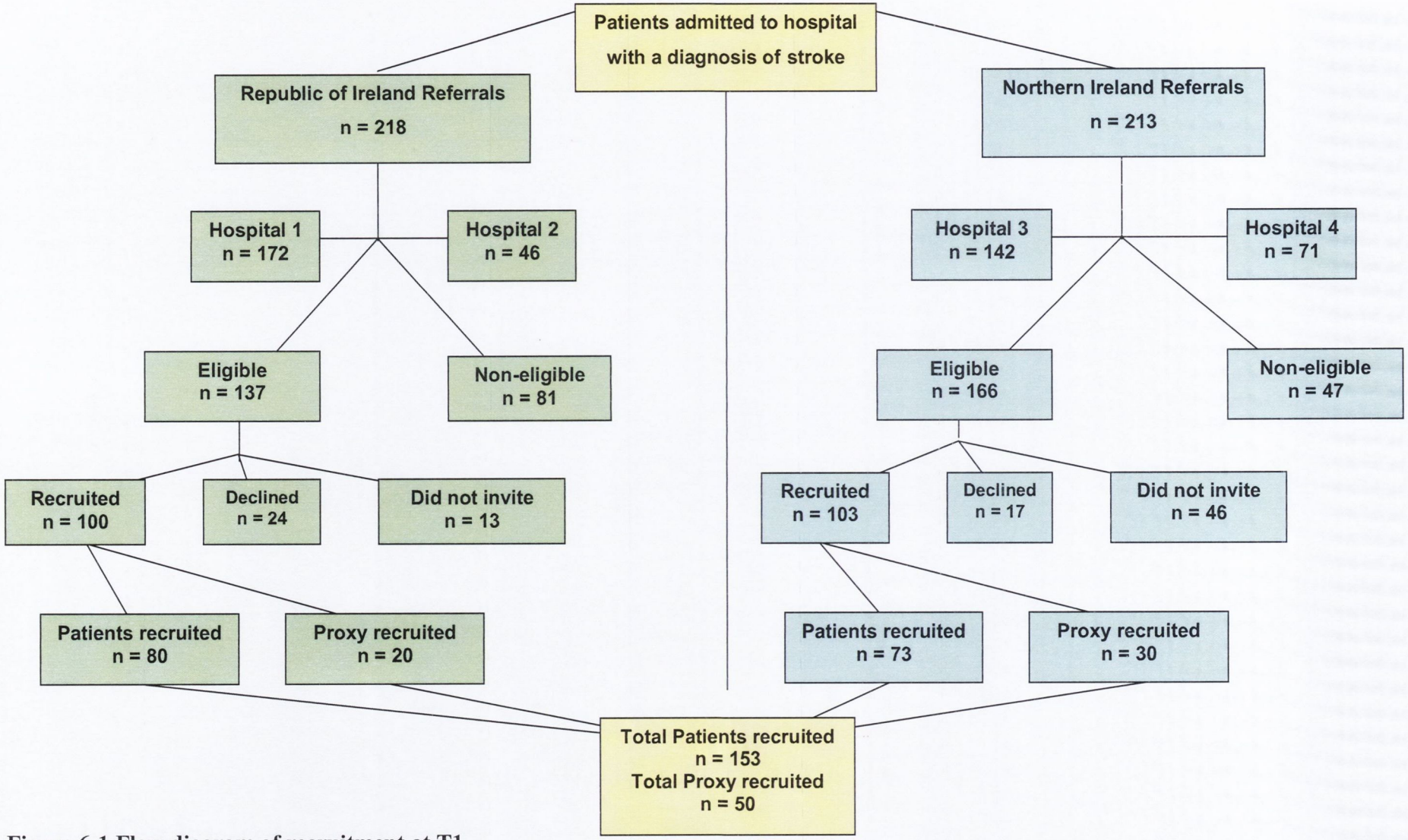


Figure 6-1 Flow diagram of recruitment at T1

6.1.1 Sample description

Demographic characteristics of the study's sample are provided in Table 6.2. This table also presents descriptive data for both younger (≤ 65 years) and older (>65 years) age groups. The mean age of the total sample was 71 (*SD* = 13.4) years. The sample comprised of a larger percentage of older patients (65%) compared to younger patients. The age range was from 20 to 98 years. One patient was aged 20 years; an outlier in terms of the rest of the sample's age range (35 to 98 years). This participant was not removed from analysis as the participant was eligible in terms of the inclusion criteria and did not act as an outlier in further analysis. There were approximately equal numbers of men and women, and most of the sample was married or widowed, living with others and educated to primary level. The mean age for men was 68 (SD 13.2) years and for women was 74 (SD 12.9) years; this age difference was significant ($t_{(151)}$=-2.70, p<0.01). The sample was divided into a younger and older age group to explore demographic characteristics in more detail. There were more men (67%) than women (33%) in the younger age group and more women (60%) than men (40%) in the older age group. The mean age for the younger group was 56 (SD=8.8) years and for the older group was 78 (SD=8.0) years. There were significant associations between age group and marital status (p<.001), living arrangements (p<0.05) and education (p<0.001) but not for socio-economic status. A greater proportion of older patients tended to be widowed, live alone and be educated to primary level whereas a greater proportion of younger patients tended to be married, live with others and educated to secondary level.

Table 6-2 Demographic characteristics and age group associations

Demographics	Total sample (n=153) (%)	Younger (n=51) (33%)	Older (n=102) (67%)	(χ^2)
Age range	20-98	20-64	65-98	
Gender				8.85**
Male	75 (49)	34 (67)	41 (40)	
Female	78 (51)	17 (33)	61 (60)	
Marital status				28.59***
Married	63 (41)	30 (59)	33 (32)	
Separated/Divorced	17 (12)	11 (22)	6 (6)	
Widowed	51 (33)	4 (8)	47 (46)	
Single	22 (14)	6 (12)	16 (16)	
Living arrangements				7.54*
Alone	56 (37)	12 (23)	44 (44)	
With others	94 (61)	40 (75)	54 (54)	
Other (Residential care/Nursing Home)	3 (2)	1 (2)	2 (2)	
Education				8.75**
Primary	80 (52)	19 (37)	61 (60)	
2nd Level	59 (38)	28 (55)	31 (30)	
3rd level	14 (10)	4 (8)	10 (10)	
Socio-economic status (SES)				.41
Manual	70 (46)	25 (49)	45 (44)	
Other social classes (self-employed/non manual)	78 (51)	24 (47)	54 (53)	
Not known	5 (3)	2 (4)	3 (3)	

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Clinical details of the sample are presented in Table 6-3. The majority of patients had an ischaemic stroke (95%) with more than half of the sample (55%) having a partial anterior communication infact (PACI). There were significant age group differences ($p<.05$) for stroke type and lesion location. A lacunar infarct was more common in older patients whereas a posterior communicating infarct located in the brainstem was more common in younger patients. For the majority of patients this was their first stroke, with 35 patients (23%) having one or more strokes or transient ischaemic attacks (TIA) in their previous medical history. The main co-morbidities were

hypertension, high cholesterol and heart disease which had a significantly higher incidence (χ^2 =5.06, p<.05) in the older patient group.

One in six patients (16%) had either a history of anxiety or depression. Stroke severity, assessed within 14 days of admission, was of mild to moderate severity in almost two-thirds of patients (61%). A majority of patients were functionally dependent, with either a major (42%) (Barthel score < 60) or moderate (34%) (Barthel score < 95) dependency level. There were significant functional status differences (p<.05) between the age groups. Younger patients were functionally more independent compared to older patients. The range of length of hospital stay was very wide with 320 days as an outlier for one patient. If removed, the range of hospital stay was 4 to 219 days. All four hospitals include rehabilitation in hospital following the acute admission stay. Therefore, having extended rehabilitation in hospital may account for the long length of hospital stay.

Table 6-3 Clinical characteristics and age group associations at T1

Variable	Total sample (n=153) (%)	Younger (n=51) (67%)	Older (n=102) (33%)	Statistic
Stroke type				χ^2=9.60*
Ischaemic				
- TACI	11 (7)	2 (4)	9 (9)	
- PACI	84 (55)	29 (57)	55 (54)	
- LACI	33 (22)	7 (14)	26 (25)	
- POCI	16 (10)	10 (20)	6 (6)	
Haemorrhagic (PICH)	7 (5)	2 (4)	5 (5)	
Not known	2 (1)	1 (2)	1 (1)	
Lesion location				χ^2=7.88*
Right sided	78 (51)	29 (57)	49 (48)	
Left sided	64 (42)	15 (29)	49 (48)	
Cerebellum/Brain stem	11 (7)	7 (14)	4 (4)	
Past medical history				
CVA/TIA	35 (23)	11 (22)	24 (23)	χ^2=.07
Heart disease	38 (25)	7 (14)	31 (30)	χ^2=5.06*
Hypertension	72 (47)	21 (42)	51 (50)	χ^2=1.06
Diabetes mellitus	29 (19)	7 (14)	22 (22)	χ^2=1.36
High cholesterol	39 (25)	16 (31)	23 (25)	χ^2=1.39
Anxiety or depression	25 (16)	10 (20)	15 (15)	χ^2=.60
Other co-morbidities	101 (66)	35 (68)	66 (65)	χ^2=.23
Stroke severity				χ^2=.91
Mild to moderate	94 (61)	34 (67)	60 (59)	
Moderate to severe	55 (36)	16 (31)	39 (38)	
Severe to very severe	4 (3)	1 (2)	3 (3)	
Functional status				χ^2=8.23*
Independent	37 (24)	19 (37)	18 (18)	
Dependent				
- Moderately dependent	52 (34)	17 (33)	35 (34)	
- Major dependent	64 (42)	15 (29)	49 (48)	
Length of stay (in days)				
(mean [SD])	50.3 [50.3]	47.4 [46.9]	51.8 [52.2]	t = -.51
Range	4-320	4-176	5-320	

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

The following variables: functional status, stroke severity, living arrangements and marital status were treated as dichotomous variables for the purposes of further

analyses. In relation to functional status, moderate and major dependency groups were combined. In the stroke severity groups, the severe to very severe group consisted of only 3% of the total sample. Therefore stroke severity was transformed into a dichotomous variable by combining the severe to very severe category with the moderate to severe category and reclassifying it as a moderate to very severe category. Living in residential care or a nursing home consisted of only 2% of the total sample, therefore this category was combined with the living with others category. Marital status was regrouped into 2 categories: married versus not married (including the categories separated/divorced, widowed and single).

6.1.2 Description of measures

A detailed description of the measures was given in chapter 5 and table 6.4 provides results of performance of the measures in this study. Overall, the measures used had acceptable psychometric qualities with Cronbach's alpha ranging from .69 to .93. The performance of SOC-15 questionnaire will be discussed under section 6.2.

Table 6-4 Descriptive statistics of measures at T1

Variable (n=153)	Range	Min	Max	M(SD)	α
Stroke severity:					
OPS					.71
- *Motor deficit*	0-1.6	0	1.6	.46 (.52)	
- *Proprioception*	0-1.2	0	1.2	.19 (.32)	
- *Balance*	0-1.2	0	1.2	.31 (.39)	
- *Cognition*	0-1.2	0	1.2	.27 (.24)	
Total OPS	1.6-6.0	1.6	6.0	2.8 (1.1)	
Functional status:					
Barthel Index	0-20	0	20	13.25 (5.70)	.92
Locus of control over recovery:					
RLOC	9-45	23	45	35.8 (5.1)	.75
Perceived social support:					
MSPSS					
- *Significant other*	4-28	4	28	23.9 (6.0)	.94
- *Family*	4-28	4	28	24.1 (5.5)	.92
- *Friends*	4-28	4	28	20.7 (7.0)	.94
Total MSPSS	12-84	12	84	68.6 (15.9)	.94
Depression:					
HADS-D	0-21	0	17	6.0 (4.1)	.69
HRQOL:					
SS-QOL					
Physical function	1-5	1	5	3.3 (1.2)	.92
Language	1-5	2	5	4.2 (.85)	.88
Vision	1-5	1	5	4.4 (.92)	.83
Thinking	1-5	1	5	3.3 (1.1)	.71
Energy	1-5	1	5	2.6 (1.3)	.89
Mood	1-5	1	5	3.2 (1.0)	.80
Role function	1-5	1	5	2.2 (1.0)	.76
Total SS-QOL	1-5	2	5.0	3.3 (.67)	.91
Functional ability:					
NEADL					
Mobility	0-6	0	6	2.8 (2.6)	.95
In the kitchen	0-5	0	5	3.0 (1.9)	.88
Domestic tasks	0-5	0	5	2.5 (1.9)	.86
Leisure activities	0-6	0	6	3.1 (1.5)	.71
Total NEADL	0-22	0	22	11.4 (7.1)	.95

M = Mean, SD = Standard deviation, α = Cronbach's Alpha

6.2 Profile of SOC at T1

The descriptive statistics for SOC at T1 is shown in Table 6.3. The mean scores for the four SOC subscales differed significantly ($F_{(3,456)} = 27.53$, $p<0.001$). Loss-based selection has the highest mean (SD) of 2.8 (1.0) and this was significantly different ($p<0.001$) from elective selection, optimization and compensation mean scores. Optimization had the second highest mean (SD) of 2.4 (1.3) and was significantly different from compensation's mean score. Internal reliability values for optimization and compensationwere moderate and were low for loss-based selection and elective selection. The four individual SOC constructs (elective selection, loss-based selection, optimization and compensation) were examined in terms of frequency of strategy use.

Table 6-5 Descriptive statistics for SOC-15 at T1

SOC Construct	Range	Min	Max	M (SD)	α
Elective selection	0-4	0	4	2.1 (1.1)	.26
Loss-based selection	0-4	0	4	2.8 (1.0)	.32
Optimization	0-4	0	4	2.4 (1.3)	.61
Compensation	0-3	0	3	1.9 (1.0)	.50
Composite SOC	0-15	0	15	9.2 (3.4)	.75

M = Mean, SD = Standard deviation, α = Cronbach's Alpha

The design of the SOC questionnaire i.e. the target-distractor format, on a chance assumption, could lead to the endorsement of 50% of the target (SOC) items and endorsement of 50% of the distractor items. However, over 80% of the sample used at least one strategy from each SOC construct and 5% used all 15 SOC strategies. There was greater endorsement of all loss-based and compensation items compared to elective selection and optimization items (see table 6-4).

Table 6-6 Frequency use of SOC at T1

	Frequency (%) use of strategies				
SOC Construct	*0*	*1*	*2*	*3*	*4*
Elective selection	7.8	20.3	33.3	27.5	11.1
Loss-based selection	1.3	10.5	26.1	32.0	30.1
Optimization	8.5	22.2	20.3	21.6	26.8
Compensation	9.2	26.1	25.5	39.2	_

6.2.1 Use of SOC strategies by different sub groups in the sample at T1

The mean differences in composite SOC and SOC subscales in terms of socio-demographic and resource categories (age group, gender, marital status, living arrangements, education, social class, stroke severity and functional status) were examined. There were no mean differences in the use of SOC strategies among the groups classified according to gender, living arrangements, education and socio-economic status (see table 6.5). There were significant differences in the use of optimization strategies by age group ($t_{(151)}=2.57$, $p<0.05$) and stroke severity ($t_{(151)}=1.99$, $p<0.05$). Younger patients used more optimization strategies compared to older patients as did those with a mild to moderate stroke compared to those with a moderate to very severe stroke. There were significant mean differences in the use of compensation strategies among the groups when compared according to marital status ($t_{(151)}=2.02$, $p<0.05$) and functional status ($t_{(151)}=2.68$, $p<0.01$). Married and functionally dependent patients used more compensation strategies compared to those not married and functionally independent. There were significant differences in the use of composite SOC in terms of marital status ($t_{(151)}=2.21$, $p<0.05$) and stroke severity ($t_{(151)}=2.16$, $p<0.05$). Married patients and those with a mild to moderate stroke used more overall SOC strategies compared to patients not married and with a moderate to very severe stroke. There were no mean differences in any of the groups for the SOC subscales elective selection and loss-based selection.

Table 6-7 Mean (SD) values for SOC among different socio-demographic and resource categories at T1

Variable	Composite SOC	Selection		Optimization	Compensation
		Elective selection	Loss-based selection		
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Gender					
Male	9.3 (3.6)	2.1 (1.2)	2.7 (1.1)	2.5 (1.3)	1.9 (1.1)
Female	9.2 (3.2)	2.2 (1.1)	2.8 (1.0)	2.2 (1.3)	1.9 (0.9)
Age					
< 65 years	9.6 (3.5)	2.2 (1.1)	2.8 (1.0)	**2.7 (1.4)***	1.9 (1.0)
≥ 65 years	9.0 (3.3)	2.1 (1.1)	2.8 (1.1)	**2.2 (1.3)**	2.0 (1.0)
Marital status					
Married	**9.9 (3.0)***	2.3 (1.0)	3.0 (0.9)	2.5 (1.2)	**2.1 (1.0) ***
Not married	**8.7 (3.5)**	2.0 (1.1)	2.6 (1.1)	2.2 (1.3)	**1.8 (1.0)**
Living arrangements					
Live alone	8.6 (3.6)	2.0 (1.1)	2.7 (1.0)	2.1 (1.4)	1.8 (1.1)
Live with others	9.6 (3.2)	2.2 (1.1)	2.8 (1.0)	2.5 (1.2)	2.0 (1.0)
Education					
Primary	9.3 (3.6)	2.2 (1.1)	2.8 (1.0)	2.4 (1.3)	2.0 (1.1)
Secondary	9.3 (3.3)	2.1 (1.1)	2.8 (1.1)	2.5 (1.3)	1.9 (0.9)
3rd level	8.3 (2.1)	2.0 (1.1)	2.9 (0.8)	1.9 (1.3)	1.5 (0.9)
Socio-economic status					
Manual	9.5 (3.5)	2.1 (1.2)	2.8 (.09)	2.5 (1.3)	2.0 (1.1)
Other social classes	9.2 (3.3)	2.2 (1.3)	2.7 (1.1)	2.3 (1.3)	1.9 (1.0)
Stroke severity					
Mild to Moderate	**9.7 (3.2)***	2.5 (1.1)	2.9 (1.0)	**2.5 (1.3)***	2.0 (1.0)
Moderate to very severe	**8.5 (3.5)**	1.9 (1.1)	2.6 (1.0)	**2.1 (1.3)**	1.9 (1.0)
Functional Status					
Independent	8.9 (3.5)	2.1 (1.1)	2.8 (1.1)	2.4 (1.5)	**1.6 (1.0) ** **
Dependent	9.3 (3.3)	2.1 (1.1)	2.8 (1.0)	2.3 (1.3)	**2.1 (1.0)**

*$p \leq .05$, ** $p \leq .01$

6.2.2 SOC and its associations with socio-demographics and resources at T1

The relationships between SOC and all independent variables (age, gender, resources – internal and external) and SOC subscales are summarized in Table 6-6. The SOC subscale items all correlated significantly with each other and with composite SOC ($p<.001$). Significant positive correlations were seen between age and gender for marital status and negative correlations for living arrangements ($p<.001$). Older female patients tended to live alone and were not married. Age also correlated negatively and significantly with functional status (r=-.22, $p<.01$) and recovery locus of control (r=-.19, $p<.05$). Younger patients were functionally more independent and had a higher recovery locus of control over recovery compared to older patients. Recovery locus of control over recovery also correlated significantly and negatively with stroke severity (r=-.28, $p<.001$) and positively with functional status (r=.18, $p<.05$), elective selection (r=.19, $p<.05$), loss-based selection (r=.35, $p<.001$), optimization (r=.40, $p<.001$), compensation(r=.21, $p<.01$) and composite SOC (r=.39, $p<.001$). Patients with a higher recovery locus of control over recovery had milder strokes, were functionally more independent and used more of all the SOC strategies. Perceived social support correlated significantly and negatively with marital status (r=-.28, $p<.001$) and positively with living arrangements (r=.28, $p<.001$). Married patients living with others perceived their social support to be higher compared to those not married and living alone.

Multiple linear regression models were developed to examine the associations between internal and external resources and SOC subscales, and also composite SOC independently. The socio-demographic factors age and gender were entered at the first step to control for any effect these variables may have on resources. External resources marital status and socio-economic status were entered at step 2 only. Living arrangements and education were not included in the regression models because these variables were considered as proxies for marital status and socio-economic status. The internal resources of stroke severity, recovery locus of control over recovery and perceived social support were entered at step 3. Functional status was not included in the SOC regression models because it correlated highly (r=-.71, $p<.01$) with stroke severity and it did not have any association with SOC at a univariate level. This

sequence was adopted to determine the contribution of internal resources after socio-demographic variables including external resources were accounted for.

Table 6-8 Correlations between age, gender, resources (internal and external) and SOC at T1

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	-													
2. Gender	.21**	-												
3. Marital status	.28***	.37***	-											
4. Living arrangements	-.31***	-.25***	-.61***	-										
5. Education	-.10	.07	.06	-.09	-									
6. Socio-economic status	-.08	-.12	-.14	.15	-.42***	-								
7. Stroke severity	.08	. 10	.10	-.02	-.14	.08	-							
8. Functional status	-.22**	-.12	-.19*	.09	.09	-.04	-.71***	-						
9. Recovery locus of control	-.19*	-.05	-.13	. 09	.10	-.12	-.28***	.18*	-					
10. Perceived social support	.09	-.12	-.28***	.28***	.14	.02	-.09	.12	.06	-				
11. Elective selection	.01	.05	-.12	.07	-.04	-.08	-.12	.07	.19*	.09	-			
12. Loss-based selection	-.09	.03	-.16	.07	.03	-.01	-.11	.03	.35***	.07	.37***	-		
13. Optimization	-.13	-.11	-.10	.15	-.07	.01	-.17*	.11	.40***	.08	.43***	.44***	-	
14. Compensation	-.01	.01	-.16*	.12	-.12	-.01	-.07	.03	.21**	.10	.35***	.41***	.52***	-
15. Composite SOC	-.08	-.02	-.18*	.14	-.07	-.03	-.16*	.09	.39***	.11	.71***	.72***	.82***	.74***

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 6-9 Summary of Hierarchical Regression Analysis explaining SOC subscale scores at T1

	Elective selection			Loss-based selection			Optimization			Compensation			Composite SOC		
	ß	**R^2**	**Adj R^2**	**ß**	**R^2**	**Adj R^2**	**ß**	**R^2**	**Adj R^2**	**ß**	**R^2**	**Adj R^2**	**ß**	**R^2**	**Adj R^2**
Step 1		.003	-.01		.01	.000		.02	.01		.001	-.01		.01	-.01
Age	-.01			-.11			-.13			-.03			-.10		
Gender	.06			.06			.06			.01			.02		
Step 2		.03	.001		.04	.01		.03	.01		.03	.01		.04	.01
Marital status	-.18			-.18			-.05			-.20			-.19*		
Social class	.03			-.04			-.05			.01			-.01		
Step 3		.07	.03		.15**	.11**		.18***	.14***		.08	.03		.19***	.14***
Stroke severity	-.10			-.06			-.06			-.01			-.08		
Recovery locus of control	.17			.32***			.37***			.21*			.36***		
Perceived social support	.05			.02			.06			.05			.06		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, Adj = adjusted

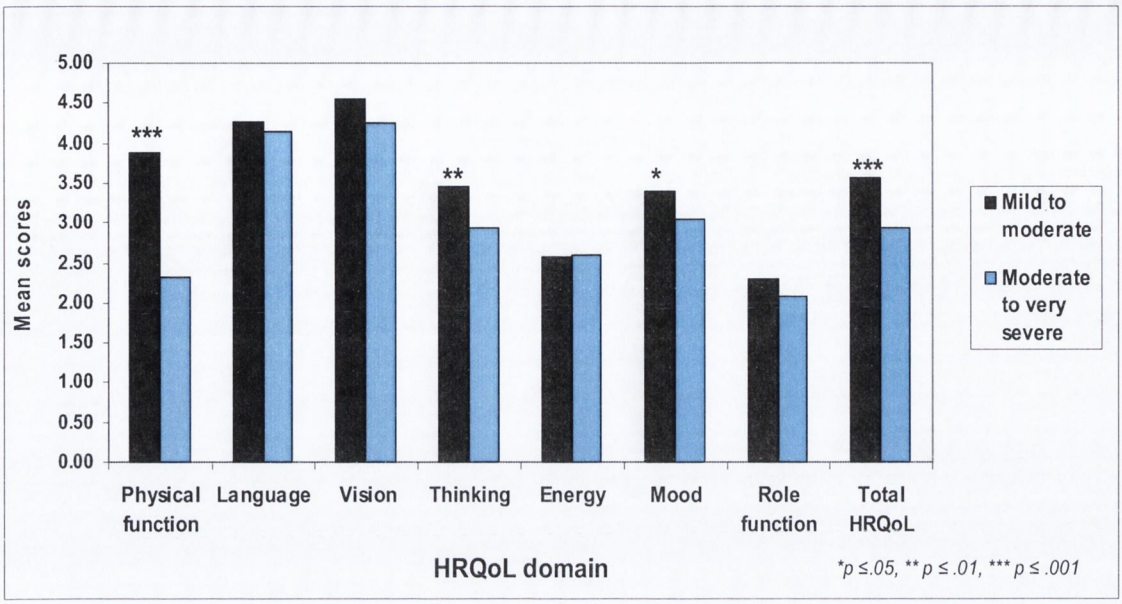
Table 6.7 displays the standardised regression coefficients (β), R^2 and adjusted R^2 after entering all variables for the four SOC subscales. The overall regression model only explained 3% in elective selection scores and was not significant ($F_{(7,139)}=1.67$, $p=.12$). None of the co-efficients explained any significant variance in elective selection. Recovery locus of control over recovery almost reached significance (β=.17, $p=.056$). In the context of loss-based selection, the overall regression model explained 11% in loss-based selection scores and was significant ($F_{(7,139)}=3.53$, $p<.01$). Recovery locus of control over recovery was the only significant variable (β=.32, $p<.001$) in the loss-based selection model. The overall regression model for optimization explained 14% of the variance and was significant ($F_{(7,139)}=4.30$, $p<.001$). Recovery locus of control over recovery was the only significant variable (β=.37, $p<.001$) that explained some of the variance in optimization. The regression model for compensation was similar to the loss-based selection and optimization models in that recovery locus of control over recovery explained some variance in the SOC subscale (β=.21, $p<.05$) while all other variables were not significant. The overall regression model for compensation explained only 3% of the variance and was not significant ($F_{(7,139)}=1.71$, $p=.11$). For composite SOC, marital status (β=.-.19, $p<.05$) and recovery locus of control over recovery (β=.36, $p<.001$) were significant variables to explain some of its variance and the overall model was significant ($F_{(7,139)}=4.54$, $p<.001$) accounting for 14% of the variance in composite SOC scores.

6.3 Profile of HRQOL at T1 and association with SOC

6.3.1 HRQOL scores by different sub groups in the sample at T1

The overall HRQOL scores were average for the entire sample in terms of rating HRQOL at T1 with the domains role function and energy rated as fair to average. The domains language and vision were rated as good. Mean differences were then examined in total HRQOL and the seven domains (physical function, language, vision, thinking, energy, mood and role function) scores across the different subgroups within the sample (age, gender, marital status, living arrangements, socio-economic status, education, stroke severity and functional status). There were no significant differences in the individual HRQOL domains and total HRQOL scores in terms of age group, marital status, living arrangements and socio-economic status. Both younger and older men and women reported their total HRQOL to be similar as

did those married or not married. However women did have a significantly higher HRQOL score for the domain language ($F_{(1,151)}$=4.67, p<.05). Married patients ($F_{(1,151)}$=4.48, p<.05) and those with a third level education as shown by post hoc analyses ($F_{(2,150)}$=6.19, p<.01) had significantly higher HRQOL scores for the domain role function than those not married and educated to primary or secondary level. Living arrangements and socio-economic status showed no significant difference in HRQOL scores reported. There were significant differences in some of the individual HRQOL domains and total HRQOL within groups when comparisons based on stroke severity and functional status were conducted (see Figure 6.1). Patients with a mild to moderate stroke reported higher HRQOL for the domains physical function ($F_{(1,151)}$=104.57, p<.001), thinking ($F_{(1,151)}$=7.16, p<.01), mood ($F_{(1,151)}$=4.01, p<.05) and total HRQOL ($F_{(1,151)}$=37.46, p<.001). Functionally independent patients reported higher HRQOL for the domains physical function ($F_{(1,151)}$=32.11, p<.001), role function ($F_{(1,151)}$=8.42, p<.01) and total HRQOL ($F_{(1,151)}$=17.63, p<.001).



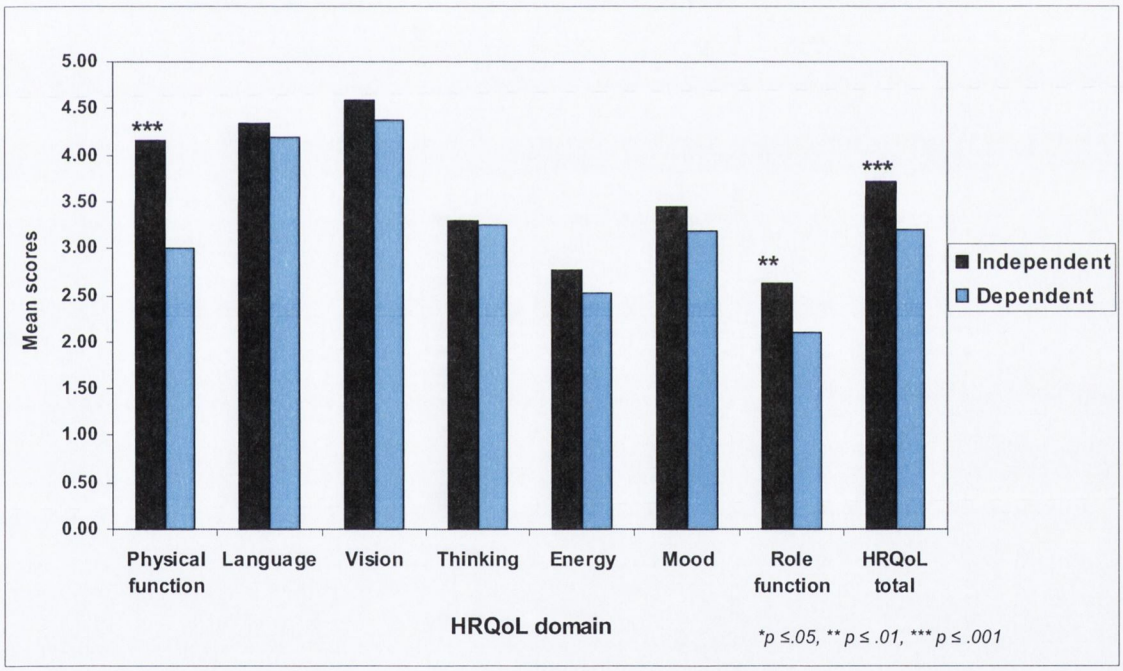


Figure 6-2 Mean differences in HRQOL domains by stroke severity and dependency

6.3.2 SOC use and its association with HRQOL at T1 (Hypothesis 1a)

Correlational analyses showed significant relationships between HRQOL and depression (r=-.54, p<.001), recovery locus of control over recovery (r=.29, p<.001) and the SOC subscale optimization (r=.21, p<.01). Patients with lower levels of

depression, a higher recovery locus of control over recovery and using more optimization strategies tended to have significantly higher HRQOL scores. Perceived social support and the SOC strategies elective selection, loss-based selection, compensation and composite SOC did not correlate significantly with HRQOL.

Multiple linear regression model was developed to examine the associations between age, gender, internal and external resources, SOC subscales (also composite SOC independently) and HRQOL. The model followed a similar sequence to the SOC regression models except the socio-demographic factors age, gender and external resources marital status and socio-economic status were all entered at the first step because these variables did not have significant relationships with HRQOL at a univariate level but nevertheless these variables were adjusted for in the multivariate analyses. Depression was controlled for and therefore was entered with internal resources stroke severity, recovery locus of control over recovery and perceived social support at second step. SOC subscales were entered at the final step to determine the contribution of SOC subscales when all other variables of interest were accounted for. Composite SOC was also entered at the final step independently of the SOC subscales to determine its contribution. SOC subscales are displayed as 3a and composite SOC is displayed as 3b in the regression model output (see table 6-10) as both variables were entered separately as final steps to the regression models.

Table 6-10 Summary of Hierarchical Regression Analysis explaining HRQOL scores at T1

Variable	B	SEB	ß	R^2	Adj R^2
Step 1				.02	-.01
Age	.001	.004	.01		
Gender	-.01	.12	-.01		
Marital status	-.14	.13	-.10		
Socio-economic status	.12	.12	.09		
Step 2				.37***	.34***
Depression	-.07	.01	-.44***		
Stroke severity	-.17	.04	-.28***		
Recovery locus of control	.01	.01	.09		
Perceived social support	-.001	.003	-.01		
Step 3a				.38	.33***
Elective selection	-.04	.05	-.06		
Loss-based selection	-.07	.05	-.10		
Optimization	.03	.05	.07		
Compensation	.01	.06	.02		
Step 3b				.37	.33***
Composite SOC	-.01	.01	-.05		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, Adj = adjusted

The unstandardised and standardised regression coefficients (B), SEB, (β), R^2 and adjusted R^2 are displayed in table 6-10 after entering all variables for HRQOL. Age, gender and external resources did not explain any significant variance in HRQOL at the first step. Depression ((β=.-.44, $p<.001$) and stroke severity (β=-.28, $p<.001$) were the significant variables that contributed to explaining 34% of the variance in HRQOL at second step. The addition of SOC subscale variables did not explain any further significant variance in HRQOL at the third step 3a and the overall model was significant ($F_{(12,133)}=6.91$, $p<.001$). Composite SOC also did not explain any further significant variance when entered at third step 3b as an alternative to SOC subscales and the overall model remained significant ($F_{(9,136)}=9.04$, $p<.001$).

6.4 Profile of functional ability and association with SOC at T1

Table 6.10 presents an overview of the individual limitations patients subjectively reported in their functional activities. For mobility, over 50% of patients reported that

they would either required help or could not do these activities alone except for the activity getting in and out of a car (56% reported alone or with difficulty). For kitchen activities, a large number of patients reported that they could manage to feed themselves alone (78%) but less patients could actually perform activities in the kitchen e.g. make a hot drink (58%) or snack (44%) and do the washing up (42%). Patients were actually assessed by occupational therapists whether or not they could perform such tasks in the kitchen at approximately week 3 to 4 following admission. For other task such as getting in and out of a car or managing the garden, patients subjectively indicated whether they could now do these tasks at this early stage of their recovery. For domestic activities, managing one's own money was the only activity a lot of patients could do without help (71%) whereas over 50% of patients either required help or could not do the other activities. For leisure activities, driving (88%) and managing the garden (88%) were the most difficult activities patients were unable to do whereas reading and using the telephone were reported to be less difficult for over 70% of patients.

Table 6-11 Frequency values (%) for individual items in functional ability at T1

	Alone (%)	*Alone with difficulty (%)*	*With help (%)*	*Unable (%)*
Mobility				
Walk outside	29	20	22	29
Climb stairs	27	20	13	40
In and out of car	38	18	21	23
Walk on uneven ground	25	22	15	38
Cross roads	29	14	18	39
Use public transport	29	11	16	44
Kitchen				
Feed self	78	13	5	4
Make hot drink	58	8	9	25
Carry hot drink	43	7	9	40
Do washing up	42	5	11	42
Make hot snack	44	7	11	38
Domestic				
Manage own money	71	5	9	15
Wash small clothes	43	5	10	42
Do housework	23	7	28	42
Do shopping	33	3	21	43
Full clothes wash	41	3	12	44
Leisure				
Read newspaper/book	76	15	1	9
Use telephone	72	17	7	4
Write letters	46	16	7	31
Go out socially	33	6	26	35
Manage garden	13	6	7	74
Drive car	11	1	0	88

6.4.1 Functional ability scores by different sub groups in the sample at T1

Mean differences were examined for the four functional ability domains (mobility, kitchen, domestic and leisure) and total functional ability scores in the different subgroups within the sample (age, gender, marital status, living arrangements, socio-

economic status, education, stroke severity and functional status). There were no significant differences in any of the functional ability domains or total functional ability scores in terms of age group, gender, living arrangements, education and socio-economic status. There was a significant mean difference in the domain 'mobility' when compared according to marital status ($F_{(1,151)}=4.08$, $p<.05$) indicating that married patients reported their performance to be better at this activity compared to those not married. There were significant mean differences in all the functional ability domains and total functional ability when examined by stroke severity (see Figure 6-3) and functional status ($p<.001$). Patients that were more functionally dependent and had a greater stroke severity reported their own performance as significantly poorer compared to more functionally independent patients with a milder stroke severity.

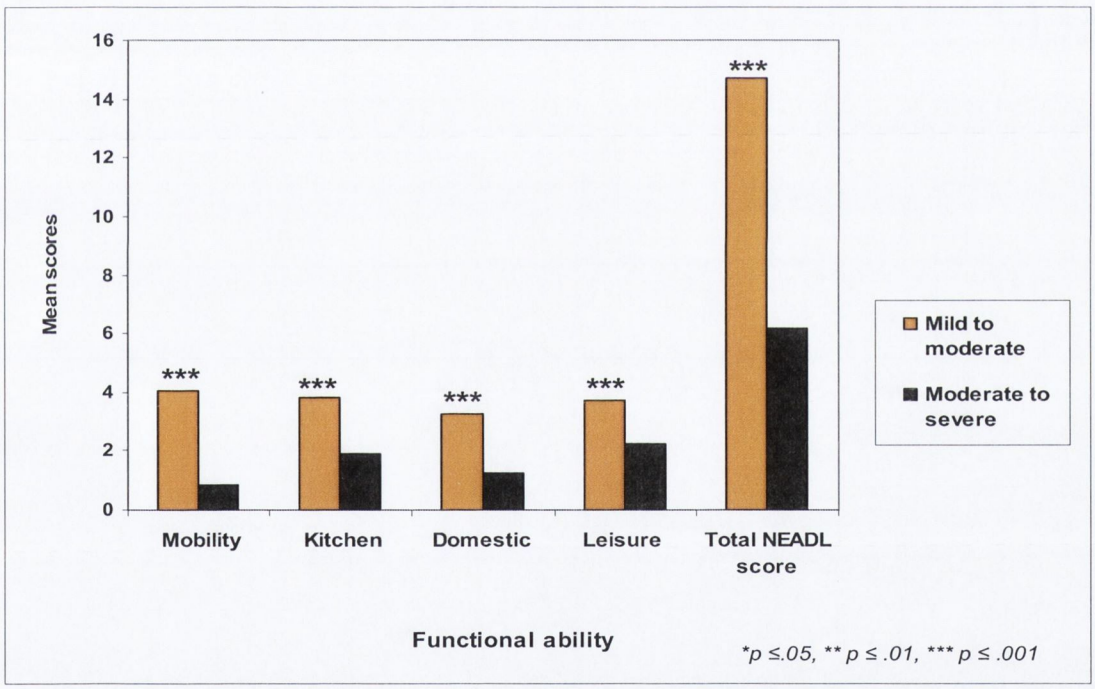


Figure 6-3 Mean differences in functional ability at T1 domains by stroke severity

6.4.2 SOC use and its association with functional ability at T1 (Hypothesis 1b)

Correlational analyses showed significant relationships between functional ability and depression (r=-.30, $p<.001$) and recovery locus of control over recovery (r=.36, $p<.001$). Patients with lower levels of depression and had a higher recovery locus of

control over recovery reported their performance at functional activities to be better compared to those who had higher levels of depression and had a lower recovery locus of control over recovery. None of the SOC subscales, composite SOC and perceived social support correlated significantly with functional ability (p>.05). Multiple linear regression examined the associations between age, gender, internal and external resources, SOC subscales and also composite SOC independently and functional ability. The entry of variables into the model followed a similar sequence to the HRQOL regression model.

Table 6-12 Summary of Hierarchical Regression Analysis explaining functional ability scores at T1

Variable	B	SEB	ß	R^2	Adj R^2
Step 1				.03	.01
Age	-.06	.05	-.11		
Gender	-.72	1.3	-.05		
Marital status	-1.1	1.3	-.09		
Socio-economic status	1.5	1.1	.10		
Step 2				.42***	.39***
Depression	-.18	.12	-.11		
Stroke severity	-3.3	.45	-.51***		
Recovery locus of control over recovery	.25	.10	.18*		
Perceived social support	.04	.03	.09		
Step 3a				.44	.39***
Elective selection	-.19	.48	-.03		
Loss-based selection	-.69	.54	-.10		
Optimization	-.49	.48	-.09		
Compensation	.78	.56	.11		
Step 3b				.43	.39***
Composite SOC	-.16	.15	-.08		

*$p \leq .05$, ** $p \leq .01$, ***$p \leq .001$, Adj = adjusted

The first step of the model with age, gender and external resources entered as variables was not significant. Stroke severity (β=.-.52, p<.001) and recovery locus of control over recovery (β=.18, p<.05) were significant variables that contributed to explaining 42% of the variance in functional ability at step 2. The addition of SOC subscale variables did not explain any further significant variance in functional ability at step 3a and the overall model was significant ($F_{(12,133)}$=8.74, p<.001). Composite

SOC also did not explain any further significant variance when entered at step 3 (b) as an alternative to SOC subscales and the overall model remained significant ($F_{(9,136)}=11.26, p<.001$).

6.5 Profile of depression and association with SOC at T1

6.5.1 Depression levels for different subgroups in the sample at T1

The frequencies for the different depression levels for the entire sample (n=153) at T1 were 65% normal, 21% possible depression and 14% probable depression. The depression levels were then examined across the different sub groups within the sample. There were significant differences between age group and depression categories ($\chi^2=7.58, p<.05$), with significantly a larger number of older patients in the possible and probable depression categories than in the normal category. Stroke severity ($\chi^2=10.22, p<.001$) and functional status ($\chi^2=10.23, p<.001$) were also significantly different in each of the depression categories. There were more patients with moderate to very severe stroke severity and functionally dependent in the possible and probable depression categories (see Figure 6.5). There were no significant differences in depression categories for gender, marital status, living arrangements, socio-economic status or education.

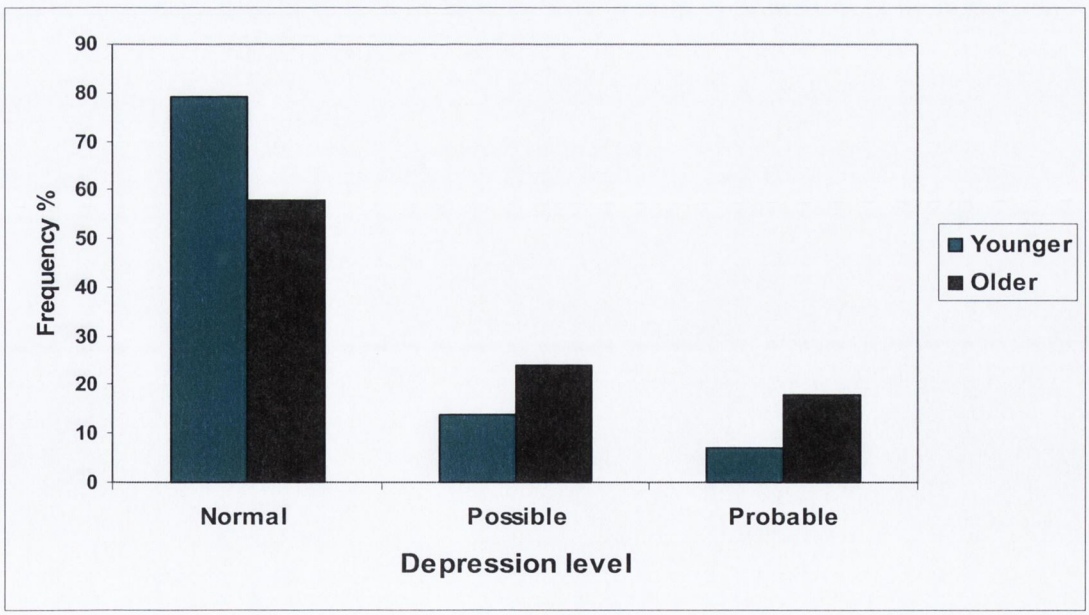


Figure 6-4 Percentage differences in depression by age group

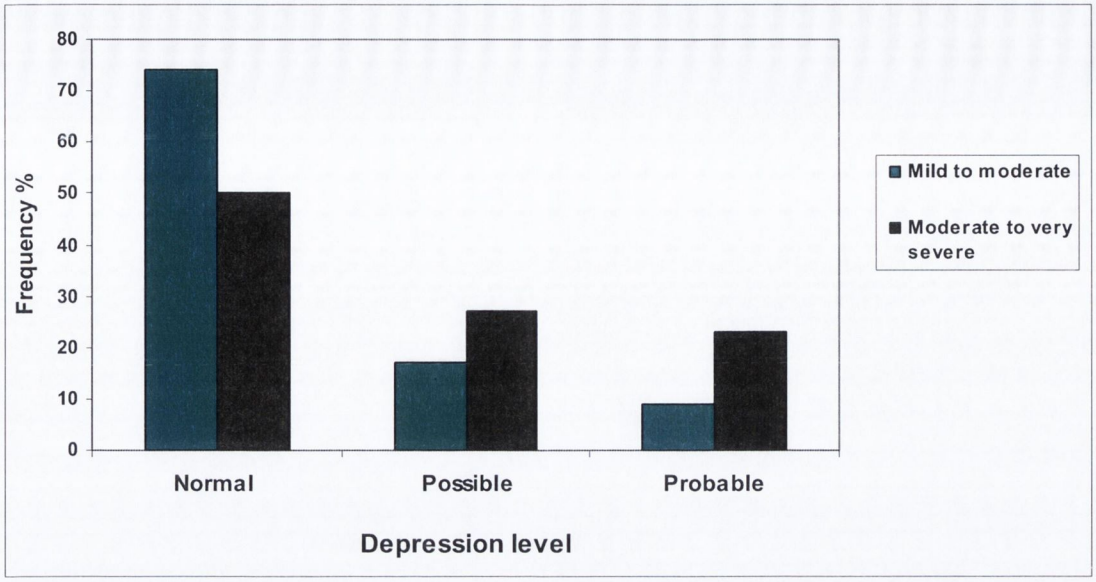


Figure 6-5 Percentage differences in depression for stroke severity group

6.5.2 SOC use and its association with depression at T1 (Hypothesis 1c)

Correlational analyses showed significant relationships between depression and recovery locus of control over recovery (r=-.27, $p<.01$), optimization (r=-.25, $p<.01$) and composite SOC (r=-.20, $p<.05$). Patients with a higher recovery locus of control over recovery and using more optimization and overall SOC strategies were less depressed. The other SOC subscales and perceived social support had no significant relationship with depression. Multiple linear regression examined the associations between age, gender, internal and external resources, SOC subscales and also composite SOC independently and depression.

Table 6-13 Summary of Hierarchical Regression Analysis explaining depression scores at T1

Variable	B	SEB	ß	R^2	Adj R^2
Step 1				.03	-.002
Age	.02	.03	.06		
Gender	.11	.75	.01		
Marital status	.61	.77	.07		
Socio-economic status	-1.10	.69	-.13		
Step 2				.11*	.06**
Stroke severity	.60	.31	.16		
Recovery locus of control	-.17	.07	-.21*		
Perceived social support	.004	.02	-.001		
Step 3a				.14	.07**
Elective selection	.05	.34	.01		
Loss-based selection	-.10	.38	-.02		
Optimization	-.72	.34	-.23*		
Compensation	.28	.39	.07		
Step 3b				.12	.07**
Composite SOC	-.16	.11	-.14		

*$p \leq .05$, ** $p \leq .01$, Adj=adjusted

Table 6-13 displays the unstandardised and standardised regression coefficients (B), (β), R^2 and adjusted R^2 after entering all variables for depression. The entry of variables into the model followed a similar sequence to the HRQOL and functional abilityregression models. The first step of the model did not explain any variance in depression. Recovery locus of control over recovery was a significant variable (β=-.21, $p<.05$) at the second step of the model, explaining 6% of the variance in depression. The SOC subscales entered at the third step (3a) explained only an additional 1% of the variance in depression with optimization as a significant variable (β=-.23, $p<.05$) and the overall model was significant ($F_{(11,134)}=2.04$, $p<.05$). Composite SOC as the third step entry also explained only an additional 1% of the variance in depression but was not significant as a variable and the overall model was significant ($F_{(8,137)}=2.40$, $p<.05$).

6.6 Chapter summary

This chapter examined the results from participants (n=153) within 4 weeks following acute stroke and, in particular, the profile and of SOC at this time point. Overall, there was a high percentage (80%) of SOC strategy use by this stroke sample. Loss-based selection was the most used SOC strategy followed by optimization. There were significant differences in the use of SOC strategies in terms of age, marital status, stroke severity and functional status.

There were significant relationships between recovery locus of control over recovery and SOC (SOC subscales and composite SOC). Recovery locus of control significantly explained some of the variance in the SOC subscales loss-based selection, optimization and compensation and composite SOC. Other socio-demographic factors or resource variables did not explain any significant variance in either the SOC subscales or composite SOC except marital status, which was significant in explaining variance in composite SOC.

Milder stroke severity and functional independence were associated with better HRQOL. SOC subscales or composite SOC were not significant in explaining any of the variance in HRQOL. There were significant relationships between functional activity, depression and recovery locus of control over recovery. However, recovery locus of control over and stroke severity were significant variables in explaining the variance in functional activity. SOC was not significantly associated with functional activity. Depression was significantly associated with age group, stroke severity and functional status. Younger and functionally independent patients with milder strokes were associated with lower depression scores. There were significant relationships between depression and recovery locus of control over recovery, optimization and composite SOC. However, only recovery locus of control over recovery and optimization were significant in explaining some of the variance in depression.

7 Results II: Use of SOC strategies one year after stroke

The aims of this chapter are to present study findings for the second phase of the study at one year after stroke (Time 2 [T2]) and to examine the relationship of SOC strategies with Health Related Quality of Life (HRQOL), functional ability and depression at this time point. This chapter describes the use of SOC strategies by patients one year after their stroke and how other psychological and clinical variables may be associated with their use at this time. Descriptive statistics are used to provide a profile of the sample. SOC is then described both as a composite score and in terms of its separate subscales. Bivariate and hierarchical regression statistical methods are used to analyse the associations of SOC with clinical and psychological variables.

7.1 Patient follow-up results

The T1 sample (n = 153) recruited into the study were followed up one year after the date of the initial stroke. Seventy percent (n=107) of the T1 sample were available for interview at T2. The thirty percent lost to follow-up were as a result of declines (n=21; 14%), mortality (n=14; 9%), unable to complete interview as a result of poor health status (n=9; 6%) and relocated (n=2; 1%) [see Figure 7-1]. The follow-up participants (n=107) were screened for cognitive deficits only at this time point as these participants had no residual language problems following their stroke at T1. All patients interviewed at T2 (n=107) scored 8 or above on the Abbreviated Mental Test (AMT).

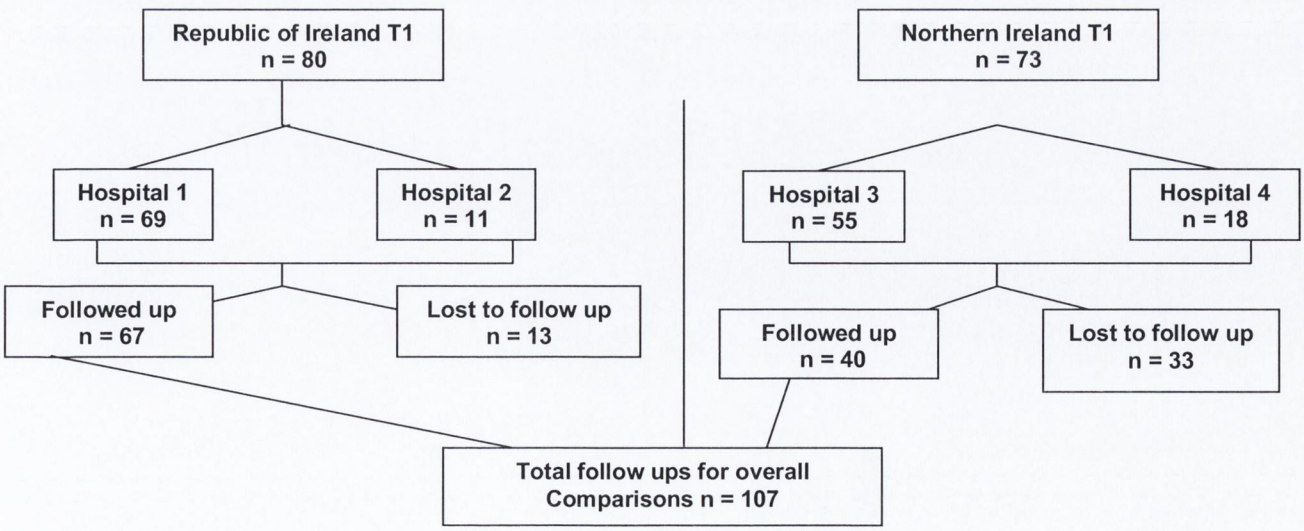


Figure 7-1 Flow diagram of the follow-up of participants at T2

7.1.1 Sample description at T2

Demographic and clinical characteristics of the study sample at T2 are given in table 7-1. The mean age of the sample at T2 was 70 (*SD* = 12.3) years. There were slightly more men (51%) than women (49%), and women (M=73, SD=11.6) were significantly older ($t_{(105)}$=-2.81, p<.05) than men (M=67, SD=12.4). There were significantly more men (68%) in the younger age group and more women (58%) in the older age group (p<.01). The mean age for the younger age group was 57 (SD = 8.65) and 77 (SD = 7.05) for the older age group with no significant gender age differences in either group. 40% of the sample was married and up to 29% were widowed. There were significant age differences in terms of marital status (p<.001), with more older people widowed (43%) compared to younger people (3%) and more younger people married (63%) compared to older people (27%). There were no age differences in the different socio-economic and there was a relatively equal number in each group. Over two thirds of the sample lived with others and there were significant age group differences (p<.001). A larger percentage of older people lived alone (41%) compared to younger people (13%). A relatively small proportion of the sample resided in a nursing home or other residential care (5%). In terms of medical history in the last 12 months, one fifth of the sample experienced a further stroke or TIA and 35% said they had experienced one or more episodes of anxiety and/or depression and 23% were reported to have other additional co-morbidities. There were no age group differences for medical history reported in the last 12 months. Over half the sample was classified as being functionally independent and 45% were functionally dependent with only 13% who had a major dependency. Both younger and older people were comparable in terms of functional status.

Table 7-1 Demographic and clinical characteristics and age group associations at T2

Variable	Total sample (n=107) (%)	Younger (n= 38) (35%)	Older (n= 69) (65%)	(χ^2)
Age range	20-94	20-64	65-94	
Gender				
Male	55 (51)	26 (68%)	29 (42%)	6.83**
Female	52 (49)	12 (32%)	40 (58%)	
Marital status				
Married	43 (40)	24 (63)	19 (27)	35.03***
Not married				
-Separated/Divorced	11 (10)	9 (24)	2 (3)	
-Widowed	31 (29)	1 (3)	30 (43)	
-Single	22 (21)	4 (10)	18 (27)	
Socio-economic status				.54
Manual	54 (50)	21 (55)	33 (48)	
Other social classes (self-employed/non manual)	50 (47)	16 (42)	34 (49)	
Not known	3 (3)	1 (3)	2 (3)	
Living arrangements				10.86**
Alone	33 (31)	5 (13)	28 (41)	
With others	68 (64)	32 (84)	36 (52)	
Other (Nursing home/ residential care)	6 (5)	1 (3)	5 (7)	
Previous medical history in last year of:				
Further CVA/TIA episode	22 (21)	5 (13)	17 (25)	1.81
Anxiety or depression	37 (35)	15 (40)	22 (32)	0.62
Other co-morbidities	25 (23)	10 (26)	15 (22)	0.29
Functional status				3.44
Independent	59 (55)	24 (63)	35 (51)	
Dependent				
-Moderate dependency	34 (32)	12 (32)	22 (32)	
-Major dependency	14 (13)	2 (5)	12 (17)	

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .01$

7.1.2 Description of measures

The internal reliability results presented in table 7-2 shows that the measures had good psychometric qualities with Cronbach's alpha ranging from .75 to .96 at T2.

Table 7-2 Descriptive statistics of measures at T2

Variables	Range	Min	Max	*M* (*SD*)	α
Functional status:					
Barthel Index	0-20	0	20	16.9 (4.6)	.91
Perceived control:					
RLOC	9-45	24	45	35.3 (5.3)	.80
Perceived social support:					
MSPSS					
- *Significant other*	4-28	4	28	23.9 (5.2)	.94
- *Family*	4-28	4	28	23.5 (5.6)	.96
- *Friends*	4-28	4	28	19.2 (6.2)	.94
Total MSPSS	12-84	12	84	66.6 (13.5)	.92
Depression:					
HADS-D	0-21	0	18	6.7 (4.3)	.75
HRQOL:					
SS-QOL					
- *Physical function*	1-5	1	5	3.5 (1.1)	.92
- *Language*	1-5	2	5	4.2 (0.8)	.87
- *Vision*	1-5	1	5	4.6 (0.8)	.86
- *Thinking*	1-5	1	5	3.0 (1.2)	.79
- *Energy*	1-5	1	5	2.4 (1.2)	.89
- *Mood*	1-5	1	5	3.3 (1.0)	.87
- *Role function*	1-5	1	5	2.4 (1.1)	.85
Total SS-QOL	1-5	1.7	5	3.4 (0.7)	.94
Functional ability:					
NEADL:					
Mobility	0-6	0	6	3.9 (2.5)	.94
In the kitchen	0-5	0	5	3.8 (1.7)	.89
Domestic tasks	0-5	0	5	3.0 (2.0)	.89
Leisure activities	0-6	0	6	3.6 (1.8)	.79
Total NEADL	0-22	0	22	14.3 (7.2)	.96

M = Mean, SD = Standard deviation, α = Cronbach's Alpha

7.2 Profile of SOC at T2

The mean scores for the four SOC subscales differed significantly ($F_{(3,318)} = 37.93$, $p<.001$). Loss-based selection has the highest mean (SD) of 2.8 (1.2) and this was significantly different from elective selection ($p<.001$), optimization ($p<.05$) and compensation ($p<.001$) mean scores. Optimization had the second highest mean (SD) of 2.4 (1.4) and this was also significantly different ($p<.05$) from the other SOC subscales. The reliability value for elective selection was low (Cronbach's $\alpha = .34$) but was higher for the other three SOC subscales (see Table 7.3).

Table 7-3 Descriptive statistics for SOC-15 at T2

SOC Construct	Range	Min	Max	*M* (*SD*)	α
Elective selection	0-4	0	4	2.0 (1.1)	.34
Loss-based selection	0-4	0	4	2.8 (1.2)	.55
Optimization	0-4	0	4	2.4 (1.4)	.74
Compensation	0-3	0	3	1.6 (1.1)	.61
Composite SOC	0-15	0	15	8.9 (3.8)	.82

M = Mean, SD = Standard deviation, α = Cronbach's Alpha

The four individual SOC constructs (elective selection, loss-based selection, optimization and compensation) were examined in terms of frequency of strategy use. Almost 80% of the sample used at least one strategy from each SOC construct and 3% used all 15 SOC strategies (see table 7.4). Over one fifth of the sample used no compensation strategies. Loss-based selection and optimization had the highest percentage use of all four strategies.

Table 7-4 Percentage use of SOC strategies at T2

	Frequency (%) use of strategies				
SOC Construct	*0*	*1*	*2*	*3*	*4*
Elective selection	8.4	28.0	24.3	29.9	9.3
Loss-based selection	5.6	8.4	19.6	29.9	36.4
Optimization	14.0	13.1	20.6	17.8	34.6
Compensation	20.6	27.1	23.4	29.0	-

7.2.1 Use of SOC strategies by different sub groups in the sample at T2

T-tests were used to examine mean differences in composite SOC and SOC subscales in terms of socio-demographic and resource categories. There were no mean differences in the use of SOC strategies among the groups classified according to age, gender, marital status, living arrangements, social class and functional status (see table 7.5).

Table 7-5 Mean (SD) values for SOC-15 subscales among different subgroups at T2

Variable	Composite SOC	Selection		Optimization	Compensation
		Elective selection	Loss-based selection		
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Age					
< 65 years	9.6 (3.4)	2.3 (1.1)	3.0 (1.1)	2.6 (1.4)	1.7 (1.1)
≥ 65 years	8.6 (4.0)	1.9 (1.1)	2.7 (1.2)	2.4 (1.5)	1.6 (1.1)
Gender					
Male	9.0 (3.9)	2.0 (1.2)	2.8 (1.2)	2.5 (1.4)	1.6 (1.1)
Female	8.9 (3.7)	2.1 (1.1)	2.8 (1.2)	2.4 (1.5)	1.6 (1.1)
Marital status					
Married	9.0 (3.9)	2.1 (1.1)	2.9 (1.1)	2.5 (1.4)	1.6 (1.1)
Not married	8.9 (3.8)	2.0 (1.2)	2.8 (1.2)	2.4 (1.5)	1.6 (1.1)
Living arrangements					
Live alone	8.8 (3.8)	2.0 (1.1)	2.9 (1.1)	2.4 (1.5)	1.6 (1.2)
Live with others	9.0 (3.8)	2.1 (1.1)	2.8 (1.2)	2.5 (1.4)	1.6 (1.1)
Socio-economic status					
Manual	9.3 (4.1)	2.2 (1.1)	2.9 (1.2)	2.5 (1.4)	1.7 (1.1)
Other social classes	8.7 (3.5)	1.9 (1.2)	2.8 (1.2)	2.5 (1.5)	1.5 (1.1)
Functional Status					
Independent	9.1 (3.6)	2.1 (1.1)	2.9 (1.2)	2.5 (1.4)	1.6 (1.1)
Dependent	8.7 (4.0)	1.9 (1.2)	2.7 (1.1)	2.4 (1.5)	1.6 (1.2)

7.2.2 SOC and its associations with socio-demographics and resources at T2

The relationships between SOC and all independent variables (age, gender, resources – internal and external) are summarized in Table 7-6. The SOC subscale items all

correlated significantly with each other and with composite SOC (p<.001). Significant positive correlations were seen between age and gender for marital status and negative correlations for living arrangements (p<.01). Similar to T1, older women tended to live alone and were not married compared to their younger counterparts and men who tended to be married and live with others. Perceived social support had significant correlations with marital status (r=-.33, p<.001) and living arrangements (r=-.29, p<.01). Married people and those who lived with others perceived their social support to be higher compared to those not married and living alone. Recovery locus of control over recovery correlated significantly with all four SOC subscales: Elective selection (r=.23, p<.05), loss-based selection (r=.24, p<.05), optimization (r=.40, p<.001), compensation(r=.34, p<.001) and composite SOC (r=.39, p<.001). People with a higher recovery locus of control over their recovery used more of all the SOC strategies compared to those with a lower recovery locus of control.

Multiple linear regression models were developed to examine the associations between internal and external resources and SOC subscales and also composite SOC independently. Socio-demographics age and gender were entered at the first step to control for any effect these variables may have on resources (see table 7-5). External resources marital status and socio-economic status were entered at the second step only. Similar to T1 analyses, living arrangements was not included in the regression models because this variable was considered a proxy for marital status. Internal resources functional status, recovery locus of control over recovery and perceived social support were entered at the third step. This sequence was adopted to determine the contribution of internal resources after socio-demographic variables including external resources were accounted for.

Table 7-6 Correlations between age, gender, resources (internal and external) and SOC at T2

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	-											
2. Gender	.23*											
3. Marital status	.31**	.38***										
4. Living arrangements	-.37***	-.24**	-.57***									
5. Socio-economic status	.17	.13	.19	-.21*								
6. Functional status	-.02	-.02	-.05	-.11	.10							
7. Recovery locus of control	-.09	-.02	.01	-.01	.01	.10						
8. Perceived social support	-.11	-.11	-.33***	.29**	-.09	.23*	.09					
9. Elective selection	-.13	.02	-.02	.04	-.12	.06	.23*	.12				
10. Loss-based selection	-.05	-.02	-.04	.02	-.06	.08	.24*	.12	.47***			
11. Optimization	-.04	-.05	-.02	.03	.00	.05	.40***	.09	.52***	.31**		
12. Compensation	-.11	.02	.02	.02	-.08	-.01	.34***	.02	.39***	.49***	.58***	
13. Composite SOC	-.10	-.01	-.02	.03	-.08	.06	.39***	.11	.76***	.75***	.83***	.78***

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 7-7 Summary of Hierarchical Regression Analysis explaining SOC scores at T2

Variable	Elective selection			Loss-based selection			Optimization			Compensation			Composite SOC		
	ß	R^2	Adj R^2	ß	R^2	Adj R^2	ß	R^2	Adj R^2	ß	R^2	Adj R^2	ß	R^2	Adj R^2
Step 1		.02	.001		.01	-.02		.01	-.02		.02	-.01		.01	-.01
Age	-.15			-.05			-.05			-.12			-.11		
Gender	.04			-.01			-.01			.08			.03		
Step 2		.03	-.01		.01	-.03		.01	-.04		.02	-.02		.02	-.02
Marital status	.03			-.03			-.02			.02			-.01		
Social class	-.11			-.05			.01			-.08			-.07		
Step 3		.11*	.04		.07	.01		.17***	.11**		.12*	.06		.18***	.12**
Functional status	.11			.05			.12			-.01			.09		
Recovery locus of control	.23*			.23*			.39***			.32***			.38***		
Perceived social support	.10			.10			.05			-.01			.08		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, Adj = adjusted

Table 7-7 presents the standardised regression coefficients (β), R^2 and adjusted R^2 after entering all variables for the four SOC subscales and composite SOC. In the context of elective and loss-based selection, the overall regression models explained only 4% and 1% of the variance respectively and were not significant. Recovery locus of control over recovery was the only significant variable in both models, (β=.23, $p<.05$). The overall regression model for optimization explained 11% of the variance and was significant (F(7,96)=2.85, $p=.01$). Recovery locus of control over recovery (β=.39, $p<.001$) was the only significant variable at the third step. For Compensation, the overall model explained 6% of the variance in compensation scores and was not significant. Finally, for composite SOC, Recovery locus of control was a significant variable at the third step (β=.38, $p<.001$) and the overall model explained 12% of the variance in composite SOC and was significant (F(7,96)=2.91, $p<.01$). In summary, recovery locus of control accounted for a significant amount of variance in elective and loss-based selection, optimization and composite SOC after controlling for socio-demographic factors, age and gender. The external resources of marital status and socio-economic status, and internal resources perceived social support and functional status were not significant in the regression models for any of the SOC subscales or composite SOC.

7.3 Profile of HRQOL at T2 and association with SOC

7.3.1 HRQOL scores by different sub groups in the sample at T2

The overall HRQOL scores were average for the entire sample in terms of rating HRQOL at T2 with the domains role function and energy rated as fair to average. The domains language and vision were rated as good. Mean differences were examined between the seven domains (physical function, language, vision, thinking, energy, mood and role function), total HRQOL scores and the different subgroups within the sample (age, gender, marital status, living arrangements, socio-economic status and functional status). There were no significant differences in the individual HRQOL domains and total HRQOL scores for age and marital status. There were significant gender and living arrangement differences for the HRQOL domain vision ($p<.05$) and also living arrangement differences for the HRQOL domain language ($p<.01$). Men rated their HRQOL better for the domain vision (M=4.7, SD=0.49) compared to women (M=4.5, SD=1.0). Individuals living alone (M=4.7, SD=0.60) rated their

HRQOL for the domain language as better in comparison to those living with others (M=4.1, SD=0.79), whereas individuals living with others rated their HRQOL better for the domain vision. There were significant differences between the HRQOL domain physical function based on socio-economic status (SES). Those with higher SES rated their physical function to be better (M=3.7, SD= 1.0) than those with lower SES (M=3.3, SD = 1.1). In relation to functional status and HRQOL, there were significant differences for the domains physical function ($F_{(1,105)}$=90.39, p<.001), language ($F_{(1,105)}$=5.87, p<.05), thinking ($F_{(1,105)}$=4.04, p<.05), mood ($F_{(1,105)}$=7.98, p<.01), role function ($F_{(1,105)}$=12.64, p=.001) and total HRQOL ($F_{(1,105)}$=40.16 p<.001) (see Figure 7-2). Functionally independent individuals rated their HRQOL overall to be better than those functionally dependent.

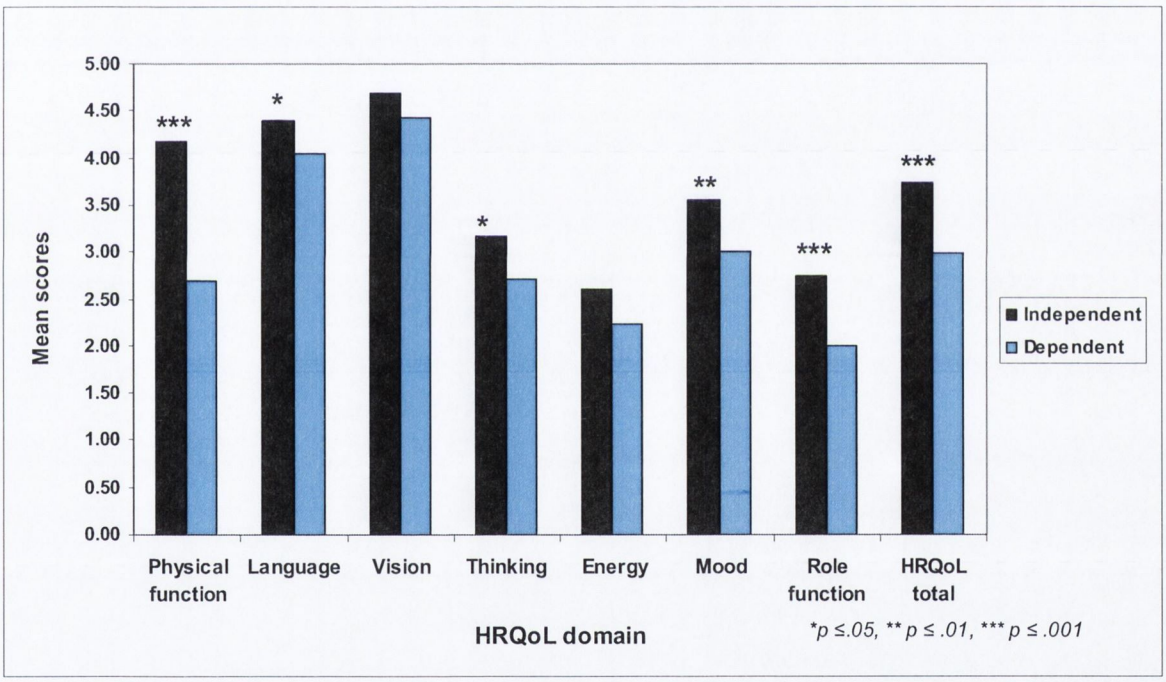


Figure 7-2 Mean differences in HRQOL domains by functional status group

7.3.2 SOC use and its association with HRQOL at T2 (Hypothesis 2a)

Correlational analyses showed significant relationships between depression (r=-.73, p<.001), recovery locus of control over recovery (r=.24, p<.05), the SOC subscale optimization (r=.22, p<.05) composite SOC (r=.20, p<.05) and HRQOL at T2. Individuals that were not depressed, had a higher recovery locus of control over

recovery and who used more optimization and SOC strategies overall tended to have a significantly higher HRQOL. Perceived social support and the SOC strategies elective selection, loss-based selection and compensation did not correlate significantly with HRQOL.

Multiple linear regression model was developed similar to the HRQOL model at T1 to examine the associations between age, gender, internal and external resources, SOC subscales and also composite SOC independently, with HRQOL at T2. Socio-demographics age, gender and the external resources marital status and socio-economic status were all entered at the first step. Region was also included at the first step because of regional differences between HRQOL scores (see Table 7.5). Depression was controlled for and therefore was entered with the internal resources of functional status, recovery locus of control over recovery and perceived social support at the second step. SOC subscales were entered at the final step to determine the contribution of SOC subscales to the overall regression model when all other variables of interest were accounted for. Composite SOC was also entered at the final step independently of the SOC subscales to determine its contribution. SOC subscales are displayed as 3a and composite SOC is displayed as 3b in the regression model output (see table 7-8), as both variables were entered separately as final steps to the regression models.

Table 7-8 Summary of Hierarchical Regression Analysis explaining HRQOL scores at T2

Variable	B	SEB	ß	R^2	Adj R^2
Step 1				.04	-.01
Age	.01	.01	.01		
Gender	-.08	.16	-.05		
Marital status	.05	.16	.04		
Socio-economic status	.27	.15	.18		
Step 2				.68***	.66***
Depression	-.09	.01	-.56***		
Functional status	.06	.01	.37***		
Recovery locus of control	.01	.01	.10		
Perceived social support	.004	.003	.07		
Step 3a				.70	.66***
Elective selection	.03	.05	.05		
Loss-based selection	.05	.04	.08		
Optimization	.01	.04	.03		
Compensation	-.03	.05	-.04		
Step 3b				.69	.66***
Composite SOC	.01	.01	.09		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, Adj = adjusted

Table 7-8 displays the unstandardised and standardised regression coefficients (B), (β), R^2 and adjusted R^2 after entering all variables for HRQOL. Depression (β=-.56, $p<.001$) and functional status (β=.37, $p<.001$) contributed significantly to the model at the second step explaining 66% of the variance in HRQOL. SOC subscales did not explain any variance in the model and the overall model was significant ($F_{(12,91)}=17.34$, $p<.001$). When composite SOC was entered as a separate third step, the overall model was significant ($F_{(9,94)}=23.38$, $p<.001$) although composite SOC itself did not add significantly to the model.

7.4 Profile of functional ability at T2 and association with SOC

Table 7-9 presents an overview of the individual limitations in functional activities. For mobility activities, less than half of participants can do these activities alone. Using public transport (31%) and climbing stairs (22%) were the most difficult activities to do alone or without help. For kitchen activities, the majority of participants can manage to feed themselves alone (92%), make a hot drink (80%) or snack (72%). For domestic activities, doing the shopping was the most difficult activity to do alone (32%). For leisure activities, driving (74%) and managing the garden (54%) were the most difficult activities, which a majority of participants were unable to do.

Table 7-9 Frequency values (%) for individual items in functional activities at T2

	Alone (%)	*Alone with difficulty (%)*	*With help (%)*	*Unable (%)*
Mobility				
Walk outside	43	30	12	15
Climb stairs	37	30	11	22
In and out of car	46	25	20	9
Walk on uneven ground	36	28	18	18
Crossroads	36	24	22	18
Use public transport	39	14	16	31
Kitchen				
Feed self	80	12	4	4
Make hot drink	64	16	4	16
Carry hot drink	56	12	6	26
Do washing up	57	12	3	28
Make hot snack	61	11	6	22
Domestic				
Manage own money	67	9	11	12
Wash small clothes	50	10	13	27
Do housework	30	12	32	26
Do shopping	42	7	19	32
Full clothes wash	50	6	15	29
Leisure				
Read newspaper/book	74	10	3	13
Use telephone	77	15	2	6
Write letters	54	12	3	31
Go out socially	50	6	25	19
Manage garden	28	9	8	54
Drive car	25	1	0	74

7.4.1 Functional ability scores by different sub groups in the sample at T1

Mean differences were examined for the four functional ability domains (mobility, kitchen, domestic and leisure) and total functional ability scores within the different subgroups of the sample at T2 (age, gender, marital status, living arrangements, socio-economic status and functional status). There were significant differences between

age group and the functional ability domains mobility ($F_{(1,105)}$=6.22, p<.05) and leisure ($F_{(1,105)}$=6.14, p<.05) (see Figure 7.3). Younger participants had higher levels of mobility (M=4.7, SD=2.1) and leisure (M=4.2, SD= 1.5) functional activities compared to older participants (M=3.4, SD=2.6 and M=3.3, SD=1.9) respectively. The mean differences between total functional ability based on age group just reached significance (p=.05). There were significant differences in ability to do kitchen activities based on living arrangements ($F_{(1,105)}$=4.84, p<.05). Participants living alone (M=4.3, SD= 1.4) had higher scores for kitchen activities compared to those living with others (M=3.6, SD= 1.8). There were significant mean differences in all the functional ability domains and total functional ability based on functional status (p<.001). Participants that were more functionally dependent reported their own performance as significantly poor compared to the more functionally independent participants.

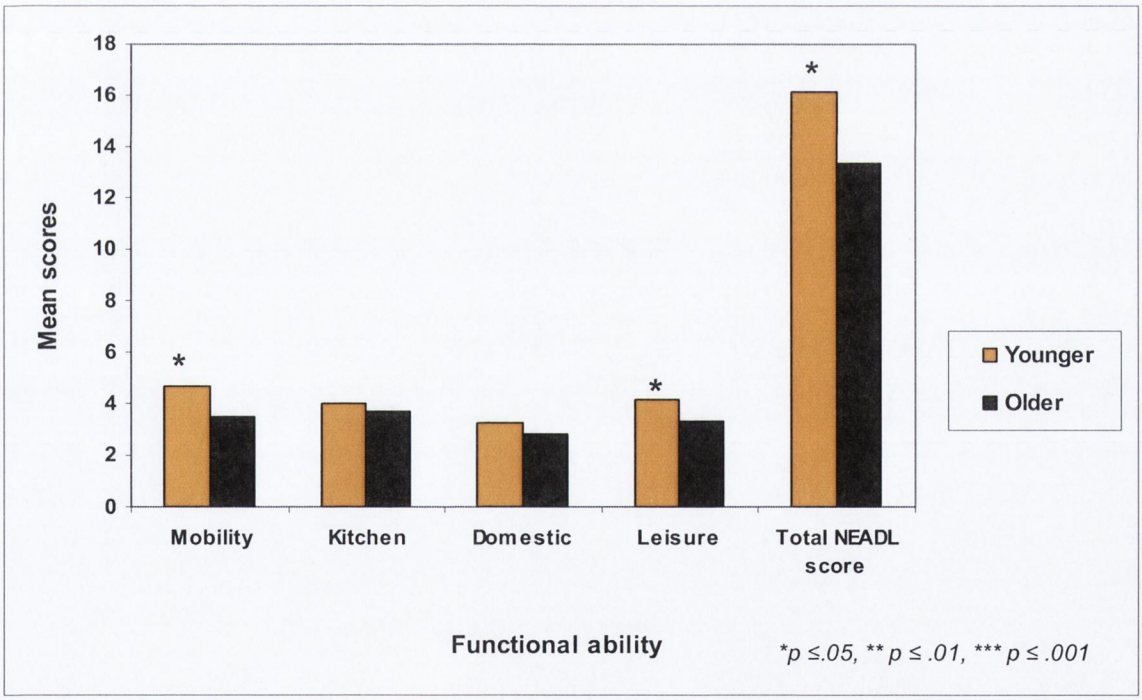


Figure 7-3 Mean differences in functional ability at T2 domains by age group

7.4.2 SOC use and its association with functional ability at T2 (Hypothesis 2b)

Correlational analyses showed significant relationships between functional ability and depression (r=-.51, $p<.001$), recovery locus of control over recovery (r=.28, $p<.01$), the SOC subscale optimization (r=.29, $p<.01$) and composite SOC (r=.23, $p<.05$). Participants that were not depressed, had a higher recovery locus of control over recovery, used more optimization and overall SOC strategies had higher functional ability levels compared to those who were more depressed, had a lower recovery locus of control over recovery and used less optimization and overall SOC strategies. Perceived social support and the SOC subscales elective selection, loss-based selection and compensation did not have significant relationships with functional ability.

Multiple linear regression examined the associations between age, gender, internal and external resources, SOC subscales and also composite SOC independently and functional ability at T2. The entry of variables into the regression model followed a similar sequence to the functional ability model at T1. The socio-demographic factors age and gender, and the external resources marital status and socio-economic status were all entered at the first step, and the internal resources functional status, recovery locus of control over recovery and perceived social support at the second step. SOC subscales were entered at the final step to determine the contribution of SOC subscales when all other variables of interest were accounted for. SOC subscales and composite SOC were entered separately as final steps to the regression models (SOC subscales are displayed as 3a and composite SOC is displayed as 3b in the regression model output - see table 7-10)

Table 7-10 Summary of Hierarchical Regression Analysis explaining functional ability scores at T2

Variable	B	SEB	ß	R^2	Adj R^2
Step 1				.05	.01
Age	-.08	.06	-.14		
Gender	-.42	1.5	-.03		
Marital status	-.04	1.6	-.003		
Socio-economic status	2.7	1.4	.19		
Step 2				.68***	.65***
Depression	-.32	.11	-.19**		
Functional status	1.09	.10	.67***		
Recovery locus of control	.32	.08	.23***		
Perceived social support	.03	.03	.06		
Step 3a				.70	.66***
Elective selection	-.55	.46	-.09		
Loss-based selection	-.02	.43	-.01		
Optimization	.78	.41	.16		
Compensation	.19	.50	.03		
Step 3b				.68	.65
Composite SOC	.14	.12	.08		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, Adj=adjusted

Table 7-10 displays the unstandardised and standardised regression coefficients (B), (β), R^2 and adjusted R^2 after entering all variables for functional activities. Depression, RLOC and functional status added significantly to the model at the second step accounting for 65% of the variance in functional ability. Functional status added significantly to this model as participants tended to rate their level of functional ability in accordance with their actual functional status. It was important to control for functional status in order to estimate what SOC contributed to functional ability. Although SOC subscales or composite SOC did not explain any additional variance, the overall models were significant ($F_{(12,91)}=17.38$, $p<.001$) and ($F_{(9.94)}=22.47$, $p<.001$) respectively.

7.5 Profile of depression and association with SOC at T2

7.5.1 Depression levels for different subgroups in the sample at T2

The frequencies for the different depression levels for the entire sample (n=107) at T2 were 64% normal, 15% possible depression and 21% probable depression. The depression levels were then examined across the different sub groups within the sample. There were no significant differences between age group, gender, marital status, living arrangements, socio-economic status and depression levels. There were significant differences in depression levels for functional status (χ^2 =14.01, p<.001). There were more functionally dependent individuals in the possible and probable depression categories (see Figure 7-4).

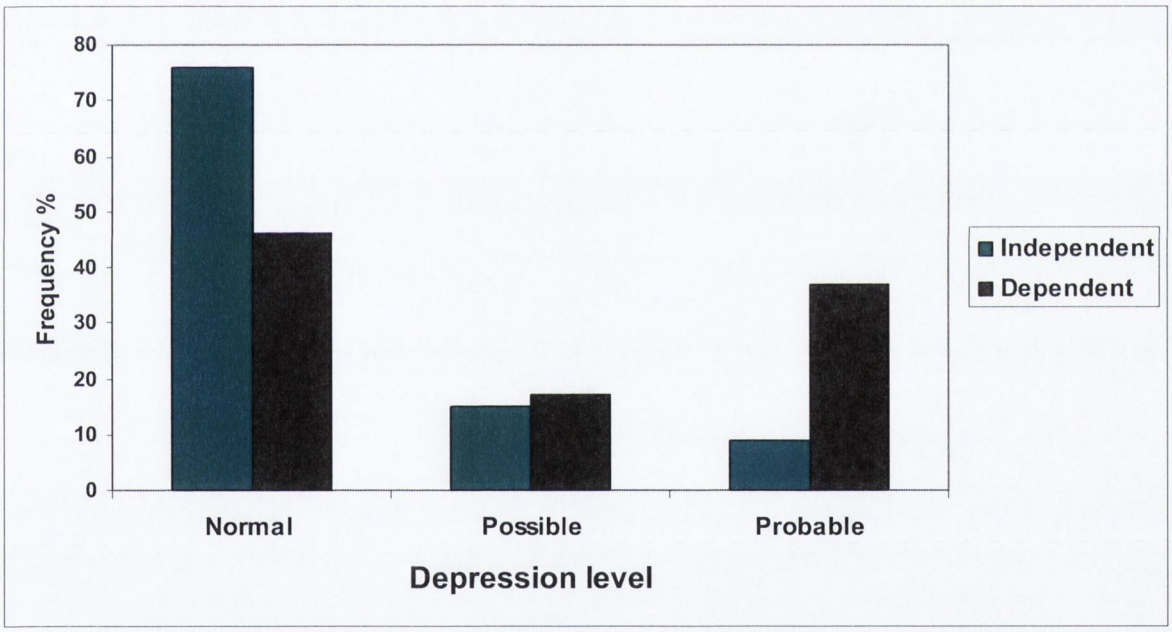


Figure 7-4Percentage differences in depression by functional status at T2

7.5.2 SOC use and its association with depression at T2 (Hypothesis 2c)

Correlational analyses showed significant relationships between depression and recovery locus of control over recovery (r=-.26, p<.01), perceived social support (r=-.24, p<.05), and composite SOC (r=-.20, p<.05). Individuals with a higher recovery locus of control over recovery and higher perceived social support were found to have significantly lower depression levels. SOC subscales had no significant relationship with depression.

Multiple linear regression examined the associations between age, gender, internal and external resources, SOC subscales and also composite SOC independently and depression at T2. The entry of variables into the regression model followed a similar sequence to the depression model at T1. Socio-demographic factors age and gender, and the external resources marital status and socio-economic status were all entered at the first step, and the internal resources functional status, recovery locus of control over recovery and perceived social support at the second step. SOC subscales were entered at the final step to determine the contribution of SOC subscales when all other variables of interest were accounted for. Composite SOC was also entered at the final step independently of the SOC subscales to determine its contribution. SOC subscales and composite SOC were entered separately as final steps to the regression models (SOC subscales are displayed as 3a and composite SOC is displayed as 3b in the regression model output - see table 7-11)

Table 7-11 Summary of Hierarchical Regression Analysis explaining depression scores at T2

Variable	B	SEB	ß	R^2	Adj R^2
Step 1				.01	-.03
Age	.01	.04	.03		
Gender	-.27	.94	-.03		
Marital status	-.71	.99	-.08		
Socio-economic status	.13	.88	.01		
Step 2				.26***	.20***
Functional status	-.35	.09	-.37***		
Recovery locus of control	-.18	.07	-.23*		
Perceived social support	-.08	.03	-.26**		
Step 3a				.27	.18***
Elective selection	.02	.43	.01		
Loss-based selection	-.35	.40	-.10		
Optimization	-.19	.38	-.06		
Compensation	.43	.46	.11		
Step 3b				.26	.19***
Composite SOC	-.05	.11	-.04		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, Adj=adjusted

Table 7-11 displays the unstandardised and standardised regression coefficients (B), (β), R^2 and adjusted R^2 after entering all variables for depression. Functional status (β=-.37, $p<.001$), recovery locus of control (β=-.23, $p<.05$) and perceived social support (β=-.26, $p<.01$) were significant variables at the second step accounting for 20% of the variance in depression. SOC subscales or composite SOC did not explain any additional variance in the model. When SOC subscales were included at the third step (3a), the overall model was significant ($F(11,92)=3.06$, $p<.01$). Composite SOC as a separate entry at the third step (3b) also resulted in an overall model that was significant ($F(8,95)=4.11$, $p<.001$) accounting for 19% of the variance in depression.

7.6 Chapter summary

This chapter examined the results from the data of participants (n=107) at one year following stroke and in particular the profile and role of SOC at this time point. In general, there were no age or gender differences in the use of SOC strategies but participants with elevated depression scores tended to use less of these strategies. Recovery locus of control over recovery was the main significant variable to be associated with SOC and explained significant amounts of the variance for three of the SOC subscales (elective and loss-based selection, and optimization), and composite SOC.

Participants who were functionally independent reported having a higher HRQOL compared to those that were dependent. There were significant positive relationships between the SOC subscales elective selection and optimization, and composite SOC, with HRQOL, but SOC did not explain any of the variance in HRQOL.

For everyday functional activities, a relatively large number of participants were unable to do tasks such as shopping, managing the garden and driving. Older participants experienced more difficulty in performing functional activities generally. Participants who had higher recovery locus of control over recovery scores and used optimization strategies had higher levels of functional activities. Depression, recovery locus of control over recovery and functional status explained most of the variance in functional activity. SOC subscales or composite SOC did not explain any additional variance in functional activity.

There were more functionally dependent individuals in the higher depression categories Recovery locus of control over recovery, perceived social support and functional status were significantly associated with depression and explained most of the variance in depression. SOC subscales or composite SOC did not significantly explain any variance in depression.

The third chapter of results (chapter 8) will examine the changes in SOC and other variables from one month to one year after stroke. It will then address the predictive value of SOC strategies in determining functional outcome, HRQOL and depression one year after stroke

8 Results III: Use of SOC strategies from one month to one year after stroke

The aim of this results chapter is to relate findings at one month to outcomes at one year after stroke and to determine the predictive value of SOC strategies in determining HRQOL, functional ability and depression one year after stroke.

8.1 Patient recruitment and follow-up summary

Analyses in this chapter are based on the data from the sample who participated at T1 and were followed up at T2 (n=107). The thirty percent lost to follow up (n=46) were only included in the analyses examining the representativeness of the follow-up sample to T1. A summary of recruitment and follow-up is displayed in Figure 8-1.

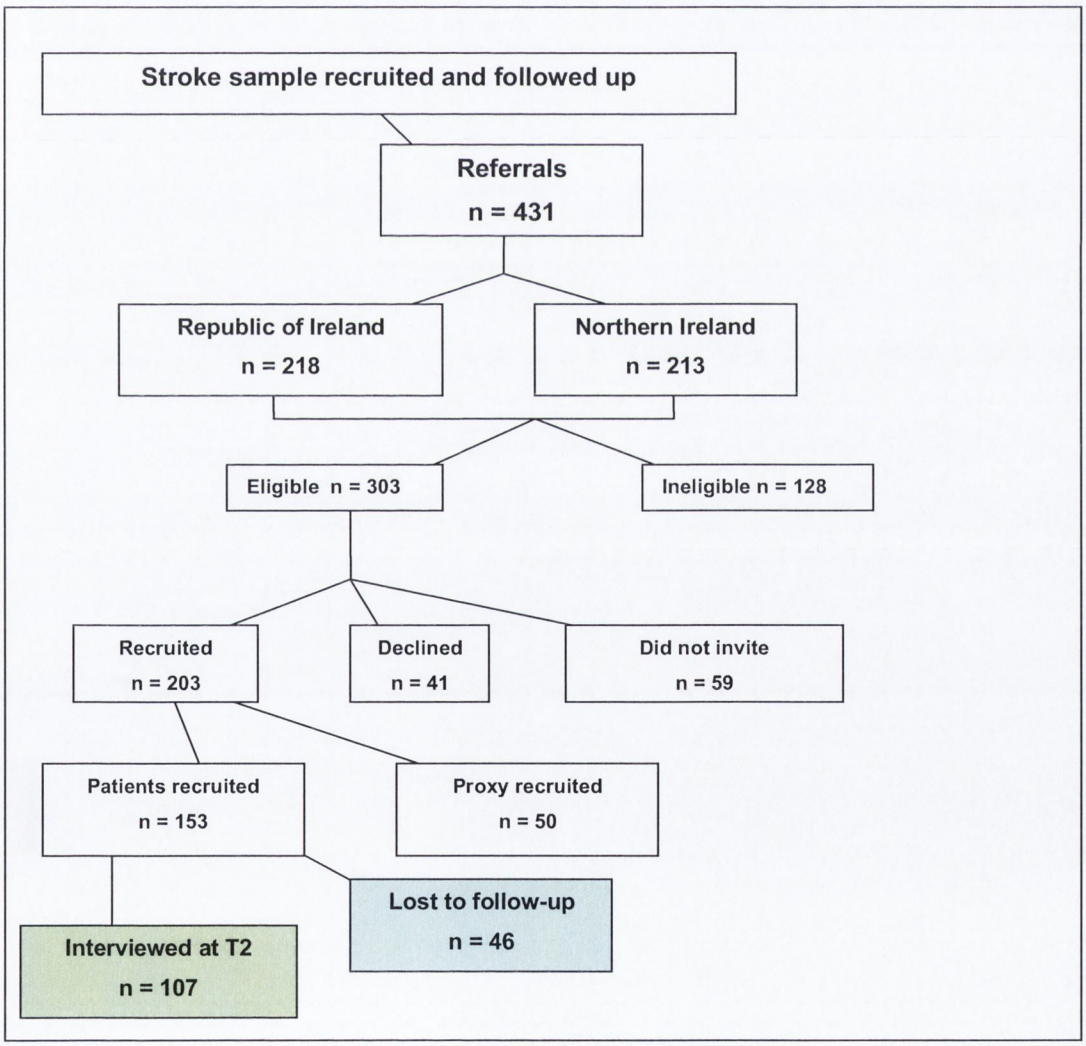


Figure 8-1 Flow diagram of summary of recruitment at T1 and Follow-up at T2

8.1.1 Comparing the sample followed up to the sample not followed up

In order to assess how representative the sample interviewed at T2 was of the sample recruited at T1, differences were examined between the sample that participated at T1 that were followed up at T2 and the sample that participated at T1 not followed up at T2. Differences between demographic and health-related variables were examined. Chi-square tests were used to compare differences in participation for categorical variables i.e. region, marital status, living arrangements, education and stroke severity groups. Independent t-tests were conducted for continuous variables i.e. age, functional status, SOC subscales, composite SOC, HRQOL, functional ability and depression.

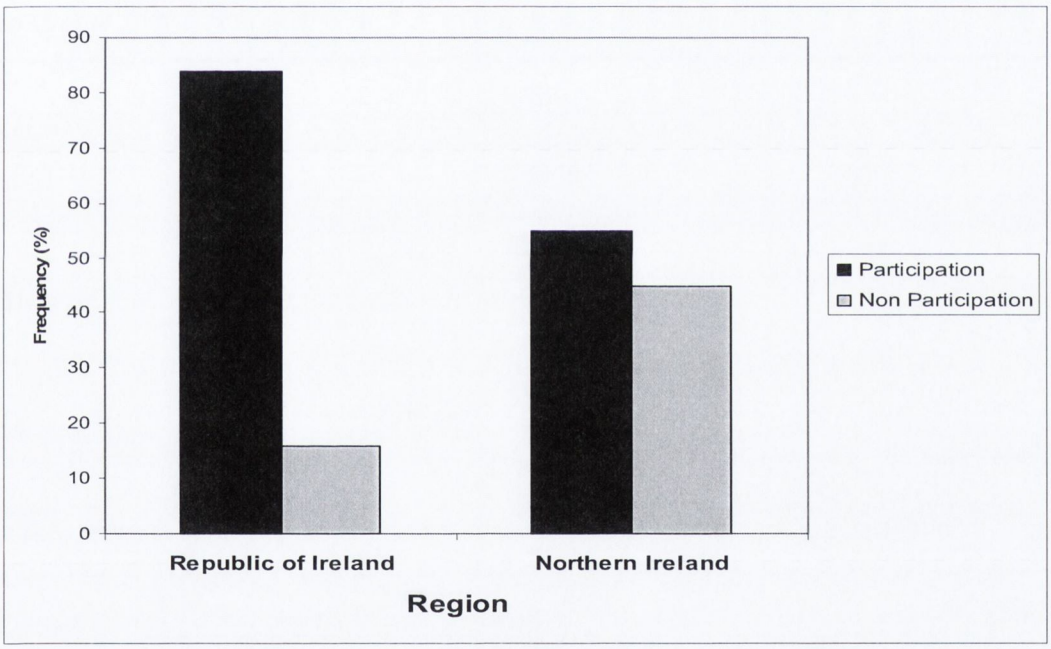


Figure 8-2 Regional differences for participation

There was a significant relationship between region and participation (χ^2 = 15.22, p<.001) (see Figure 8.2). Of those participants who were not interviewed at T2 (n=46), 45% were from NI compared to 16% from ROI. There were no differences in those who participated compared to those who did not participate at T2 in terms of marital status (married v's not married) (χ^2 = 1.99, p=.158), living arrangements (χ^2 = 2.32, p =.128), education (χ^2 = 1.33, p=.513) and stroke severity (mild-moderate v's moderate-very severe) (χ^2 = .671, p = .413). There were no significant differences in

participation in terms of age ($t_{(151)}$=1.44, p<.15) but there were significant differences in terms of functional status ($t_{(151)}$=-2.18, p<.03). Patients who did not participate at T2 tended to have poorer functional status compared to patients who did participate. There were no significant mean differences in participation based on SOC subscales, composite SOC, HRQOL, functional ability and depression (p>.05).

8.2 Reliability results of SOC-15

Cronbach's alpha for each of the SOC subscales at T1 were below an acceptable level for internal consistency ($\alpha \geq .7$) (see Table 8-1). However at T2, the internal consistency for elective selection (α = .34) remained very low at T2 and ranged from α = .55-74 for the other SOC subscales. Composite SOC had better internal consistency at T1 (α = .75) and T2 (α = .82) compared to the individual SOC subscales. Because Cronbach's alpha was very low for elective (at T1 and T2) loss-based selection (at T1), these two subscales were combined to form a single selection construct to examine its internal consistency. The Cronbach's alpha for a single selection construct was α = .50 at T1 and α = .63 at T2.

Table 8-1 Internal reliability results of SOC-15

SOC Construct	Range	T1	T2	Cronbach's alpha (α)	
		M (SD)	M (SD)	T1 (n=153/107)	T2 (n=107)
Elective selection	0-4	2.1 (1.1)	2.0 (1.1)	.26/.25	.34
Loss-based selection	0-4	2.8 (1.0)	3.0 (1.3)	.32/.34	.55
Optimization	0-4	2.4 (1.3)	2.4 (1.4)	.61/.56	.74
Compensation	0-3	1.9 (1.0)	1.6 (1.1)	.50/.47	.61
Composite SOC	0-15	9.2 (3.4)	9.1 (3.8)	.75/.75	.82

8.3 Comparisons of SOC and other variables at T1 and T2 (Hypothesis 3)

There were no significant mean differences for composite SOC and the SOC subscales from T1 to T2 except for the SOC subscale compensation ($t(106) = 2.20$, $p<.05$) (see Table 8-1). Compensation strategies were used less frequently at one year after stroke in comparison to their use within the first 4 weeks. There were significant mean differences between all of the functional ability domains and total functional ability from T1 to T2 (see Table 8-2). There was a significant improvement in all functional ability domains and total functional ability from one month to one year after stroke. There were no significant mean differences for HRQOL from T1 to T2 except for the domain of thinking ($t(106) = 2.68$, $p<.01$). Participants reported significantly poorer HRQOL in terms of memory and concentration in general at one year after stroke compared to the first 4 weeks (see Table 8-2).

Table 8-2 Comparison of outcome variables at T1 and T2

Variable	M (SD) T1	M (SD) T2	t-statistic
HRQOL			
SS-QOL:			
- Physical function	3.3 (1.2)	3.5 (1.1)	-1.83
- Language	4.2 (0.8)	4.2 (0.8)	-.21
- Vision	4.4 (0.9)	4.6 (0.8)	-1.68
- Thinking	3.3 (1.1)	3.0 (1.2)	2.68**
- Energy	2.6 (1.3)	2.4 (1.2)	.65
- Mood	3.2 (1.0)	3.3 (1.0)	-.68
- Role function	2.2 (1.0)	2.4 (1.1)	-.34
Total SS-QOL	3.3 (0.7)	3.4 (0.7)	-.93
Functional ability			
NEADL:			
Mobility	2.8 (2.6)	3.9 (2.5)	-3.31***
In the kitchen	3.0 (1.9)	3.8 (1.7)	-3.53***
Domestic tasks	2.5 (1.9)	3.0 (2.0)	-2.73**
Leisure activities	3.1 (1.5)	3.6 (1.8)	-2.47*
Total NEADL	11.4 (7.1)	14.3 (7.2)	-3.58***
Depression:			
HADS-D	6.0 (4.1)	6.7 (4.3)	-1.63

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

There was no significant mean difference in depression from T1 to T2. Depression was also examined in terms of the 3 categories normal, possible and probable to investigate any differences from T1 to T2. There was a significant association between depression category and time point ($\chi 2 = 31.00$, $p < .001$). The probable category increased from 13% at T1 to 22% at T2. However there were no significant mean differences in the probable category from T1 to T2. When possible and probable categories were combined together and the combined mean differences examined from T1 to T2, there were no significant mean differences between these two combined categories (possible and probable).

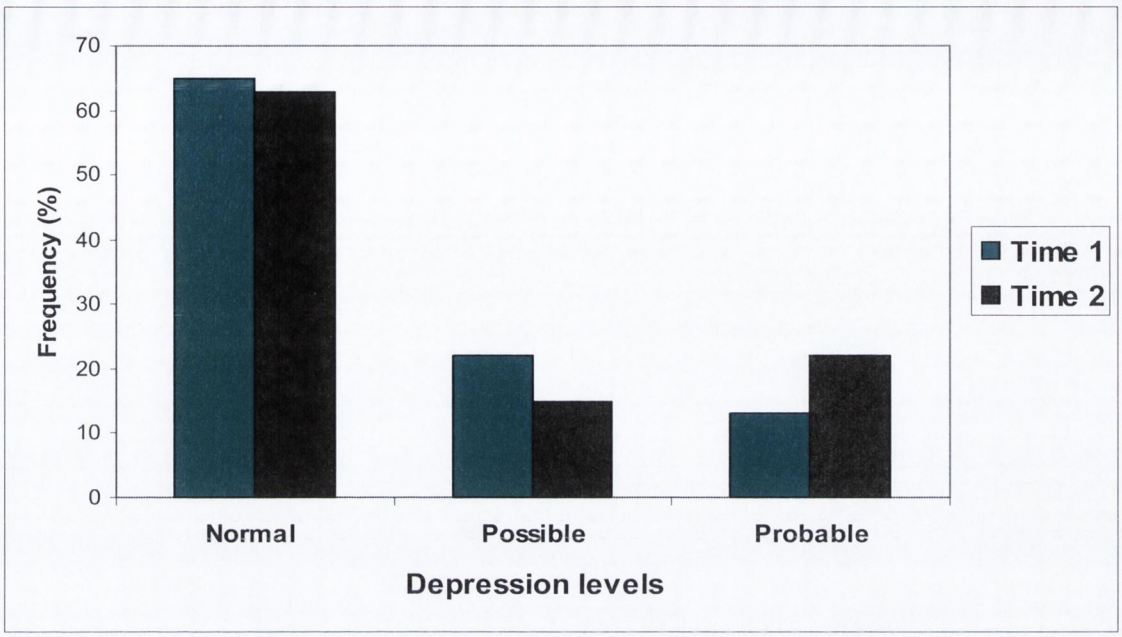


Figure 8-3 Percentage differences in depression at T1 and T2

8.4 Predictive value of SOC at one month in determining outcome one year after stroke

Hierarchical multiple linear regression models were developed to examine the predictive value of SOC in determining HRQOL, functional ability and depression one year after stroke. The models followed a similar sequence in that age, gender and external resources marital status and socio-economic status were all entered at the first step. For each model, the relevant outcome variable at T1 was also controlled for at the first step i.e. HRQOL at T1, functional ability at T1 and depression at T1. Internal resources stroke severity and recovery locus of control over recovery were entered at the second step. Depression at T1 was controlled for in the HRQOL and functional abilitymodels and therefore was also entered at the second step in these two models. SOC subscales were entered at the final step to determine its predictive value when all other variables of interest were accounted for. Composite SOC was also entered as a separate final step entry independent of the SOC subscales. SOC subscales are displayed as step 3a and composite SOC is displayed as step 3b in the regression

models' outputs (see tables 8-3, 8-4 and 8-5), as both variables were entered separately as final steps to the regression models.

8.4.1 Predictive value of SOC at T1 in determining HRQOL one year after stroke (Hypothesis 4a)

Correlational analyses showed significant relationships between HRQOL at T2 and HRQOL at T1 ($r=.62$, $p<.001$), depression at T1 ($r=-.41$, $p<.001$) and stroke severity ($r=-.30$, $p<.01$). HRQOL at one year after stroke was associated with a higher HRQOL at T1, lower depression levels at T1 and a milder stroke. Recovery locus of control, SOC subscales or composite SOC within 4 weeks after stroke were not significantly associated with HRQOL one year after stroke in univariate analyses. The regression analysis for HRQOL showed that socio-economic status ($\beta=.21$, $p<.05$) and HRQOL at T1 ($\beta=.62$, $p<.001$) were significant predictors at the first step of the model explaining 38% of the variance in HRQOL one year after stroke. The variables entered at the second and third step were not significant predictors of HRQOL one year after stroke although the overall model remained significant after the SOC subscales were entered ($F_{(12,90)}=6.25$, $p<.001$) at the third step and when composite SOC was entered as a separate third step entry ($F_{(9,93)}=8.12$, $p<.001$).

Table 8-3 Summary of Hierarchical Regression Analysis predicting HRQOL scores

Variable	B	SEB	ß	R^2	Adj R^2
Step 1				.41***	.38***
Age	-.003	.005	-.04		
Gender	.003	.13	.002		
Marital status	-.10	.13	-.07		
Socio-economic status	.23	.12	.21*		
HRQOL at T1	.65	.08	.62***		
Step 2				.44	.39***
Depression at T1	-.02	.02	-.10		
Stroke severity	.07	.06	-.10		
Recovery locus of control at T1	-.02	.01	-.15		
Step 3a				.45	.38***
Elective selection at T1	.07	.06	.11		
Loss-based selection at T1	.01	.07	.02		
Optimization at T1	-.06	.06	-.11		
Compensation at T1	-.03	.07	-.05		
Step 3b				.44	.39***
Composite SOC at T1	-.005	.02	-.02		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, Adj=adjusted

8.4.2 Predictive value of SOC in determining functional ability one year after stroke (Hypothesis 4b)

Correlational analyses showed significant relationships between functional ability at T2 and functional ability at T1 (r=.46, $p<.001$), depression at T1 (r=-.19, $p<.05$) and stroke severity (r=-.38, $p<.001$). Functional ability one year after stroke was associated with a milder stroke severity, lower depression levels and better functional ability one month after stroke. Recovery locus of control, SOC subscales or composite SOC one month after stroke did not have a significant relationship with functional ability one year after stroke. The regression analysis for functional ability showed that socio-economic status (β=.18, $p<.05$) and functional ability at T1 (β=.48, $p<.001$) were significant predictors at the first step of the model explaining 24% of the variance in functional ability one year after stroke. The variables entered at the second

and third step were not significant predictors of functional ability one year after stroke although the overall model remained significant after the SOC subscales were entered ($F_{(12,90)}$=3.40, p<.001) at the third step and when composite SOC was entered as a separate third step entry ($F_{(9,93)}$=4.41, p<.001).

Table 8-4 Summary of Hierarchical Regression Analysis predicting functional ability scores

Variable	B	SEB	ß	R^2	Adj R^2
Step 1				.27***	.24***
Age	-.08	.05	-.15		
Gender	.75	1.39	.05		
Marital status	-1.39	1.4	-.10		
Socio-economic status	2.58	1.27	.18*		
Functional ability at T1	.49	.08	.48***		
Step 2				.30	.24***
Depression at T1	-.04	.17	-.02		
Stroke severity	-.12	.67	-.17		
Recovery locus of control at T1	-.11	.14	-.07		
Step 3a				.31	.22***
Elective selection at T1	.72	.69	.11		
Loss-based selection at T1	.01	.76	.002		
Optimization at T1	-.13	.69	-.02		
Compensation at T1	-.64	.78	-.09		
Step 3b				.30	.23***
Composite SOC at T1	-.001	.21	.001		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

8.4.3 Predictive value of SOC in determining depression one year after stroke (Hypothesis 4c)

Correlational analyses showed significant relationships between depression at T2 and depression at T1 (r=.50, p<.001), stroke severity (r=.30, $p \leq .001$), recovery locus of control at T1 (r=-.22, p<.05), HRQOL at T1 (r=-.50, p<.001) and functional ability at T1 (r=-.29, p<.01). Depression one year after stroke was associated with presence of depression, greater stroke severity, lower recovery locus of control, poorer HRQOL and poorer functional ability one month after stroke. The regression analysis for depression showed that depression at T1 was a significant predictor (β=.49, p<.001)

but there were no other significant predictors at any of the three steps in the model. However, the overall model was significant after the SOC subscales were entered ($F_{(11,91)}=3.32$, $p<.001$) at the third step and when composite SOC was entered as a separate third step entry ($F_{(8,94)}=4.34$, $p<.001$) explaining 20% and 21% of the variance respectively.

Table 8-5 Summary of Hierarchical Regression Analysis predicting depression scores

Variable	B	SEB	ß	R^2	Adj R^2
Step 1				.24***	.20***
Age	.005	.03	.01		
Gender	-.37	.85	-.04		
Marital status	-.48	.87	-.06		
Socio-economic status	.12	.78	.01		
Depression at T1	.53	.10	.49***		
Step 2				.27	.21***
Stroke severity	.61	.37	.16		
Recovery locus of control at T1	-.01	.08	-.02		
Step 3a				.29	.20***
Elective selection at T1	-.49	.41	-.13		
Loss-based selection at T1	.21	.46	.05		
Optimization at T1	.32	.41	.09		
Compensation at T1	.29	.47	.07		
Step 3b				.27	.21***
Composite SOC at T1	.08	.12	.06		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, Adj=adjusted

Table 8-6 Summary of Hierarchical Regression Analysis predicting interactive effects of SOC and age on stroke outcome variables

Variable	HRQOL					Functional ability					Depression				
	B	**SEB**	**ß**	**R^2**	**Adj R^2**	**B**	**SEB**	**ß**	**R^2**	**Adj R^2**	**B**	**SEB**	**ß**	**R^2**	**Adj R^2**
Step 1				.41***	.38***				.25***	.21***				.24***	.21***
Gender	-.02	.12	-.01			.15	1.38	.01			-.40	.82	-.05		
Marital status	-.10	.12	-.07			-1.56	1.41	-.11			-.42	.83	-.05		
Social class	.30	.11	.21			2.49	1.28	.17			.16	.76	.02		
Outcome variable at T1	.59	.10	.57***			.46	.09	.45***			-	-	-		
†Depression at T1	-.01	.02	-.08			-.05	.16	-.03			.53	.09	.49***		
Step 2				.42	.38***				.27	.22***				.24	.20***
Composite SOC	-.04	.06	-.06			-.10	.65	-.01			.15	.39	.03		
Age	-.03	.06	-.05			-1.10	.66	-.16			.06	.40	.01		
Step 3				.42	.37***				.28	.22***				.26	.20***
Composite SOC*Age	-.02	.05	-.04			-.58	.57	-.09			.41	.34	.11		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, Adj = adjusted, † Depression at T1 was controlled for in HRQOL and functional ability models

8.5 Moderation effects of SOC and other variables

The following sub sections will report the results found regarding moderation effects between relationships.

8.5.1 Moderation effects of age and SOC (Hypothesis 5)

Moderation effects of age were examined to assess if it influenced SOC's relationship with HRQOL, functional ability and depression one year after stroke. Hierarchical multiple regression analyses were conducted with interaction terms by using the procedure proposed by Aiken and West (1991). The interplay between each SOC subscale and composite SOC with age was examined in separate regression models. The models followed a similar sequence in that age, gender and the external resources marital status and socio-economic status were all entered at the first step. For each model, the relevant outcome variable at T1 was controlled for at the first step i.e. HRQOL at T1, functional ability at T1 and depression at T1. Depression at T1 was also controlled for at the first step in HRQOL and functional ability models. At the second step the relevant SOC subscale or composite SOC and age were entered after these variables were centred. The interaction term (SOC subscale or composite SOC*Age) was entered at the third and final step. There was no significant effect of the interaction of elective selection and age for any of the three models (HRQOL (β=-.004, ns), functional ability (β=.06, ns) and depression (β=-.02, ns)). There was no significant effect of the interaction of loss-based selection and age for any of the three models (HRQOL (β=.002, ns), functional ability (β=.07, ns) and depression (β=.10, ns)). There was no significant effect of the interaction of optimization and age for any of the three models (HRQOL (β=-.08, ns), functional ability (β=.12, ns) and depression (β=.11, ns)). There was no significant effect of the interaction of compensation and age for any of the three models (HRQOL (β=-.11, ns), functional ability (β=.08, ns) and depression (β=.14, ns)). There was no significant effect of the interaction of composite SOC and age for any of the three models (HRQOL (β=-.04, ns), functional ability (β=-.09, ns) and depression (β=.11, ns)). The results for composite SOC and age interaction effects are shown in Table 8.6.

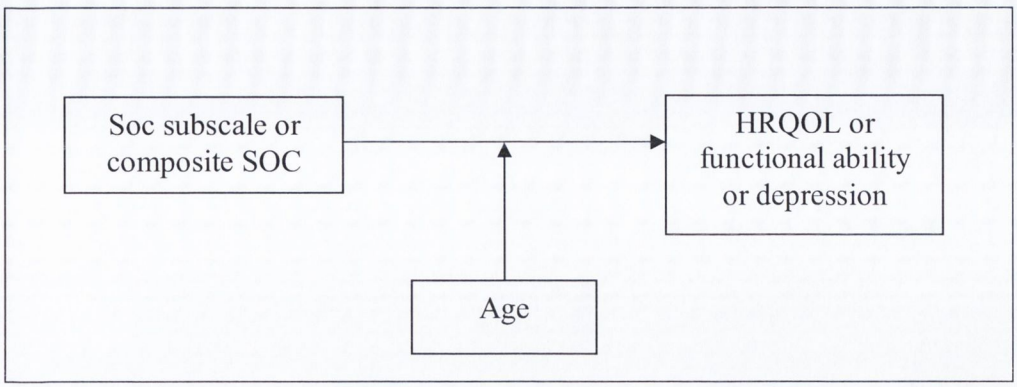


Figure 8-1 Moderation effects of age and SOC on stroke outcomes

8.5.2 Moderation effects of SOC and stroke severity (Hypothesis 6)

Moderation effects of SOC on the relationship between stroke severity and HRQOL, functional ability and depression one year after stroke were examined. Hierarchical multiple regression analyses were conducted with interaction terms similar to the model for SOC and age interaction. This time at the second step stroke severity and the relevant SOC subscale or composite SOC were entered after these variables were centred. The interaction term (stroke severity*SOC subscale or composite SOC) was entered at the third and final step. There was no significant effect of the interaction of stroke severity and elective selection for any of the three models (HRQOL (β=-.11, ns), functional ability (β=-.11, ns) and depression (β=-.002, ns)). There was no significant effect of the interaction of stroke severity and loss-based selection for any of the three models (HRQOL (β=.05, ns), functional ability (β=.04, ns) and depression (β=-.03, ns)). There was no significant effect of the interaction of stroke severity and optimization for any of the three models (HRQOL (β=-.05, ns), functional ability (β=-.05, ns) and depression (β=-.04, ns)). There was no significant effect of the interaction of stroke severity and compensation for any of the three models (HRQOL (β=-.03, ns), functional ability (β=-.12, ns) and depression (β=.003, ns)). There was no significant effect of the interaction of stroke severity and composite SOC for any of the three models (HRQOL (β=.09, ns), functional ability (β=-.09, ns) and depression (β=-.03, ns)).

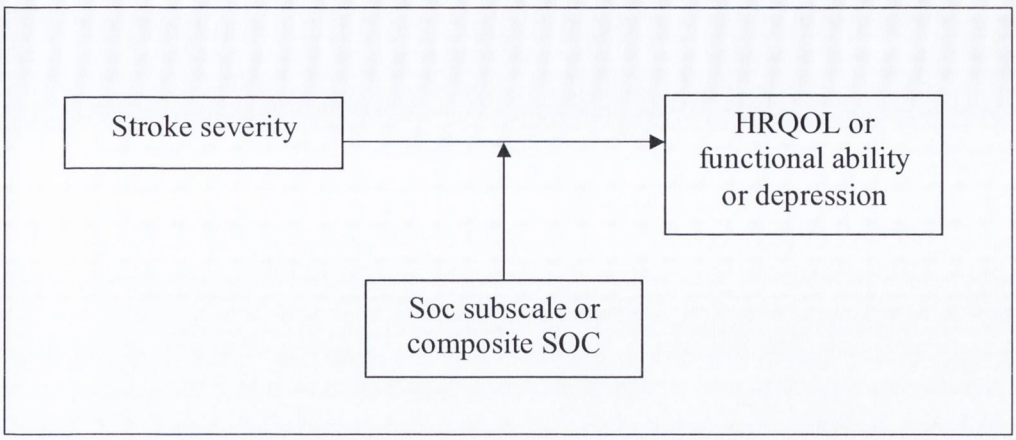


Figure 8-2 Moderation effects of SOC and stroke severity on stroke outcomes

8.5.3 Moderation effects of SOC and recovery locus of control (Hypothesis 7)

Moderation effects of SOC on the relationship between recovery locus of control and HRQOL, functional ability and depression one year after stroke were examined. Hierarchical multiple regression analyses were conducted with interaction terms similar to the models above. This time at the second step recovery locus of control and the relevant SOC subscale or composite SOC were entered after these variables were centred. The interaction term (recovery locus of control*SOC subscale or composite SOC) was entered at the third and final step. There was no significant effect of the interaction of recovery locus of control and elective selection for any of the three models (HRQOL (β=-.03, ns), functional ability (β=-.03, ns) and depression (β=.05, ns)). There was no significant effect of the interaction of recovery locus of control and loss-based selection for any of the three models (HRQOL (β=-.03, ns), functional ability (β=-.05, ns) and depression (β=.04, ns)). There was no significant effect of the interaction of recovery locus of control and optimization for any of the three models (HRQOL (β=-.06, ns), functional ability (β=-.09, ns) and depression (β=.04, ns)). There was no significant effect of the interaction of recovery locus of control and compensation for any of the three models (HRQOL (β=-.06, ns), functional ability (β=.002, ns) and depression (β=.12, ns)). There was no significant effect of the interaction of recovery locus of control and composite SOC for any of the three models (HRQOL (β=-.05, ns), functional ability (β=-.05, ns) and depression (β=.07, ns)).

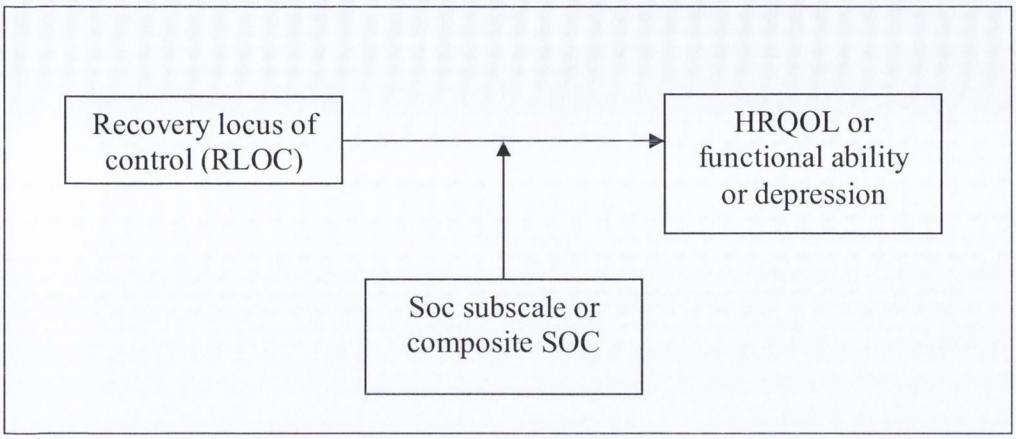


Figure 8-3 Moderation effects of SOC and recovery locus of control on stroke outcomes

8.5.4 Moderation effects of recovery locus of control and stroke severity (Hypothesis 8)

Moderation effects of recovery locus of control on the relationship between stroke severity and HRQOL, functional ability and depression one year after stroke were examined. Multiple hierarchical regression analyses were conducted with interaction terms similar to the models above. This time at the second step stroke severity and recovery locus of control were entered after these variables were centred. The interaction term (stroke severity*recovery locus of control) was entered at the third and final step. The interaction effect for stroke severity and recovery locus of control (β=.23, p<.01) was significant for functional activity. These interactions indicated that higher recovery locus of control ameliorated the negative effects of stroke severity on functional activity. The interaction effects were plotted using methods developed by Aiken and West (1991). The slope of the lines displayed that for those with a highly severe stroke, recovery locus of control was associated with high functional status. The t value for the low level of recovery locus of control was significant (t(99)=-3.02, p<.01). However the t-values for the simple slopes high and medium levels of recovery locus of control were not significant i.e. the simple slopes did not differ from zero. The interaction effect for stroke severity and recovery locus of control (β=.15, p=.055) almost reached significance for HRQOL (see Table 8-7).

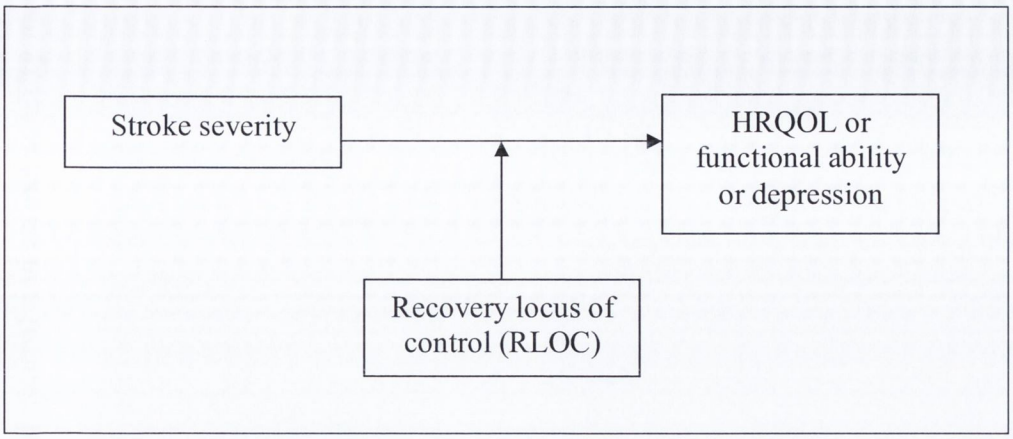


Figure 8-4 Moderation effects of recovery locus of control and stroke severity on stroke outcomes

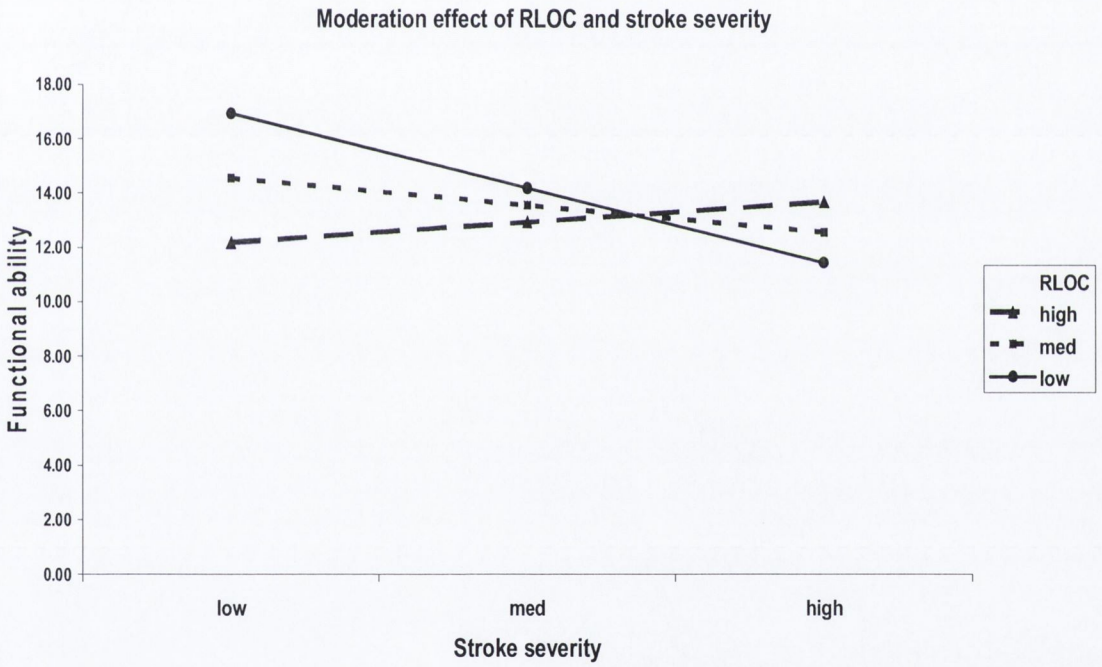


Figure 8-5 Moderation effect of stroke severity on functional ability by recovery locus of control (RLOC)

Table 8-7 Summary of Hierarchical Regression Analy.is predicting interactive effects of recovery locus of control and stroke severity on stroke outcome variables

Variable	HRQOL					Functional ability					Depression				
	B	SEB	ß	R^2	Adj R^2	B	SEB	ß	R^2	Adj R^2	B	SEB	ß	R^2	Adj R^2
Step 1				.42***	.38***				.28***	.23***				.24***	.20***
Age	-.01	.01	-.04			-.08	.05	-.14			.01	.03	.01		
Gender	.001	.13	.001			.73	1.40	.05			-.37	.85	.04		
Marital status	-.10	.13	-.07			-1.37	1.43	-.09			-.48	.87	-.06		
Social class	.30	.12	.20*			2.58	1.28	.18*			.12	.78	.01		
Outcome variable at T1	.60	.10	.58***			.48	.09	.47***			-	-	-		
Depression at T1	-.01	.02	-.07			-.04	.16	-.02			.53	.10	.49***		
Step 2				.44	.39***				.30	.24***				.27	.21***
Stroke severity	-.08	.06	-.10			-1.27	.77	-.17			.69	.42	.16		
Recovery locus of control	-.11	.06	-.15			-.54	.71	.07			-.07	.42	-.02		
Step 3				.46	.41***				.35**	.29***				.28	.22***
Recovery locus of control*stroke severity	.12	.06	.15			1.81	.67	.23**			-.53	.41	-.11		

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, Adj = adjusted

8.6 Chapter summary

Thirty percent of the sample recruited at T1 was lost to follow at T2 primarily as a result of mortality, declined health and refusals (some participants did not wish to participate in the second interview a year later after their stroke). The group who did not participate at T2 was different from those who did participate at T2 in terms of having poorer functional status.

The mean level of use of the 3 SOC subscales elective selection, loss-based selection, optimization and composite SOC remained consistent over time. Compensation strategies were used less frequently at one year after stroke in comparison to their use after one month. Functional ability significantly improved from one month to one year after stroke but there was no significant improvement in HRQOL or change in depression levels.

HRQOL at one year after stroke was associated with better HRQOL, lower depression levels and a milder stroke one month after stroke. Socio-economic status and HRQOL at T1 were the only significant predictors of HRQOL one year after stroke. Functional ability one year after stroke was associated with milder stroke severity, lower depression levels and better functional ability within 4 weeks of stroke. Socio-economic status was also a significant predictor in determining functional ability one year after stroke along with functional ability at T1. Depression one year after stroke was associated with depression, greater stroke severity, lower recovery locus of control, poorer HRQOL and functional ability within 4 weeks of stroke. There were no significant predictors of depression one year after stroke.

SOC subscales or composite SOC did not explain any significant variance in HRQOL, functional ability or depression one year after stroke. There was no interactive effect of age on the use of SOC strategies in predicting HRQOL, functional ability or depression. The use SOC strategies did not have an impact on the relationships between recovery locus of control and stroke outcomes (HRQOL, functional ability and depression) or stroke severity and stroke outcomes. However, there was a significant interaction between stroke severity and recovery locus of control in predicting functional ability one year after stroke.

9 Discussion, further recommendations and conclusion

This is the first longitudinal study to examine the use of the SOC model of successful ageing in explaining the adaptation process for a patient population one month and one year following stroke. SOC strategies were examined to investigate if they predicted how people adapt both physically and psychologically following stroke. The study examined the extent to which individuals, following the impact of an acute physical illness that becomes chronic, engage in SOC strategies and the relationship of these strategies with (HRQOL), functional ability, and depression one year later. This study revealed that self-rated SOC strategies did not predict stroke outcome in terms of HRQOL, functional ability and depression one year after stroke. However, the use of SOC strategies did have significant relationships with some resources and outcomes at the individual time points in the study and these main relationships will be discussed in detail throughout this chapter. Overall findings from the study unveiled two very pertinent findings in relation to the SOC model. The first of these results showed that the use of SOC strategies in a stroke population were not age specific and the second finding was that there was no change in the use of SOC strategies over time with the exception of the subscale compensation.

The main findings and their consistency and relevance to both the stroke and SOC literature will be discussed in more detail through this chapter. The structure of the discussion will be in line with the direction of the framework used to describe the study's hypotheses (see figure 4-1, page 82). The framework outlines the relationships that were examined between resources, biographical details, SOC and outcomes (HRQOL, functional ability and depression) at two separate time points (one month and one year after stroke). In addition, the relationships between SOC and outcomes were also examined over time (from one month to one year) which was the primary focus of this study. The most significant findings of the study will be discussed in the direction as relationships are presented in the framework i.e. profile use of SOC after stroke, resources and SOC, SOC and outcomes and then resources and outcomes. Interpretation and limitations of this study and recommendations for further research will then be discussed.

9.1 Clinical-demographic summary

This study investigated the relationships between the use of SOC strategies and physical and psychological outcomes among a stroke patient sample (20 to 98 years) who were assessed within one month and one year after stroke. There were equal proportions of men and women with approximately 65% of the sample 65 years and older at both time points. The stroke type for over 50% of the sample was a partial anterior circulation infarct located in the right side of the brain and just over 60% had a mild to moderate stroke severity. However this resulted in over 70% of the sample been functionally dependent within one month after the stroke and 45% one year later. At both time points, 35% of the sample scored in the possible and probable depression range. HRQOL scores were average and did not change from one month to one year after stroke despite improvement in functional ability.

9.2 Use of SOC strategies after stroke

The study findings indicate that stroke patients reported engaging in SOC strategies thus offering some support of the model to loss regulation after stroke. SOC was operationalised using a 15-item questionnaire (4 items for each of the SOC subscales and three items in the case of the compensation subscale). Similar to another study that has used a small item SOC questionnaire (Freund & Baltes, 1998), this measurement approach permits SOC to be represented in two ways: as one composite construct (selective optimization with compensation) and as individual constructs (elective selection, loss-based selection, optimization and compensation). Overall use of SOC strategies was high (80%) with loss-based selection followed by optimization having the highest frequency use in this stroke sample. These findings suggest that SOC may be applicable for regulation of major loss as well as adaptation to everyday tasks, consistent with the proposals of Baltes and Carstensen (1999). Therefore it is not surprising that these patients were engaging in SOC strategies as a result of loss following stroke. Greater use of loss-based selection strategies compared to the other strategies is to be expected in the immediate aftermath of stroke, since these strategies tend to be used more frequently during periods of limited resources, e.g., following stroke deficits. This patient sample has been faced with sudden loss in functioning therefore it is not surprising that loss-based selection strategies are the most popular used strategies. Rehabilitation was at an early stage for the majority of these patients

and in some cases had not yet commenced. For this reason, it was unlikely that these patients would engage in compensation strategies in this acute phase following stroke. Compensation strategies typically involve using external aids or strategies, to which a majority of these patients would not yet have been introduced to. However one year after stroke, loss-based selection and optimization remain the most frequently used strategies. Surprisingly compensation was the least used strategy, although it might have been expected that these strategies would be in greater use a year later when patients would be using help of others or external means to achieve everyday functioning, thus counteracting their losses. Compensation strategies are noted to be of use when confronting loss of resources or the decline of goal-relevant means in selected domains of functioning (Baltes & Baltes, 1990). Unexpectedly, compensation strategies were used less frequently at one year after stroke compared to their use after one month. This is in keeping with the findings at T1 where compensation strategies were used more frequently by the functionally dependent individuals; as there had been a significant improvement a year after stroke in functional ability, therefore there may be a less reliance on using compensation strategies such as external aids and help as there was following the acute stroke onset. Therefore the significant improvement in functioning that was evident from one month to one year later may account for the decreased use in compensation strategies over time. However, the number of items on the compensation subscale i.e. 3 items, in comparison to the other SOC subscales i.e. 4 items, has to be considered when interpreting the mean scores of the SOC subscales. The magnitude of differences between the means was less than one third of a unit.

The use of the other SOC strategies elective selection, loss-based selection, optimization and composite SOC from one month to one year did not change over time. Based on the assumption that the operationalisation of SOC processes are resource dependent (Li & Freund, 2005), an increase in SOC use a year later would be expected as a result of improved physical function, i.e., greater availability of physical resources. In this study, with improvement in physical function, there were no findings of improvement in internal resources such as recovery locus of control or social support after one year which may account for why there was no increased use of SOC strategies.

The fact that SOC strategies generally did not change over time, with the exception of

compensation, is a consistent finding with the coping literature generally and in relation to stroke (Darlington et al., 2007; Donnellan et al., 2006). There have been some exceptions to this finding in the recent literature, one study reporting that certain coping strategies were used to a lesser extent over time (Rochette, Bravo, Desrosiers, St-Cyr Tribble, & Bourget, 2007). Another recent study provided some initial evidence with a small sample that the strategies used during the stressful situation of engaging in stroke rehabilitation were not the strategies generally used pre-morbid to deal with stress (Gillen, 2006). However, Gillen's methodology used the trait-like descriptor (coping typically used in stressful situations as a measure of dispositional coping styles) and the state-like descriptor (coping during a particularly stressful situation to measure situational coping strategies) of the Brief COPE inventory (Carver, 1997). This was not a longitudinal study involving a measure of coping before stroke and coping during rehabilitation. Further longitudinal studies are required to confirm the stability of adaptive strategies used in the long term following stroke and to establish if SOC strategies remain stable following disease-specific limitations of resources.

9.3 Resources and SOC strategies

The relationships between resources available and the use of SOC strategies were examined at the individual time points only as the primary interest of the study was the use of SOC and adaptation outcomes. However resources were appropriately adjusted for in the relevant analyses and there were some associations of interest found in the results that will be discussed in the following sections.

9.3.1 The association between internal resources and SOC strategies

Within one month after stroke patients with milder stroke severity had higher overall SOC scores and had greater use of optimization strategies. Those with a less severe stroke may recognize their lesser disability and recognize their potential to attain higher physical functioning compared to the patients with a more severe stroke in the acute period and will therefore engage in strategies e.g. optimization, that will facilitate their physical functioning. The rate of recovery in milder stroke patients may be occurring at a faster pace than in the more moderate to severe groups who have a much more significant level of disability to contend with and therefore this may account for greater use of overall SOC in these patients.

Functionally dependent patients used significantly more compensation strategies than independent patients, and had higher overall SOC scores but this finding was not significant. These patients will require the help of others and external aids compared to their independent counterparts who may not require compensation strategies as much. This finding supports SOC theory in that successful development across the lifespan entails processes geared towards maximising gains and minimising losses (Abraham & Hansson, 1995; Freund & Baltes, 2000). The maintenance of a given level of functioning in the face of loss or decline in goal-relevant means can be attained by the use, refinement, and new acquisition of compensatory means. Therefore compensation would be the expected process to be operationalised more frequently by functionally dependent patients. However this finding was not consistent one year after stroke.

Recovery locus of control over recovery was associated with composite SOC and in particular loss-based selection and optimization at one month and one year after stroke, such that beliefs in internal control were consistently related to composite SOC, loss-based selection and optimization use immediately following stroke. Johnston et al. (1999) point out that models of coping suggest that coping is determined by mental representation or appraisals and previous evidence has shown that internal control beliefs were positively associated with active coping in the generic literature (Carver et al., 1989). This same concept could be applied to SOC. However, the association between appraisal and the use of SOC strategies has received little attention to date. Some evidence suggests a lack of relationship between control beliefs and SOC. Freund and Baltes (1998) investigated the reported use of SOC-related life-management behaviours' and their association with indicators of successful ageing. Control beliefs were considered one of the rival predictive variables of outcomes controlled for in this study. Results indicated that composite SOC or the individual SOC subscales did not correlate significantly with any of the control beliefs constructs: internal positive, internal negative and powerful others. The control beliefs measure used in Freund and Baltes's (1998) study included general items of internal and external locus of control assessing the extent to which individuals believed that the good things in their lives were a function of their own actions or the actions of other people determine what happens to oneself. This

interpretation of locus of control is similar to that used in this current study with the exception that this current study was more focused in assessing locus of control in terms of recovery.

Recovery locus of control was also associated with compensation at one month and with elective selection after one year following stroke. Patients with higher beliefs in internality following acute stroke may be more focused to be involved with their rehabilitation regimen and therefore are using more compensatory strategies in achieving a successful outcome at an early stage of their recovery. Greater sense of recovery locus of control has been shown to be associated with faster recovery following stroke (Johnston et al., 1999; Partridge & Johnston, 1989). The association between recovery locus of control and elective selection after one year may be because over time the appraisal of the situation regarding the limitations that an individual has in terms of physical functioning has taken place. Those individuals that have greater recovery locus of control may have greater awareness of their physical limitations a year later after stroke and therefore employ elective selection strategies in order to restrict their everyday activities to fewer domains of functioning for a more independent lifestyle. However to date, there is no empirical evidence to support this claim although this line of enquiry would be of interest in further studies considering the significant association between SOC and recovery locus of recovery in this patient sample.

9.3.2 The association between external resources and SOC

Some associations were found between external resources and SOC; however these were primarily during the acute period after stroke in this study. For example, patients that were married used more overall SOC, in particular compensation strategies. One explanation for this finding may be that those are married have less feelings of loneliness as Freund and Baltes (1998) reported that those who used SOC–related behaviours had higher scores on absence of feelings of loneliness. This finding may also be as a result of more social resources generally but of note, perceived social support or living arrangements did not have any significant association with the use of SOC strategies in this current study. The pattern of SOC use in terms of marital status was not maintained one year after stroke.

This may be because there was improved physical function for the majority of patients resulting in both married and non-married patients using similar amounts of SOC strategies or differences may have been lost as a result of the reduced sample size at follow-up.

9.3.3 The association between biographical details and SOC

No gender differences were found in this stroke sample. Only a small number of studies that have measured SOC strategies have reported gender differences in relation to SOC use i.e. women tend to use more optimization and compensation strategies and these findings have referred to general healthy samples (Abraham & Hansson, 1995; Wiese, Freund, & Heckhausen, 2000). Therefore as a result of limited empirical evidence in relation to gender differences and SOC use, this study was not expecting a gender pattern in terms of SOC use.

Generally there were no overall age differences in the use of SOC except for younger patients using more optimization strategies than older patients in the first month after stroke. As optimization refers to adaptive processes or strategies where no direct or indirect losses have occurred and where an actual amelioration or maximisation of means can be found (Lang et al., 2002), this may also be the case for losses following stroke as younger patients in this study had less physical deficits. Also, younger patients may have a stronger focus on striving for gains and higher levels of performance and role-function responsibilities, e.g., returning to work, therefore, there may be a greater need to use optimization strategies in comparison to SOC use by older patients. This finding is consistent with the literature that younger adults, in contrast to older adults, appear to be more motivated to optimise their performance than to compensate for a loss (Coats, Janoff-Bulman, & Alpert, 1996; Freund & Riediger, 2006).

SOC has been conceptualised and proposed as an ageing model although empirical findings of previous studies have been inconsistent in terms of associations between age and SOC use (Abraham & Hansson, 1995; Freund & Baltes, 2002; Wiese, Freund, & Baltes, 2000). Results of moderation analyses indicated that there was no moderation effect of age on the use of SOC strategies in predicting HRQOL, functional ability or depression. This finding is in line with Ziegelmann's et al's study

(2007) that also found no evidence of age-associated changes in exercise-specific SOC strategy use in orthopaedic rehabilitation patients. This is contrary to the findings of some previous studies that have found differences in the use of SOC by different age groups. These other studies have found that, with increasing age, there was a tendency to report less engagement in SOC-related behaviours (Freund & Baltes, 1998, 2002). The rationale given for this was that the range of alternative goals and domains of functioning becomes more and more restricted by a limitation of internal or external resources. This same rationale would fit with the findings of this study, in that both younger and older stroke patients had restrictions and limitations on their resources as a result of the consequences of stroke. Therefore it is not surprising that no age group differences were found and the finding no age differences in the use of SOC is in keeping with fact that the use of SOC strategies may be in response to resource limitations which is an assumption of the SOC model. In interpreting the absence of an age effect and the use of SOC strategies, it is important to consider that this study did not have a comparison ageing group.

9.4 SOC strategies and outcomes

Although there were some associations between SOC processes and stroke outcomes, SOC subscales or composite SOC were not predictive of HRQOL, functional ability or depression one year after stroke. There may be a number of possible explanations as to why SOC was not predictive of the selected outcomes after stroke. One explanation is that SOC was applied in this study in the context of adaptation to a specific condition. To date, SOC has been tested primarily in general healthy populations and therefore, findings from these generic studies need to be interpreted with some degree of caution when generalising to health specific conditions. In addition, the SOC measure used in this study (and SOC measures currently available) was not stroke specific. There has been only one longitudinal study to date that has investigated the predictive properties of SOC strategies in relation to ageing satisfaction (Jopp & Smith, 2006). Therefore, there is limited empirical evidence on which to base the interpretation of the results concerning the predictive value of the strategies in the current study. Research to date indicates that SOC has mainly been associated with psychological health such as well-being and life satisfaction in general healthy populations (Freund & Baltes, 1998, 2002; Wiese, Freund, & Baltes, 2000). However the authors of the model proposes SOC to be capable of extending

beyond psychological health, as SOC processes have been proposed to be capable of interacting with non-normative factors such as deficits following illness as well as age-related factors (Baltes & Baltes, 1990).

In relation to disease specific studies, SOC has primarily been used as a framework to explain and describe certain adaptive behaviours as a result of certain conditions, e.g., osteoarthritis, macular degeneration and multiple sclerosis (Gignac et al., 2002; Ryan et al., 2003; Wilhite et al., 2004). Although these other conditions have their respective limitations, this is the first condition related study with limitations to resources as a result of physical, psychological and social deficits where SOC has been examined for its potential predictive properties of adaptation. The SOC model may in fact be a valuable model in explaining gradual loss as it has been proposed as a measure of gradual loss over time but for acute shock losses such as stroke, it may not be as appropriate in this context. Further discussion as to why SOC did not explain adaptation in this cohort and issues surrounding SOC measurement will be addressed in a later section in this chapter.

9.4.1 The association between SOC strategies and HRQOL

Empirical evidence regarding SOC has indicated a positive association between the use of SOC strategies and life satisfaction and psychological wellbeing (Freund & Baltes, 1998, 2002; Wiese, Freund, & Baltes, 2000). Therefore it was hypothesised in this study that the use of SOC strategies would be predictive of better HRQOL. This prediction was not supported in this study and some of the variations in the results regarding HRQOL may provide some explanations as to why this was the case. Overall HRQOL scores were average and there was no significant improvement in HRQOL over time in the sample although there was improvement in functional ability. This finding emphasises the fact that HRQOL incorporates several components such as mood, energy and role function including physical function that all play a role in determining stroke outcome. Although there was a significant improvement in physical function, a majority of patients had some residual functional and psychosocial deficits as a result of stroke, and learning to incorporate these deficits into everyday life may take longer than 12 months. Evidence to support this is that HRQOL appears to be relatively good for the majority of patients 6 years after stroke (Hackett et al., 2000) when it is likely that adjustment to all forms of deficits

has taken place. A recent study found that coping strategies were predictive of quality of life at 5 months and at a year following discharge from a rehabilitation unit (Darlington et al., 2007). Darlington et al. argued that after 5 months improvement in general functioning is less likely to occur and therefore individuals have to deal with possible permanent losses and the effect they have on everyday living. This study differed in terms of method as well as findings from the current study in that the quality of life measures used were generic and may not have tapped into the specific issues that stroke survivors may encounter in their everyday lives and the study had a relatively smaller sample size in comparison to the current study. The total mean values for HRQOL scores in this study at T1 and T2 (3.3 (0.7) and 3.4 (0.7) respectively) were lower than the mean value score (3.7 (0.7)) obtained in a recent study comparing patient HRQOL scores to family proxy scores and used the same HRQOL measure (Williams et al., 2006). In Williams et al's study (2006), the stroke severity mean score was within the mild category in terms of severity whereas in this current study, stroke severity ranged from mild to moderate severity. Because of the variations that existed in the current study in terms of lower HRQOL scores compared to another stroke study using the same measure and that HRQOL did not improve over time, may explain why the use of SOC strategies did not predict HRQOL after one year. However, some of the current study's hypotheses in relation to HRQOL were supported because greater use of the SOC subscale optimization was associated with better HRQOL at one month and one year after stroke.

9.4.2 The association between SOC strategies and functional ability

The SOC model implies that the endorsement of SOC strategies may lead to better physical functioning (Baltes & Baltes, 1990) but to date no actual empirical evidence exists to support this assumption. Nevertheless this study explored whether the use of SOC strategies were predictive of improved functional ability one year after stroke. Although functional ability improved significantly from T1 to T2 and at T1 was a significant predictor of functional ability at one year after stroke, SOC did not have any contribution to this improvement. Clinical improvement and neurological recovery to local central nervous system (CNS) processes can occur in the initial 4-6 weeks post stroke but CNS reorganisation tends to occur after the 4-6 weeks initial period and these mechanisms are thought to underlie the later return of function (Heitzner & Teasell, 1998). This would explain the improvement in functional ability

over time. Spontaneous recovery of body functions and activities explains why functional ability levels following acute stroke is a determinant of functional ability in the long term. Observed improvements in functional recovery have been shown to be anything from 16% to 42% in the first 6 to 10 weeks after stroke onset (Kwakkel et al., 2006). Intensive rehabilitation did not take place until patients were medically stable to participate i.e. after any acute medical complications subsided and this ranged from 2-4 weeks after initial diagnosis in certain cases. The line of inquiry regarding coping or adaptive behaviours explaining improvement in physical functioning remains limited or non existent in the stroke literature (Donnellan et al., 2006). However since this review, a recent study examined the predictive values of coping strategies in determining functional outcome following stroke. This study found that coping strategies (rationalise, hope, escape, openness to others and give control to others or time) were not predictors of participation in daily activities and social roles or depression 6 months after stroke (Rochette et al., 2007) which is consistent with the current study's findings. Therefore further studies are required to investigate whether or not coping behaviours make no difference to improvement in functional recovery after stroke.

9.4.3 The association between SOC strategies and depression

The hypothesis investigating the predictive value of SOC in determining depression in the long term after stroke was developed from the empirical evidence in relation to SOC and psychological wellbeing in general healthy individuals (Freund & Baltes, 1998, 2002; Wiese, Freund, & Baltes, 2000). Similar to the findings for HRQOL and functional ability, SOC did not predict improvement in depression levels one year after stroke. Depression, a worse stroke severity, lower recovery locus of control, poorer HRQOL and functional ability within 4 weeks after stroke were associated with depression one year later. Consistent findings in the literature in relation to depression and stroke indicate that physical disability and stroke severity have the main association with depression (Hackett & Anderson, 2005). The impact that depression has on functional ability (Chemerinski et al., 2001; Herrmann et al., 1998; Parikh et al., 1990; Ramasubbu et al., 1998) and on HRQOL (Haacke et al., 2006; Kauhanen et al., 2000; King, 1996; Sturm, Donnan, Dewey, Macdonell, Gilligan, Srikanth et al., 2004) has been well documented. In this study, although expected relationships were found between depression and other variables, there were no

significant predictors of depression one year after stroke except for depression at one month. This finding suggests that there is an association of depression after one month with depression after one year. The literature indicates that there is a high probability of depression after one year as a result of depression within the acute phase following stroke (Berg et al., 2003) but the predictive odds of depression were not tested in this current study. Although SOC did not predict depression one year after stroke, optimization was associated with depression during the acute stroke period but not one year later. Depressed patients may be less inclined to engage in optimization strategies because they may be less likely to maximise their capabilities and functioning or patients may feel depressed as a result of not optimizing. The literature has indicated that being persistent has been shown to be related to subjective well-being (Freund and Baltes, 1998). Clinically significant executive dysfunction is frequent after stroke and may be linked with depression although this is still not well established in the context of stroke studies (Pohjasvaara et al., 2002). Further investigation could clarify if there is a direct association between depression and executive function and therefore may be a follow on effect to planning and implementing strategies for performance.

9.5 Resources and outcomes

9.5.1 The association between resources and HRQOL

A higher Socio-economic status i.e. non-manual and self-employed workers and HRQOL one month after stroke were significant predictors of HRQOL a year later. One previous study has shown socioeconomic group (manual workers) to be a predictor of poorer HRQOL at one year (Patel et al., 2007). Other stroke studies have shown SES to be a predictor of HRQOL in the longer term after stroke (Paul et al., 2005; Sturm, Donnan, Dewey, Macdonell, Gilligan, Srikanth et al., 2004). This study's finding is consistent with the global issue of health inequalities in terms of the effects of social gradient and health (Marmot, 2005) in that individuals with lower SES have worse health related outcomes especially in terms of mortality. Therefore this phenomenon may be reflected in the HRQOL findings of this study. In the stroke literature, the emphasis in relation to SES determining outcome after stroke has been in relation to mortality rates and also the prevalence of the population at risk of stroke in the first place. The results concerning SES and stroke outcomes will be discussed

in more detail in the following section under functional ability. The current study findings suggest that one's initial HRQOL is an important factor in determining HRQOL in the first year after stroke. More studies are needed to confirm this finding as only one other previous study found that quality of life at two weeks after stroke was a predictor of quality of life at 3 months (Mackenzie & Chang, 2002). Much of the evidence determining HRQOL after stroke has focused on long term follow-up studies (Haacke et al., 2006; Hackett et al., 2000).

9.5.2 The association between resources and functional ability

Recovery locus of control yielded the results it previously has in the literature in relation to disability and stroke. Other studies where recovery locus of control predicted functional independence were either within the first 6 months (Johnston et al., 1999) or 3 years (Johnston et al., 2004) after stroke. Recovery locus of control was associated with functional ability in this study at both time points, i.e., in the immediate aftermath of stroke and 12 months later. Findings from this current study also showed that recovery locus of control also had a moderation effect between stroke severity and functional ability. Patients with higher recovery locus of control ameliorated the negative effects of stroke severity on functional ability. Based on current evidence and the findings of this study, it may be appropriate to consider possible interventions to increase perceived control within rehabilitation programmes, as greater control in terms of internality appears to indicate better recovery from a functional ability perspective.

Socio-economic status was a predictor of functional ability a year after stroke. This is not an unexpected finding as the association between socio-economic status and health inequalities in relation to stroke has been well documented (Cox, McKevitt, Rudd, & Wolfe, 2006). Socio-economic status as a determinant of functional ability is consistent with previous studies in the acute (Jakovljevi et al., 2001), sub acute (Putman et al., 2007) and long term (van den Bos, Smits, Westert, & van Straten, 2002) periods following stroke in that lower socio-economic status results in greater functional dependency and long term disability. Individuals from this study who were from a manual social class had a worse outcome in terms of functional ability compared to those self-employed and from a non-manual social class. Although large socio-economic inequalities have been found for stroke prevalence in Europe (Dalstra

et al., 2005), this finding may be explained by previous evidence in the literature that indicates socio-economic status affects access to some health services after stroke (Kapral et al., 2002) which may also contribute to the finding of a worse functional recovery. Although there is evidence that low SES is associated with more severe stroke (van den Bos et al., 2002; Weir, Gunkel, McDowall, & Dennis, 2005), in this study, SES was not associated with stroke severity. Results from the present study indicate that the influence of SES seems to continue to affect outcome largely independent of stroke severity, consistent with the findings of another recent study (Arrich, Lalouschek, & Mullner, 2005).

9.5.3 The association between resources and depression

Recovery locus of control was also associated with depression at one month and one year after stroke. This finding is consistent with the literature that indicates that the construct recovery locus of control is positively related to indices of psychological and behavioural well being (Scharloo & Kaptein, 1997) as illness perceptions (especially perceived consequences and recovery locus of control) have been shown to be important factors influencing psychological (e.g., depression, self-esteem, anxiety, life satisfaction) and behavioural (e.g., working time, impairment, activity levels) outcome. The current study's findings are also consistent with previous stroke studies that have investigated the association between illness representations and depression as these studies have shown recovery locus of control to be associated with depression (Johnston et al., 1999; Morrison et al., 2000; Sinyor et al., 1986; Thomas & Lincoln, 2006). The findings from this current stroke study indicates that recovery locus of control following stroke has some association with depression, however there was no evidence regarding the predictive value of recovery locus of control determining depression in this stroke population. This finding is also in keeping with the literature that although associations have been found between recovery locus of control and mood after stroke, no evidence has yet been found determining its predictive ability (Morrison et al., 2000; Morrison, Pollard, Johnston, & MacWalter, 2005).

9.6 Implications for stroke care based on study's findings

This study offers some advancement of the SOC theory especially in relation to the endorsement of SOC strategies after stroke. The main aim and intention of the study was to examine whether SOC may be of value in measuring adaptation after stroke. There were clearly no age or disability related differences regarding the endorsement of SOC strategies by these stroke patients. This study also informs the theory from the perspective that a generic self-rated tool does not measure physical (functional ability) or psychosocial adaptation (HRQOL, depression levels) after stroke. The self-report SOC measure may be too generic to deal with the onset of acute disability, and as construed does not relate to functional recovery, depression or HRQOL. However, in view of the study's findings, it may be a consideration that the SOC model might in fact be more suitable as a framework to identify actual behaviours considered adaptive following an abrupt onset of a condition like stroke resulting in physical and psychosocial disability i.e. reduced activity and limited participation in life domains.

Adaptive strategies as measured by patients' own perceptions are shown not to relate to recovery as a result of the findings from this study. In other words, patients' own self ratings of their adaptive strategies are not informative in relation to their rehabilitation programme and recovery. Therefore, viewing the SOC model as a potential framework on which to observe and interpret adaptive behaviours following the abrupt onset of a condition may offer more insight into recovery in comparison to using self-reported ratings of adaptive strategies. The potential strength of SOC within the rehabilitation process may be its understanding of the interaction between individuals and their environment and this would be of great importance especially following discharge to the individuals' familiar home setting. The focus with SOC is action based in that the emphasis is on goal pursuit whilst also addressing what losses may exist. The SOC framework may be useful in assisting with the identification of goals as part of the rehabilitation process and possibly address bridging the gap of goal setting between patients and health care professionals. Evidence in the literature has shown that giving information about setting goals and involving the patient in the process of setting these goals have been proposed as positive determinants of motivation (Maclean, Pound, Wolfe, & Rudd, 2000) which has an important role in determining outcome (Maclean & Pound, 2000).

There may be a need for more use of more patient involvement frameworks in which to organise rehabilitative stroke care. Some of the issues that have been highlighted in the rehabilitation literature in relation to stroke provide additional support for possibly using SOC as a framework within the rehabilitation process. For example, one study identified that individualised needs were not addressed during the rehabilitation process and that rehabilitation services after stroke failed to meet individual needs or facilitate the transition to life at home (Sabari, Meisler, & Silver, 2000). Another study that did aim to allow patients to identify their own rehabilitation needs and included psychosocial, social and spiritual components as well as physical needs found that the need for information, particularly information about the reasons for stroke and about the activities that promote recovery were largely unmet (Lui & MacKenzie, 1999). These studies did not highlight that a framework was used to organize rehabilitative stroke care. The use of the SOC framework would promote and allow individuals to focus on what goals were still achievable and encourage the identification of what goals to focus on as part of the rehabilitation. Another rehabilitation concern is that patients may be reluctant to use adaptive aids because they reinforce the sense of loss associated with stroke impairment (Gitlin, Luborsky, & Schemm, 1998) and this may be an attempt to avoid stigma rather than non-adherence. Because the SOC framework emphasizes the use of strategies to overcome losses, the reinforcement of compensation strategies may be an alternative method for dealing with this issue because this SOC process encourages goal pursuit by the use of alternative devices and not focusing directly on the loss or deficit experienced.

There are also contrasting perspectives between patients and health professionals in that priorities of rehabilitation and goal setting are not identical although both are concerned with a physical recovery (Bendz, 2003; Hart, 1998; Kaufman, 1988). The use of the SOC framework would encourage that priorities and goals were identified with a similar orientation and allow for more co-operative negotiations between therapists and patients. This may also improve the actual delivery of rehabilitation care from a multidisciplinary perspective and allow the identification of appropriate ways of measuring progress and quality care and over come role overlap between the different therapists and health professionals that can sometimes occur. Overall the use of the SOC framework would result in strengthening the communication between the

health professionals themselves and with patients. Another consideration in relation to involving patients in goal setting is that their hopes and expectations of recovery can be high particularly in the early weeks following stroke (Wiles, Ashburn, Payne, & Murphy, 2002) and the use of the SOC framework in the rehabilitative process may encourage realistic expectations in line with a recovery that incorporates psychosocial, cultural and environmental issues with improvement in physical functioning.

Conflicts have been known to occur when delivering rehabilitation care to older people who have had a stroke. A study by Becker (1994) indicated that widespread negative attitudes about ageing in the US affect assumptions about the rehabilitation of those who are old and extend to illnesses that are associated with old age, such as stroke. This study concluded that rehabilitation policies pose a threat to adult status for the majority of older people. The SOC framework has been proposed as a framework that identifies successful ageing would perhaps establish the importance of promoting and extending rehabilitation processes to their broadest limits in this often neglected population in terms of receiving rehabilitative care. There is no justification to deny patients access to rehabilitation solely because of advanced age (Bagg et al., 2002).

9.7 Limitations generally

The rationale for using the SOC model to explain adaptive coping following stroke were provided earlier in this thesis (see section 3.8.1 in chapter 3). The SOC model has been found to explain the processes through which older people actively cope with the many changes associated with ageing (Freund & Baltes, 1998, 2002), and stroke is a condition that primarily affects the older population. However in light of this study's findings i.e. that SOC does not explain adaptation following stroke, some of the study's limitations generally and those concerning the SOC model and its measurement are therefore explored further.

9.7.1 Limitations of the SOC model

The SOC model was developed to address successful adjustment to specific difficult situations as well as to successful ageing more generally. However the SOC model has never been tested following a situation of sudden onset causing disruption to the

continuity of older people's everyday lives. Only one study to date has measured the potential of the SOC model in explaining how older adults adapt to disability and this concerned a chronic and incurable physical condition where physical recovery is irreversible (Gignac et al., 2002). The model is built on the premise that losses intrinsically feature as a key role but these losses refer to the gradual losses that come with ageing and emerge over a prolonged trajectory. The losses following stroke can cause abrupt chaos to an individual's everyday life routine that may require adaptive strategies that are specific in reorganising goals and shifting priorities to achieve those goals in response to the dramatic changes and loss of resources. The SOC model is inherently very global and has been developed to address gradual change across the lifespan. Although the authors' of the model propose that it is multidimensional and multifunctional, it may well be the case that the model is not capable of balancing losses and gains especially when there is a sudden or dramatic shift in losses e.g. after stroke. It may be the case that the SOC model is not effective enough in determining the adaptive process following a condition of sudden onset. However, this does not explain its lack of association with stroke outcomes one year after stroke. Therefore, there are clearly more empirical studies required to examine the use of the SOC model in sudden onset conditions in order to establish the effectiveness of the SOC within such a context.

Some views that have been made in relation to the SOC model, concerns its open and broad ranging themes and lack of specificity. For example, Pearlin and Skaff (1995) and Godfrey (2001) emphasised that the SOC model lacks attention to contextual factors such as economic, social, and cultural conditions that may influence the achievement of successful ageing, and to some of the individual's resources that may favour adaptation. Godfrey (2001) goes on to say that the SOC model proposes to explicitly examine the process of adaptation to physical, social, interpersonal and psychological changes but it does not explicitly examine the relationship between these processes and social structural factors such as class, ethnicity and gender, and norms and values embedded in culture that influence the meaning individuals give to old age (Godfrey, 2001). Although it is important to consider the views that have been interpreted by other authors in relation to the SOC model, Baltes (1997) does in fact address these socio-cultural interpretations. Baltes argues that the SOC model is definitely context- and person-conditioned, therefore depending on socio-cultural

context, individual resources, and personal preferences, can be implemented in very different ways and by different means (Baltes, 1997). The fact that SOC is open in regard to its phenotypic orientation is considered by Baltes (1997) to be the special strength of the SOC theory.

The empirical evidence to date, has examined the relationships between age, gender and education and SOC processes e.g. (Wiese, Freund, & Baltes, 2000) but other social and cultural factors such as economic and social network resources or cultural beliefs have not been empirically examined within the SOC framework. Therefore no previous evidence is available in order to establish whether or not the actual SOC model as a process of adaptation is an accommodating model that can include various social and cultural resources that influence the endorsement of SOC processes which in turn determine an adaptive outcome. This may be as a result of the actual quantitative measures employed to assess SOC processes, lacking consideration of broader social, economic and cultural factors because the evidence to support the SOC theory does imply the inclusion of these contextual factors.

The advantages that SOC is a broad theory conceptually, is that it can be applied to explain a diverse range of conditions where adaptive processes are needed to explain resulting physiological and psychosocial deficits, as it is a measure of potential and preparedness for dealing with a variety of demands (Baltes & Baltes, 1990). Because the SOC theory is considered very robust conceptually by its authors (Baltes, 1997; Baltes & Baltes, 1990), it may be the case that the SOC model is perhaps limited in terms of it specificity regarding the context in which it is operationalised. Steverink, Lindenberg, & Ormel (1998) highlighted, in their review of the theories of successful ageing, that the SOC model lacked specificity and emphasised that a model of successful ageing should include what goals people must achieve in order to identify success objectively. They state that when behavioural mechanisms and goals are neither sufficiently specified nor theoretically connected, it is difficult to examine how adaptive mechanisms relate to successful outcomes. In the context of a stroke population, it may therefore be necessary to specify what each patient will be adapting to and what goals are important in order to assess success in terms of adaptation to stroke. Because the theoretical components of the SOC model are very general, so too has its application of measurement to assess the model's processes interacting with

age-related, historical and non-normative factors (e.g. unexpected events such as having a stroke). This has resulted in non-specific goals or generic goals used in SOC measures determining successful adaptation outcomes. In this current study, the SOC measure did not define specifically goals that patients would select, optimize or compensate for in order to achieve a desired outcome. Instead patients were given instructions to think in the context of time since their stroke when making efforts to pursue and achieve their goals generally.

Steverink et al (1998) also indicated that all models of successful ageing including SOC have a limited emphasis on the biological or physiological aspects. Therefore the SOC model in its current state may not be very effective in determining physiological deficits, i.e., functional impairment and disability from a theoretical perspective until this aspect of the model is developed further. This may also explain why many of the studies examining SOC have primarily focused on psychological outcomes such as well-being and life satisfaction (Freund & Baltes, 1998, 2002). Another aspect of the SOC model that may warrant development is in relation to its growth mechanisms (Steverink et al., 1998). SOC has solely focused on maintenance and loss avoidance through the use of the SOC processes and therefore not essentially targeting improvement. This may explain why no improvement in stroke recovery was predicted by the SOC measure. In a review linking ageing theory and disability models, Putnam (2002) asserts that most ageing theories do not consider the cumulative experience of disability although there is a good set of theories to explain the general phenomenon of ageing.

The SOC model is heavily resource dependent, especially for optimization and compensation strategies (Freund, 2006). Large amounts of resources are required for maintaining and achieving goals in everyday activities and are important determinants of well-being (Jopp & Smith, 2006). After stroke, resources may be limited and therefore goals may be unattainable. The SOC model focuses on attaining goals despite any existing deficits in terms of functioning i.e. maximising gains and minimising losses (Baltes & Baltes, 1990). However, other literature would support disengagement from unattainable goals as this has been shown to be related to higher subjective well being in older adults (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). Wrosch et al (2003) indicated that persistent pursuit of personal goals is only

part of adaptive self regulation and what is equally important is giving up personal goals, i.e., abandon goal directed activities and re-engage in valued alternative goals especially in situations in which people are confronted with unattainable goals. This concept is not entirely dissimilar from SOC in that the SOC processes loss-based selection and compensation are operationalised on the same grounds. Loss-based selection recognises that some goals are unattainable as a result of losses and therefore its emphasis is on selecting certain goals over others where there are losses. On the other hand compensation is similar to goal re-engagement in that alternative means are considered in pursuit of goals but this SOC process is also recognising that some goals are no longer attainable. However the SOC action-theoretical framework's overall emphasis operates around the concept of persistent pursuit of goals despite limited resources for successful development. Although SOC emphasises the minimisation of losses and the maximisation of gains for successful development, in the context of loss following stroke, there may be more positive outcomes in terms of recovery if the effort and commitment is withdrawn from trying to pursue unattainable goals and may result in greater well-being and better HRQOL. In terms of patients having better recovery outcomes following stroke, patients that pursue goals that are still possible may do better in terms of recovery than trying to achieve goals no longer possible.

The literature indicates that often the goals identified by the patients are different from those set by health care professionals in terms of rehabilitation following stroke (Kaufman, 1988). It may be the case that patients are more aware of their potential resources for achieving certain goals in comparison to what health care professionals have interpreted where the focus is more on reduced functions and training (Bendz, 2003; Hart, 1998). Therefore in terms of goal setting as part of rehabilitation intervention, goals that are no longer attainable and goal re-engagement may need to be explicitly expressed and discussed by both the patient and health care professionals in order to reduce the tension and mismatch between the goals of recovery and rehabilitation. SOC and any other goal related theory may have potential to act as a framework in identifying goals as part of the rehabilitation process and to bridge the gap of goal setting between patients and health care professionals. As providing patients with information about setting goals and involving them in the actual process of setting goals have been proposed as positive determinants of motivation (Maclean

et al., 2000).

9.7.2 Methodology issues of SOC

In view of this study's findings that SOC processes did not determine outcomes in this stroke sample, it is therefore important to review how SOC was operationalised. SOC was measured in this study in line with how the authors say it should be measured using a shortened version of the original SOC-48 which is a generic measure used to assess SOC processes in general ageing populations (Baltes et al., 1995; Freund & Baltes, 1998, 2002).

Use of generic measures in condition specific studies can determine quantitatively the particular aspect or variable measured in that patient group and compare with the general population and other patient groups. There are advantages in using a generic measure like SOC-15 in that it allows generalisability of results with other condition specific populations and in particular comparability with a general ageing population. However, the findings from this study would indicate that a generic measure of SOC may not address the individual experiences of dealing with the consequences following stroke although individuals were instructed to think in the context of their stroke when giving their responses. The items in SOC-15 may be too global and not specific enough for a stroke population in order to detect the changes of how people will employ adaptive strategies to overcome any deficits a year later after a stroke.

Generic measures have certain limitations when used in condition specific patient groups such as stroke populations. Although cognitive and language deficits were screened for in this patient population, there are other subtle stroke sequelae that may exist such as proprioception or visual deficits that are difficult to screen for and may affect reliable measurement in a stroke population. The cognitive and language screening measures, although appropriate, may not be sensitive enough to detect some of the more complex higher cortical deficits that present with stroke that are still not completely understood (Kalaria & Ballard, 2001; Patel et al., 2003). Generic type measures may not be suitable for use in stroke patients as a result of the sequelae that the stroke itself may impose on the assessment process. However, it has to be noted that the current study did have evidence that the majority of measures used were reliable. There may be a need for more comparison studies to compare the validity,

reliability, and responsiveness of generic and disease-specific measures in the same population and age-specific groups (Patrick & Deyo, 1989). The emphasis of comparing disease specific and generic measures has primarily focused on quality of life measures in relation to stroke (Geyh et al., 2007; von Steinbuechel, Richter, Morawetz, & Riemsma, 2005; Williams, Weingerger, Harris, & Biller, 1999) but in fact the emphasis may need to be on all measures used in stroke studies, especially in relation to subjective measurement.

It may be a point of argument as to why adaptive strategies were measured using the SOC questionnaire over using a specific coping instrument. As the condition stroke can be primarily concerned with older people, it was therefore considered logical to use a framework and measure that has specific relevance in gerontological science. For example the well known the Ways of Coping Questionnaire (Folkman & Lazarus, 1988) has not been a commonly used measure in older populations as this measure was primarily developed using student populations and its intended purpose was for use in standard adult populations. This current study did not include comparisons of the SOC questionnaire with another coping measure as fieldwork was conducted in a previous study that involved testing comparisons of SOC with two other coping measures in a general ageing population. The results concerning this work have been described in the method chapter (see pages 94 and 95). Based on the findings from this study, the SOC-15 did not predict well established outcome measures such as HRQOL, functional ability and depression. Evidence on coping and stroke outcomes is generally lacking within the literature (Donnellan et al., 2006) and it is therefore difficult to infer whether this study's findings are similar to how other coping measures perform. The most recent studies have shown that coping strategies predicted quality of life (Darlington et al., 2007) but not levels of participation or depression (Rochette et al., 2007).

9.7.3 Psychometric evaluation of SOC-15 in this current study

This study has been the first testing of the SOC-15 in a patient and more specifically a stroke population therefore the psychometric results give some indication for its use in this disease group. The SOC-15 was found to have internal reliability similar to the SOC-48 when used to assess adaptation in a general ageing population (O'Hanlon et al., submitted) with Cronbach's alpha (α) for elective selection, loss-based selection,

optimization and compensation of .55, .60, .64 and .62 respectively. The reliability results reported for SOC-15 subscales in terms of internal consistency in this study were below an accepted level as the estimated Cronbach's alpha (α) should not fall below 0.7 for research purposes (Kline, 1999). Optimization at Time 2 (T2) was the only SOC subscale and composite SOC at both time points that were above this value.

The cronbach's alpha for elective (.26) and loss-based (.32) selection were much poorer in comparison to optimization (.61) and compensation (.50) at Time 1 (T1) and elective selection (.34) continued to be weak at Time 2 (T2). Further analyses examining internal consistency of the elective and loss-based selection showed that the internal consistency for elective and loss-based selection combined as a single selection construct improved considerably. The items for subscales elective and loss-based selection may not have been distinguishable in terms of selecting goals as a result of losses or selecting goals generally free of losses in this patient group. This patient group may have been solely focusing on the losses they perceived as a result of stroke and therefore elective selection items may not have been interpreted as a separate construct. The internal consistency improved for all the SOC subscales at T2 but the frequency use of each SOC item in all specific subscales at T1 was relatively proportional to the frequency use of each item at T2. It may be the case that individuals especially those who sustained a moderate to severe stroke, may be more aware of their deficits one year later compared to their initial awareness during the acute period. Individuals are likely to be overwhelmed by the abrupt onset of stroke and unable to comprehend their situation (Watson & Quinn, 1998).

Internal consistency estimates of reliability primarily address errors due to sampling content i.e. the degree to which the items on a measure are representative of the domain of the construct being measured but also addresses errors due to temporary fluctuations within a single occasion such as fatigue, mood and attentiveness (Pedhazur & Schmelkin, 1991). Temporary fluctuations causing reliability errors such as these may also need to be considered especially in a population following stroke. Other studies that have used SOC self-report measures have also reported results below an acceptable level in terms of internal consistency. One group of researchers looked at a Chinese version of SOC and found the internal consistencies just below acceptable (Chou & Chi, 2001) as did another study that had included a slightly

different answering response (the participant indicated their level of agreement with either the distractor or target answer instead of just choosing distractor or target item) (Wiese, Freund, & Baltes, 2000). Studies that have used the SOC-48 and the SOC-12 have indicated that test retest reliability is considered more adequate to describe the psychometric properties of SOC and result in acceptable scores for test retest reliability (Freund & Baltes, 1998; Jopp & Smith, 2006; Wiese, Freund, & Baltes, 2000). The explanation given for this is that the SOC constructs are considered rather heterogeneous, therefore high homogeneity is not to be expected.

However, Briggs & Cheek (1986) recommend that an optimal level of homogeneity occurs when the mean inter-item correlations are in the range for the inter-item correlation of 0.2 to 0 .4. They believe this to be the optimal range because a single total score lower than 0.1 will not adequately explain the complexity of the items and a score higher than 0.5 would indicate that items on a scale are overly redundant and the construct measured too specific. The inter-item correlations for SOC in this study did generally fall within this range except for the relationship between optimization and compensation which was slightly greater than 0.5 and therefore, overall inter-item correlations did indicate some level of homogeneity. Finally in terms of reliability, it is worth noting that coping measures used in stroke studies have not consistently had acceptable internal consistency results. A review of coping measures used in stroke studies reported that internal consistency reliabilities of the coping subscales were generally less than value considered acceptable (cronbach's $\alpha \geq 0.7$) and only one study reported test-retest reliability (Donnellan et al., 2006). Therefore issues regarding reliability is not solely a methodological problem for SOC but appears to be a concern for the majority of measures that have been used to assess coping or adaptive behaviours in stroke samples.

In terms of validity, it is important to establish from the findings for this study whether the SOC-15 is measuring what it purports to measure. The findings from this study indicate the evidence that there is for construct validity for SOC-15 in a stroke sample, i.e. the extent to which SOC-15 is related to other measures in ways that are consistent with the hypothesised direction. It was expected that greater use of SOC strategies would be negatively related to outcomes that would delay or reduce the process of recovery following stroke such as physical impairment and depression, and

positively related to outcomes that would indicate a better recovery such as better HRQOL and improved functional ability. The main findings in terms of validity of SOC-15 showed there were negative relationships between depression and the SOC subscale optimization and composite SOC a month after stroke. In the longer term, a year after stroke, there were positive relationships between HRQOL and the SOC subscale optimization and composite SOC. Recovery locus of control over recovery was also correlated positively with composite SOC and in particular loss-based selection and optimization at one month and one year after stroke. In line with the literature that shows internal control beliefs to be positively associated with active coping (Carver et al., 1989), it would have been expected in this study that recovery locus of control to positively correlate with SOC. This expected finding is additional support to the validity of the SOC measure used in this study.

However, beyond these findings there was no other evidence to support validity of the SOC-15 questionnaire in a stroke population. The SOC-15 questionnaire had been previously demonstrated to be valid in a study by O'Hanlon et al (Submitted). Their findings supported the validity of the SOC-15 which supported its use to examine adaptation in the context of stroke. They found that the four subscales of the SOC-15 were negatively associated with functional impairments, the experience of pain, depression, loneliness and boredom, and positively related to self-esteem, societal generativity and more positive perceptions of ageing. These results were found in a general healthy ageing sample whereas it may be much more difficult to actually disentangle what the SOC-15 is actually measuring in the context of stroke due to cognitive and perception deficits experienced.

9.7.4 Other Methodology issues

There was variation in the type, amount and when patients actually commenced rehabilitation as a result of different location, hospital and most importantly the hetereogeneity of stroke severity and accompanying medical complications. It was not possible to control for this level of confounding but in the majority of cases, those who were still in hospital two weeks after their stroke would have commenced a rehabilitation programme. All hospitals involved in this study included acute care and rehabilitation as part of the one stroke admission.

Other methodological issues need to be taken into consideration when interpreting the finding of this study. There was a reduction in sample size (n=46) from T1 to T2 and this would have resulted in some statistical power been lost in particular with the multivariate analyses. The timing of assessments post stroke was within one month and one year following stroke. This wide gap from one time point to the next may have resulted in the loss of detecting change over time as significant changes may have been occurring between 3 and 6 months after stroke when discharge from hospital and rehabilitation were more likely to have taken place. Residual consequences may also be more apparent in that physical functioning is less likely to improve and individuals have to deal with permanent damage and the effect this has on everyday living (Astrom et al., 1992; Darlington et al., 2007). It has also been well documented that the greatest risk of occurrence of depression is within the first few months after stroke onset (Burvill et al., 1995; Herrmann et al., 1998). Therefore conducting assessments at 3 and 6 months following stroke may have provided clearer indications of what effect expected events such as readjusting back into one's own home environment again following discharge, would have on the adaptation process during these time points.

Finally other study limitations of note are from a statistical perspective. There was increased risk of committing Type I errors as a result of multiple statistical testing. However, the Bonferroni correction was set for any exploratory subgroup analyses that were not indicated in the hypotheses and when several pair-wise comparisons were made. The most credence was also given to the original, a priori hypotheses and less to any secondary analyses. Beyond using this criteria, replication of the study which may not be feasible, is the conventional method ensures reliability of study findings. The other statistical limitation is that there may not have been enough power in the study in terms of sample size to detect other moderation effects. Aguinis (2004) has shown that the power of this test can be very low, typically below 50%. Therefore, one needs very large sample sizes over 200 to have reasonable power to detect moderator effects when one of the variables is continuous.

9.8 Further recommendations and future directions

The aim of this study was to gain further understanding of the use of SOC strategies following the sudden onset of a condition with uncertain potential for recovery or recurrence. The hypotheses of this research were that the use of SOC strategies would improve patients' outcomes in terms of functional ability, HRQOL and mood (lower depression levels). However the study's findings were not in line with the hypotheses set out initially. The limitations of the study have focused primarily on how SOC was operationalised within the context of stroke in that a generic self-report measure did not indicate the adaptive strategies that patients may employ after stroke to be predictive of adaptation or recovery. Therefore, the SOC model may potentially be better considered as a framework to organise and implement stroke rehabilitation as in goal setting, pursuit and attainment.

Considerations for measuring SOC in future stroke studies would be dependent on a study's aim and complexity of its design but there may be advantages in using a specific SOC questionnaire that had greater emphasis on stroke related issues. There is now growing support that SOC should focus on specific domains of functioning (Jopp & Smith, 2006) as there is evidence to show that the preference for SOC strategies is domain specific (Wiese, Freund, & Baltes, 2000). Another consideration would be using a generic form alongside a domain-specific SOC measure as this has been the method employed in some quality of life studies (Darlington et al., 2007). This would allow a study to explore specific behaviours relevant to stroke but also make some generalisations with other medical conditions and to general healthy populations.

Alternative methods for assessing the use of SOC strategies in a stroke population may need also to be considered as a result of the findings from this study. In line with Jopp and Smith's (2006) recommendations, behavioural measures of SOC may be more reliable because with self-report SOC, it may be difficult to determine whether individuals are actually using SOC strategies and not simply articulating a preference for their use. In stroke where communication and cognitive impairments exist, self-reports of observed behaviours by therapists for example, would allow a broad range of patients to be included in a study including patients with cognitive and language

difficulties. The method employed by Gignac et al. (2002) was qualitative using content analysis where behavioural adaptation interview responses were categorised as selection, optimization and compensation. A similar approach could be taken with a stroke population in order to identify the use of SOC processes that indicate adaptive responses to the life changing events following stroke. This approach could be a consideration as part of therapy assessment and implementation that patients are involved with after stroke. This would entail that therapists delivering rehabilitation care could observe patient's behaviour in how they respond to therapy and categorise this behaviour using each of the SOC processes. The therapist would be acting as SOC proxies on behalf of the patient.

Another consideration is the method employed by Lang et al. (2002) where indicators of adaptation strategies were generated from changes of self-reports on everyday activities over time. This method would involve using an instrument that provides minute to minute reconstruction of the sequence, duration, frequency and geographical and social context of activities engaged in during a day preceding an interview. This recorded information of activities can then be organised into specific activity categories e.g. self-care, social engagement, housekeeping). The activity categories are then related to the specific SOC processes (elective selection, loss-based selection, optimization and compensation). This method may be worth exploring further in the context of stroke as the competence and capability required for achieving everyday activities following stroke is of significant importance in determining outcome in terms of recovery. Therefore identifying SOC strategies from changes reported in everyday activities following stroke may give some indication on the adaptive process involved.

The predictive value of resources in determining SOC use in stroke patients was not examined as part of this study. However, a follow on study examining if the change in resources is related to change in SOC strategies would be an important perspective to explore establishing whether this component of the SOC model in a stroke sample is consistent with other research work that has examined this component of the model (Baltes & Lang, 1997; Jopp & Smith, 2006).

As the test of cognitive impairment used in this study did not facilitate the isolation of

executive dysfunction, therefore it was not possible to examine whether executive dysfunction and at what level affected the participants in their choice of SOC use and how more complex activities were affected as a result of stroke. Executive function is the component of cognition that involves self-monitoring and self-regulation of behaviour in accordance with the environment. In terms of assessing SOC strategy use, it would be important in further research to identify patients with executive dysfunction using a battery of executive function tests. Therefore it may be possible to establish how executive dysfunction impairs the endorsement of SOC strategies as executive function refers to the ability to direct behaviour in a goal-directed manner.

9.9 Conclusion

The aim of this study was to examine adaptive strategies along with other predictor variables that may lead to enhanced outcome for patients in the first year after stroke using the Baltes SOC model (Baltes & Baltes, 1990) of successful ageing. This study has relevance both to understanding of the use of the SOC model within the context of a sudden onset condition such as stroke and how it is associated with stroke outcomes. This was the first longitudinal study to date to examine the use of SOC strategies within the context of a sudden condition such as stroke that potentially becomes chronic over time.

In line with the review on defining and quantifying coping strategies after stroke as part of the preparatory work for this study (Donnellan et al., 2006), no further inferences can be make from this study's results as to the type of adaptive strategies that patients use following acute stroke that predict outcome one year later. Self-rated SOC strategies did not predict stroke outcome in terms of HRQOL, functional ability and depression one year after stroke.

In terms of advancing and developing the SOC model further in the context of health-related conditions, findings from the study showed that use of SOC strategies in a stroke population were not age specific and that there was no change in the use of SOC strategies over time, with the exception of the subscale compensation.

Stroke patients engaged in the use of SOC strategies indicating that SOC strategies may potentially be used in response to loss regulation after stroke. These patients did

engage in the use of loss-based selection strategies more frequently in comparison to the other SOC subscales. This was an expected finding since loss-based selection strategies are triggered by loss experience or in response to losses and involves restructuring one's goals in favour of goals that can still be accomplished. Some patterns of SOC use e.g. the use of compensation strategies in response to some specific changes such as their use in relation to functional limitations were not expected. Therefore there may be less reliance on using compensation strategies such as external aids and help as indicated by the SOC model in response to losses. The SOC subscale optimization showed the most significant positive associations with other variables such as depression and stroke severity. Recovery locus of control was also positively associated with depression levels and with the SOC subscales at both time points. The associations found between recovery locus of control and SOC subscales is worth further consideration in future research as the association between appraisal and the use of SOC strategies has received little attention to date.

In addition to previous research, this study gives further insights into the operationalisation of SOC as a generic measure within the context of a health-related condition. SOC as a generic measure did not predict stroke outcome after one year. The findings from this study indicate that a stroke specific measure of SOC may be warranted in order to detect significant differences in determining outcomes for a stroke population. In future studies and interventions, the development and application of a stroke specific self report assessment of SOC processes may answer some of the unresolved issues in relation to the use of SOC processes after stroke.

Future research into the psychological components for stroke and rehabilitation still requires further investigation in determining the specific role that psychological factors can make to the adaptation and recovery of patients after stroke (Barton, 2007).

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Appendix I – Participant information sheet & consent form

STROKE STUDY INFORMATION SHEET

Title: Adjustment and coping after Stroke

Introduction: *We invite you and the person closest to you to take part in a research study. The aim of this research is to look at how people cope and adjust following a stroke. The findings from this study will give us a better understanding of the impact a stroke has on a person's quality of life. This may help us to improve the care provided for other patients in the future.*

What does the study involve for patients?

You and the person closest to you will be interviewed by a researcher who will fill out some questionnaires on how you are coping and adjusting following your stroke. The interview will be carried out in hospital at a time that is convenient for you. If you feel unable to take part in the interview as a result of the stroke, your next of kin or the person closest to you can answer the questions in the interview on your behalf.

What does the study involve for the next of kin/significant other?

If you are the next of kin or the person closest to the patient taking part in this study, you will be interviewed separately at a time that is convenient for you. Alternatively the interview questions can be left with you to fill out in your own time. We are very keen to have the views of the patients' significant other as coping with a stroke may also be very challenging for you. If you are also participating in the study on the patient's behalf, you

will be asked to complete a questionnaire about the patient asking information that you will be likely to know.

A follow-up interview will be carried out a year later to see the changes made during this period. You will be contacted prior to this time by either telephone or by post.

Voluntary Participation: *Your participation in this study is completely voluntary. If you decide to take part, you will be asked to sign a consent form. However, you are free to withdraw from the study at any time without explanation. Your decision to take part, or otherwise, in no way influences the patient's care in the hospital. The researcher is not part of your medical team and will not discuss your responses with them.*

Confidentiality: *All information obtained in this study will remain confidential. Your name will not be published and will not be disclosed to anyone within or outside the hospital.*

Permission: *The study has been given permission by St James's Hospital and Federated Dublin Voluntary Hospitals (includes the Adelaide and Meath Hospitals, Tallaght) Joint Research Ethics Committee.*

Contact for Further Information: *You can get more information and answers to any questions or concerns you may have about the study from Ms Claire Donnellan, Stroke Research Nurse who can be contacted on: 01 4142576 or (086) 1777778*

CONSENT FORM

Study Title: Coping with Stroke

This study and this consent form have been explained to me. The Researcher has answered all my questions to my satisfaction. I believe I understand what will happen if I agree to be part of this study.

I have read, or had read to me, this consent form. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction. I freely and voluntarily agree to be part of this research study. I have received a copy of this agreement and the information sheet explaining the study.

PARTICIPANT'S NAME:_____
(Block capitals)
PARTICIPANT'S SIGNATURE: _____

Date:_____

Participant: Patient ☐ ***Significant Other/NOK*** ☐ ***Proxy*** ☐

Statement of the researcher's responsibility: I have explained the nature, purpose, procedures, benefits, risks of, or alternatives to, this research study. I have offered to answer any questions and fully answered such questions. I believe that the participant understands my explanation and has freely given informed consent.

RESEARCHER'S SIGNATURE: _____

Date: _____

(Keep the original of this form in the participant's medical record, give one copy to the participant, keep one copy in the Researcher's records.)

Appendix II - Measures

Patient Study No.

Patient Clinical Background Information

Section 1: General Details

1.1 Gender: M ❒ F ❒ 1.2 Hosp No: _____ 1.3 DOB:_____

1.4 Date of Admission: _____ 1.5 Date of Stroke: _____

1.6 Admitted from: Home ❒ Referral Hospital ❒ GP ❒ Nursing Home ❒ Residential Home ❒ Other ❒ Specify: _____

1.7 Length of Stay: (days) _____ 1.8 Date of Discharge: _____

1.9 Date of Death (if applicable): _____

Section 2: Medical History

Previous History of	No	Yes	No. of Episodes
2.1 Previous TIA/ Stroke			
2.2 Heart Disease			
2.3 Hypertension			
2.4 Diabetes			
2.5 High Cholesterol			
2.6 Anxiety/Depression			

2.7 Other co-morbidities generally and during this admission Yes ❒ No ❒
If yes, please specify _____

Section 3: Stroke Classification

3.1 Stroke type: Ischaemic ❒ Haemorrhagic ❒

3.2 Stroke subtype: Total Anterior Circulation Infarct ❒ Partial Anterior Circulation Infarct ❒ Lacunar ❒ Posterior Circulation Infarct ❒

3.3 Lesion location: Right hemispheric ❒ Left hemispheric ❒ Brain stem ❒

Section 4: Background Information

4.1 Marital status: Married ❒ Separated ❒ Divorced ❒ Widowed ❒
Never married/Single ❒

4.2 Do You: Live alone ❒ Live with others ❒

4.3 Which of the following best describes the highest level of education you have completed?

Primary Education or less ❒

Some Second Level, no exams/none passed ❒

Second Level, exams (ROI: Group or Inter Certificate, NI: Junior Cert or O-Levels) ❒

Diploma or equivalent from university/RTC/Tech ❒

Primary/Bachelors Degree or equivalent ❒

Higher Degree ❒

4.5 What was/is your occupation? [If retired, record main pre-retirement occupation. If relevant, record the rank or grade e.g. rank in army or Gardaí, grade in civil Service. If farmer, record number of acres farmed]

If no occupation is given, proceed to question 4.6

4.5(a) Were/are you employed or self-employed? Employed ❒ Self-employed ❒

4.5(b) Did/do you manage or supervise others? No ❒ Yes (Manager) ❒ Yes (Supervisor) ❒

If no, proceed to question 4.6

4.5(c) How many people did/do you manage or supervise?

Less than 25 ❒ 25 or more ❒

4.6 What was/is the occupation of your spouse? [If retired, record main pre-retirement occupation. If relevant, record the rank or grade – e.g. rank in army or Gardaí, grade in civil Service. If farmer, record number of acres farmed]

Patient Study No.

Orpington Prognostic Score

Date of Assessment: / /

This is a stroke severity measure. It has 4 parts. I will be checking strength of your arm, awareness of arm, asking some memory questions and looking at your ability to sit up stand and walk.

1. Motor deficit in arm (see MRC grading below)	Score
1a. MRC grade 5	0
1b. MRC grade 4	0.4
1c. MRC grade 3	0.8
1d. MRC grade 1-2	1.2
1e. MRC grade 0	1.6
2. Proprioception (eyes closed) Locates affected thumb:	
2a. Accurately	0
2b. Slight difficulty	0.4
2c. Finds thumb via arm	0.8
2d. Unable to find thumb	1.2
3. Balance	
3a. Walks 10 feet without help	0
3b. Maintains standing position	0.4
3c. Maintains sitting position	0.8
3d. No sitting balance	1.2
4. Cognition	
4a. Mental Test Score 10	0
4b. Mental Test Score 8-9	0.4
4c. Mental Test Score 5-7	0.8
4d. Mental Test Score 0-4	1.2
Total score = 1.6 + motor + proprioception + balance + cognition	
MRC GRADING FOR POWER	
Greatest power in the extensors of the affected limb	**Score**
Normal power	5
Diminished power	4
Movement against gravity	3
Movement with gravity eliminated	2
Flicker when attempting movement	1
No movement	0
Abbreviated Mental Test	
One point for each correct answer	**Score**
1. Age	1
2. Time (to nearest hour)	1
3. An address for recall at end of test – this should be repeated by the patient to ensure it has been heard correctly: 42 West Street	1
4. Year	1
5. Name of hospital	1
6. Recognition of two persons (doctor, nurse etc) Additional item	1
7. Date of birth	1
8. Year of first world war	1
9. Name of present president/monarch	1
10. Count backwards from 20 to 1	1
Total: / 10	

Patient Study No.

Frenchay Aphasia Screening Test (FAST)

Comprehension

Show patient card with river scene. Say "Look at the picture. Listen carefully to what is said and point to the things I tell you to". Score 1 for each correctly performed. If instructions require repeating, score as error. Unprompted self-correction may be scored as correct. Score range 0 - 10.

(a) River Scene

1. Point to a boat	1
2. Point to the tallest tree.	1
3. Point to the man and point to the dog.	1
4. Point to the man's left leg and then to the canoe.	1
5. Before pointing to a duck near the bridge, show me the middle hill	1
Total Score	

(b) Shapes

1. Point to the square.	1
2. Point to the cone.	1
3. Point to the oblong and the square.	1
4. Point to the square, the cone and the semi-circle.	1
5. Point to the one that looks like a pyramid and the one that looks like a segment of orange.	1
Total Score	

Expression

(a.) Show patient the river scene and say : "Tell me as much about the picture as you can". If patient does not appear to understand, say: "Name anything you can see in the picture". Score range 0 - 5

Unable to name any objects intelligibly	0
Names 1-2 objects	1
Names 3-4 objects	2
Names 5-7 objects	3
Names 8 or 9 objects or uses phrases and sentences, but performance not normal (e.g. hesitations, inappropriate comments etc.)	4
Normal – uses phrases and sentences, naming 10 items	5
Score	

(b.) Remove picture card from view and inform patient that you are now going to attempt something a little different. Then ask him/her to name as many animals as he/she can think of in 1 minute. Record the names of any kind of animal, wild or domestic, and not just those which may have been seen in the picture. Commence timing as soon as patient names first animal and allow 60 seconds. Score 0-5

None named	0
Names 1-2	1
Names 3-5	2
Names 6-9	3
Names 10-14	4
Names 15 or more	5
Score	

Comprehension (a)	
Comprehension (b)	
Expression (a)	
Expression (b)	
Overall Total Score	**/20**

Sheet of paper for naming animals

Patient Study No.

Barthel Index

1. FEEDING
0 = unable
1 = needs help cutting, spreading butter, etc., or requires modified diet
2 = independent

_____

2. BATHING
0 = dependent
1 = independent (or in shower) _____

3. GROOMING
0 = needs help with personal care
1 = independent face/hair/teeth/shaving (implements provided) _____

4. DRESSING
0 = dependent
1 = needs help but can do about half unaided
2 = independent (including buttons, zips, laces, etc.) _____

5. BOWELS
0 = incontinent (or needs to be given enemas)
1 = occasional accident
2 = continent _____

6. BLADDER
0 = incontinent, or catheterized and unable to manage alone
1 = occasional accident
2 = continent _____

7. TOILET USE
0 = dependent
1 = needs some help, but can do something alone
2 = independent (on and off, dressing, wiping) _____

8. TRANSFERS (BED TO CHAIR AND BACK)
0 = unable, no sitting balance
1 = major help (one or two people, physical), can sit
2 = minor help (verbal or physical)
3 = independent _____

9. MOBILITY (ON LEVEL SURFACES)
0 = immobile or < 50 yards
1 = wheelchair independent, including corners, > 50 yards
2 = walks with help of one person (verbal or physical) > 50 yards
3 = independent (but may use any aid; for example, stick) > 50 yards _____

10. STAIRS
0 = unable
1 = needs help (verbal, physical, carrying aid)
2 = independent _____

TOTAL (0–20): _____

Patient Study No.

SOC 15

We are interested in learning about how you decide which things in life are important for you and how you go about accomplishing what you want in life "**since your stroke**". In the following, we present examples of two different ways people might have. Imagine there are two people talking about what they would do in a particular situation. We would like you to decide which person is most similar to you – in other words, which one behaves most like the way you probably would. Now, think about your life overall, including how things are going, think about your goals – that is, both things that you want to improve and things that you are satisfied with and want to maintain. In each case circle A or B.

1 PERSON A	PERSON B
When something doesn't work as well as usual, I look at how others do it	When something doesn't work as well as usual, I don't spend much time thinking about it

Which person is most similar to you?

A	B

2 PERSON A	PERSON B
When I can't do something as well as I used to, I wait and see what comes	When I can't do something as well as I used to, I think about exactly what is important to me

Which person is most similar to you?

A	B

3 PERSON A	PERSON B
I keep trying until I succeed at a goal	I don't keep trying very long, when I don't succeed right away at a goal

Which person is most similar to you?

A	B

4 PERSON A	PERSON B
When things don't go so well as before, I wait for better times	When things don't go as well as before, I drop some goals to concentrate on the more important ones

Which person is most similar to you?

A	B

5 PERSON A	PERSON B
I do everything I can to make my plans work	I wait a while first to see if my plans will work out by themselves

Which person is most similar to you?

A	B

6 PERSON A	PERSON B
When things don't go as well as they used to, I keep trying other ways until I can achieve the same result I used to	When things don't go as well as they used to, I accept it

Which person is most similar to you?

A	B

7 PERSON A	PERSON B
I can change a goal again at any given time	When I decide upon a goal, I stick to it

Which person is most similar to you?

A	B

8 PERSON A	PERSON B
When I am not able to achieve something anymore, I direct my effort at what is still possible	When I am not able to achieve something anymore, I trust that the situation will improve by itself

Which person is most similar to you?

A	B

9 PERSON A	PERSON B
When I have started something that is important to me, but has little chance at success, I make a particular effort	When I have started something that is important to me, but has little chance at success, I usually stop trying

Which person is most similar to you?

A	B

10 PERSON A	PERSON B
When I can't do something as well as before, then I accept it	When I can't do something as well as before, then I find out about other ways and means to achieve it

Which person is most similar to you?

A	B

11 PERSON A	PERSON B
I make important life decisions	I don't like to commit myself to specific life decisions

Which person is most similar to you?

A	B

12 PERSON A	PERSON B
I think about exactly how I can best make my plans work	I don't think long about how to best to make my plans work, I just try it

Which person is most similar to you?

A	B

13 PERSON A	PERSON B
Even when I really consider what I want in life, I wait and see what happens instead of committing myself to just one or two particular goals	When I think about what I want in life, I commit myself to one or two important goals

Which person is most similar to you?

A	B

14 PERSON A	PERSON B
I consider exactly what is important for me	I take things as they come and carry on from there

Which person is most similar to you?

A	B

15 PERSON A	PERSON B
When I can no longer do something in my usual way, I don't think long about it	When I can no longer do something in my usual way, I think about, what exactly, I am able to do under the circumstances

Which person is most similar to you?

A	B

Scoring for each SOC item and corresponding SOC subscales

Item Number	Item	SOC subscale	Coding
SOC 1	When something doesn't work as well as usual, I look ...	COM	A (1); B (0)
SOC 2	When I can't do something as well as I used to, I wait.....	LBS	A (0); B (1)
SOC 3	I keep trying until I succeed at a goal.....	OPT	A (1); B (0)
SOC 4	When things don't go so well as before, I wait for.....	LBS	A (0); B (1)
SOC 5	I do everything I can to make my plans work....	OPT	A (1); B (0)
SOC 6	When things don't go as well as they used to, I keep....	COM	A (1); B (0)
SOC 7	I can change a goal again at any given time	ES	A (0); B (1)
SOC 8	When I am not able to achieve something anymore.....	LBS	A (1); B (0)
SOC 9	When I have started something that is important to me...	OPT	A (1); B (0)
SOC 10	When I can't do something as well as before, then I.....	COM	A (0); B (1)
SOC 11	I make important life decisions.....	ES	A (1); B (0)
SOC 12	I think about exactly how I can best make my plans.....	OPT	A (1); B (0)
SOC 13	Even when I really consider what I want in life, I wait.....	ES	A (0); B (1)
SOC 14	I consider exactly what is important for me.....	ES	A (1); B (0)
SOC 15	When I can no longer do something in my usual way.....	LBS	A (0); B (1)

ES=Elective selection, LBS=Loss-based selection, OPT=Optimization, COM=Compensation

Patient Study No.

Hospital Anxiety and Depression Scale (HADS)

The following are questions relating to how you are feeling at present. Please choose the reply which comes closest to how you have been feeling **in the past week**. Don't take too long over your replies; your immediate reaction to each item will probably be more accurate than a long thought-out response.

A	**I feel tense or wound up:**		D	**I feel as if I am slowed down:**	
	Most of the time	3		Nearly all the time	3
	A lot of the time	2		Very often	2
	From time to time, occasionally	1		Sometimes	1
	Not at all	0		Not at all	0
D	**I still enjoy the things I used to enjoy:**		A	**I get a sort of frightened feeling like "butterflies" in the stomach:**	
	Definitely as much	0		Not at all	0
	Not quite so much	1		Occasionally	1
	Only a little	2		Quite often	2
	Hardly at all	3		Very often	3
A	**I get a sort of frightened feeling as if something awful is about to happen:**		D	**I have lost interest in my appearance:**	
	Very definitely and quite badly	3		Definitely	3
	Yes but not too badly	2		I don't take as much care as I should	2
	A little, but it does'nt worry me	1		I may not take quite as much care	1
	Not at all	0		I take as much care as ever	0
D	**I can laugh and see the funny side of things:**		A	**I feel restless as I have to be on the move:**	
	As much as I always could	0		Very much indeed	3
	Not quite so much now	1		Quite a lot	2
	Definitely not so much now	2		Not very much	1
	Not at all	3		Not at all	0
A	**Worrying thoughts go through my mind**		D	**I look forward with enjoyment to things**	
	A great deal of the time	3		As much as I ever did	0
	A lot of the time	2		Rather less than I used to	1
	From time to time, but not too often	1		Definitely less than I used to	2
	Only occasionally	0		Hardly at all	3
D	**I feel cheerful**		A	**I get sudden feeling of panic:**	
	Not at all	3		Very often indeed	3
	Not often	2		Quite often	2
	Sometimes	1		Not very often	1
	Most of the time	0		Not at all	0
A	**I can sit at ease and feel relaxed**		D	**I can enjoy a good book or radio or TV program:**	
	Definitely	0		Often	0
	Usually	1		Sometimes	1
	Not often	2		Not often	2
	Not at all	3		Very seldom	3

Scoring (add the As = Anxiety. Add the Ds = Depression).
0 – 7 = Normal, 8 – 10 = Possible, 11 – 12 = Probable

Patient Study No.

Stroke-specific Quality of Life questionnaire (SS-QOL)

We would like to know how you're doing with activities or feelings that can sometimes be affected by stroke. Each question will ask about a specific activity or feeling. For each question, think about how that activity or that feeling has been **in the past week**.
The first group of questions asks about how much trouble you have with specific activities. Each question deals with problems that some people have after their stroke. Circle the number in the box that best describes how much trouble you have had with that activity **in the past week.**

	Couldn't do it at all	A lot of trouble	Some trouble	A little trouble	No trouble at all
Physical function					
1. Did you have trouble eating, for example, cutting food or swallowing?	1	2	3	4	5
2. Did you have trouble getting dressed, for example, putting on socks or shoes, buttoning buttons, or zipping?	1	2	3	4	5
3. Did you have trouble taking a bath or shower?	1	2	3	4	5
4. Did you have trouble walking?	1	2	3	4	5
5. Did you lose your balance when bending over or reaching for something?	1	2	3	4	5
6. Did you have trouble getting out of a chair?	1	2	3	4	5
7. Did you have trouble writing or typing?	1	2	3	4	5
8. Did you have trouble opening a jar?	1	2	3	4	5
9. Did you have trouble doing daily work around the house?	1	2	3	4	5
10. Did you have trouble doing the work you used to do?	1	2	3	4	5
Language					
11. Did you have trouble speaking, for example, get stuck, stutter, stammer, or slur your words?	1	2	3	4	5
12. Did you have trouble speaking clearly enough to use the telephone?	1	2	3	4	5
13. Did other people have trouble understanding what you said?	1	2	3	4	5
14. Did you have trouble finding the word you wanted to say?	1	2	3	4	5
15. Did you need to repeat yourself so others could understand you?	1	2	3	4	5
Vision					
16. Did you have trouble seeing the television well enough to enjoy a show?	1	2	3	4	5
17. Did you have trouble reaching for things because of poor eyesight?	1	2	3	4	5
18. Did you have trouble seeing things off to one side?	1	2	3	4	5

The next questions ask about how much you agree or disagree with each statement. Each question deals with a problem or feeling that some people have after a stroke. Circle the number in the box that best describes how you felt about each statement **during the past week**.

	Strongly agree	Moderately agree	Neither agree nor disagree	Moderately disagree	Strongly disagree
Thinking					
19. It was hard for me to concentrate.	1	2	3	4	5
20. I had trouble remembering things.	1	2	3	4	5
21. I had to write things down to remember them.	1	2	3	4	5
Energy					
22. I felt tired most of the time.	1	2	3	4	5
23. I had to stop and rest often during the day.	1	2	3	4	5
24. I was too tired to do what I wanted to do.	1	2	3	4	5
Mood					
25. I was discouraged about my future.	1	2	3	4	5
26. I wasn't interested in other people or activities.	1	2	3	4	5
27. I felt withdrawn from other people.	1	2	3	4	5
28. I had little confidence in myself.	1	2	3	4	5
29. I was irritable.	1	2	3	4	5
30. I didn't join in activities just for fun with my family or friends.	1	2	3	4	5
31. I felt I was a burden to my family.	1	2	3	4	5
Role Function					
32. I didn't go out as often as I would like.	1	2	3	4	5
33. I did my hobbies and recreation for shorter periods of time than I would like.	1	2	3	4	5
34. I didn't see as many of my friends as I would like.	1	2	3	4	5
35. My physical condition interfered with my social life.	1	2	3	4	5

Patient Study No.

Recovery Locus of Control questionnaire (RLOC)

These are statements other people have made about their recovery. Please will you indicate the extent to which you agree or disagree with them.

	Strongly agree	*Agree*	*Uncertain*	*Disagree*	*Strongly disagree*
1. How I manage in the future depends on me, not on what other people can do for me.					
2. It's often best just to wait and see what happens.					
3. It's what I do to help myself that's really going to make all the difference.					
4. My own efforts are not very important, my recovery really depends on others					
5. It's up to me to make sure that I make the best recovery possible.					
6. My own contribution to my recovery doesn't amount to much.					
7. Getting better now is a matter of my own determination rather than anything else.					
8. I have little or no control over my progress from now on.					
9. It doesn't matter how much help you get, in the end it's your own efforts that count.					

Patient Study No.

Nottingham Extended ADL Index

Domain	Questions: Do you.....	Not at all	With help	Alone with difficulty	Alone easily
Mobility	Walk around outside?				
	Climb stairs?				
	Get in and out of the car?				
	Walk over uneven ground?				
	Cross roads?				
	Travel on public transport?				
In the kitchen	Manage to feed yourself?				
	Manage to make yourself a hot drink?				
	Take hot drinks from one room to another?				
	Do the washing up?				
	Make yourself a hot snack?				
Domestic tasks	Manage your own money when you are out?				
	Wash small items of clothing?				
	Do your own housework?				
	Do your own shopping?				
	Do a full clothes wash?				
Leisure activities	Read newspapers or books?				
	Use the telephone?				
	Write letters?				
	Go out socially?				
	Manage your own garden?				
	Drive a car?				

Scoring: 0 = Not at all; with help.
1 = On my own with difficulty; alone easily.

Appendix III – Ethics approval letters

THIS NOTEPAPER MUST NOT BE USED FOR PRESCRIPTIONS OR INVOICING PURPOSES

Dan Lynch, Joint Research Ethics Committee Secretariat.
Telephone : 4142860. Fax : 4142371. Email: dan.lynch@amnch.ie

THE ADELAIDE & MEATH HOSPITAL, DUBLIN
INCORPORATING
THE NATIONAL CHILDREN'S HOSPITAL

TALLAGHT, DUBLIN 24, IRELAND
TELEPHONE +353 1 4142000

Ms. Claire Donnellan,
Stroke Research Nurse,
William Stokes Unit,
Adelaide & Meath Hospital, Dublin,
Incorporating the National Children's Hospital,
Tallaght,
Dublin 24.

Wednesday, 03 March 2004

RE : The implications of stroke for successful ageing: is the SOC model useful as an explanatory framework in adaptation to stroke?

Please quote this reference in all communications regarding this study : 040302/1804

Dear ~~Prof. O'Neill,~~ Ms Donnellan,

The Joint Research Ethics Committee at its meeting on 2nd March 2004 agreed to give ethical approval to the above study.

Yours sincerely,

Daniel R. Lynch,
Senior Executive Officer.

335703001

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

Naas General Hospital
Naas
Co Kildare

Telephone: 045 84 9510
Fax: 045 84 9617

25th January 2005.

Ms. Claire Donnellan,
Stroke Research Fellow,
Faculty of Health Sciences,
Trinity Education Centre,
Adelaide and Meath Hospital,
Tallaght,
Dublin 24.

Re: Proposal for a Research Study: Coping with Stroke (abbreviated title)

Dear Ms. Donnellan,

Thank you for your email of 18th January, which included a copy of the above proposal.

As requested, a copy of the proposal will be brought to the attention of members of the Ethics Committee at Naas General Hospital for their consideration. A meeting of the committee is convened for Wednesday 16th February 2005.

Pending approval, you might advise me of who will be carrying out the actual research, if its known at this point.

Yours sincerely,

Michael Knowles
General Manager
michael.knowles@mailm.hse.ie

BELFAST CITY HOSPITAL TRUST
incorporating
BELVOIR PARK HOSPITAL

LISBURN ROAD, BELFAST BT9 7AB

TELEPHONE (028) 9032 9241
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c/o Post Graduate Centre
Lisburn Road
Belfast BT9 7AB

Telephone: 028 90263925 extn 2381
Fax: 028 90263925
E-mail: research.office@bch.n-i.nhs.uk

01 October 2004

Ms C Donellan,
WILLIAM STOKES UNIT
ADELAIDE & THE MEATH HOSPITAL
TALLAGHT 24

Dear Ms Donellan,

Please find below the projects on the research register of the Belfast City Hospital Trust (BCHT) in which your involvement has been registered. Please contact the Research Office if any of the details are incorrect.

If you are involved in any project not listed, and it involves BCHT staff, patients or takes place on BCHT premises, please register it immediately. Forms are available from the Belfast City Hospital Research Office.

Project ID: 04035VC-A A Longitudinal study of the implications of stroke for successful ageing: is the SOC model useful as an explanatory framework in adaptation to stroke?

Ethics Ref: 64/04b **Start:** **End:**

Lead Directorate: Acute Medicine

Sponsor/Funder:	**Organisation:**
Funder	Health Research Board Programme
Sponsor	Royal College of Surgeons in Ireland

Thank you.
Yours sincerely

Zoe Hunter

Research Co-ordinator

THE ROYAL GROUP OF HOSPITALS AND DENTAL HOSPITAL HEALTH AND SOCIAL SERVICES TRUST

Grosvenor Road
BELFAST
BT12 6BA
TEL: 028 90 633300/04

14th December 2004

Claire Donnellan
William Stowes Unit
Age-Related Health Care
Adelaide & Meath Hospital
Tallaght
Dublin 24

Dear Ms Donnellan

HONORARY APPOINTMENT

I am instructed by the Royal Group of Hospitals and Dental Hospital Health and Social Services Trust to offer you an Honorary appointment as a Research Placement in the Clinical Services Department from 14th December 2004 to 1st September 2006 subject to:

a) any relevant provisions of the Health and Personal Social Services (Northern Ireland) Order 1972 and the Health and Personal Social Services (Northern Ireland) Order 1991 and any rules, orders regulations made thereunder;

b) the conditions of service determined by the Trust from time to time in so far as they are applicable to Honorary Appointments; and

c) the terms and conditions of appointment as set out hereunder.

You will be required to conform with any rules or instructions issued by the Trust or any authorised officers of the Trust.

In consideration of the above offer of any Honorary Appointment, you undertake to indemnify the Trust and/or their officers against any liability, which they or any of them may incur owing to the granting of such an appointment.

During or following the period of the appointment you will not disclose without lawful authority, other than to an authorised person or in the course of duty, any matter or information which you have obtained or to which you have had access owing to the appointment.

If you agree to accept the appointment on the terms and conditions of service detailed above, please sign the form of acceptance on the enclosed copy of this letter and return that copy (completed) to me.

Yours sincerely

for **CHIEF EXECUTIVE**

To: The Chief Executive
Royal Group of Hospitals and Dental Hospital
Health and Social Services Trust

I hereby undertake in consideration of the above offer of an Honorary Appointment to indemnify the Royal Group of Hospitals and Dental Hospital Health and Social Services Trust and/or their officers against any liability which they or any of them may incur owing to the granting of such an appointment.

SIGNATURE (in full) _____

DATE THIS 16th DAY OF DECEMBER 2004