Is the Nottingham Adjustment Scale a useful measure for assessing adjustment to chronic illness or disability in people with acquired brain injuries?

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## CONTENTS

**Abstract**  
2

**Contents**  
3

**List of Tables and Figures**  
6

**Chapter 1**

1. **Introduction**  
8
1.1(a) Adjustment to disability/illness  
8
1.1(b) Definition of adjustment  
8
1.1(c) Theories of adjustment  
10
(i) Person orientated approaches  
10
(ii) Social environmental approaches  
13
(iii) Cognitive approaches  
14
(iv) Integrative approaches  
16

1.2 **Psychological variables and their relationship to psychological adjustment**  
17
1.2(a) Coping and adjustment  
17
1.2(b) Self esteem  
21
1.2(c) Depression and adjustment  
26
1.2(d) Self efficacy  
34
1.2(e) Attributions  
38
1.2(f) Locus of Control  
41
1.2(g) Awareness of deficits  
45

1.3(a) **The relationship between cognitive functioning and adjustment**  
47

1.4(a) **The influence of physical/functional disability on mood and adjustment**  
48

1.5 **Conclusion**  
49

1.6 **Neurological Rehabilitation**  
51
1.6(a) **The relationship between psychological factors and outcome of rehabilitation.**  
53
4.3 Results

4.3(i) Change in level of functioning from start to end of rehabilitation 85
4.3(ii) Relationship between adjustment at intake and change in functioning over the rehabilitation period. 87
4.3(iii) Relationship between level of adjustment and cognitive functioning at the beginning of rehabilitation. 88
4.3(iv) Relationship between level of physical disability and NAS subscales at the beginning of the rehabilitation. 91
4.3(v) Change in level of adjustment from start to end of rehabilitation. 92
4.3(vi) Effect of diagnosis on adjustment 94

4.4 Discussion 94

4.4(i) Hypothesis One 94
4.4(ii) Hypothesis Two 99
4.4(iii) Hypothesis Three 101
4.4(iv) Changes in adjustment over the rehabilitation period. 102

Chapter 5

5.1 Summary of findings. 103
5.2 Conclusion 104
5.3 Limitations of the present studies 107

Appendices 109

Bibliography 110
<table>
<thead>
<tr>
<th>Figure/Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>The relationship between key variables for adjustment.</td>
<td>50</td>
</tr>
<tr>
<td>Table 1</td>
<td>Details of age at time of study and months post onset for whole sample.</td>
<td>62</td>
</tr>
<tr>
<td>Table 2</td>
<td>Diagnostic profile of reliability study participants</td>
<td>63</td>
</tr>
<tr>
<td>Table 3</td>
<td>Pearson’s Correlation Co-efficient for the NAS subscales (test-retest reliability)</td>
<td>65</td>
</tr>
<tr>
<td>Table 4</td>
<td>Mean scores times one and two for NAS subscale</td>
<td>66</td>
</tr>
<tr>
<td>Table 5</td>
<td>Inter-correlations between subscales of the NAS</td>
<td>67</td>
</tr>
<tr>
<td>Table 6</td>
<td>Correlations between the NAS stability indices and the RSPM</td>
<td>68</td>
</tr>
<tr>
<td>Table 7</td>
<td>Diagnostic details of validity sample</td>
<td>75</td>
</tr>
<tr>
<td>Table 8</td>
<td>Pearson’s correlations for selected NAS subscale and self report measures</td>
<td>76</td>
</tr>
<tr>
<td>Table 9</td>
<td>Diagnostic details of the outcome sample</td>
<td>84</td>
</tr>
<tr>
<td>Table 10</td>
<td>Difference between BICRO subscale means at the beginning and end of rehabilitation</td>
<td>86</td>
</tr>
<tr>
<td>Table 11</td>
<td>Correlations between NAS subscales at the beginning of rehabilitation and BICRO change scores at the end of rehabilitation</td>
<td>87</td>
</tr>
<tr>
<td>Table 12</td>
<td>Pearson’s correlations between the NAS subscales at the beginning of rehabilitation and scores on the RSPM and MHVS</td>
<td>88</td>
</tr>
<tr>
<td>Table 13</td>
<td>Comparison of mean scores on the NAS subscales by level of cognitive functioning</td>
<td>89</td>
</tr>
<tr>
<td>Table 14</td>
<td>Correlations between the Barthel ADC scale and each NAS subscale at the beginning of rehabilitation</td>
<td>91</td>
</tr>
<tr>
<td>Table 15</td>
<td>Comparison of group means on each NAS subscale at the beginning and end of rehabilitation</td>
<td>92</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Comparison of beginning and end of rehabilitation NAS scores</td>
<td>93</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Revised model of the relationship between variables for psychological adjustment.</td>
<td>105</td>
</tr>
</tbody>
</table>
Appendices

Appendix (A)  Examples of Measurements to be used

I  NAS Version 1 (revised for use in current research)
(II)  NAS version 2 (modified short form)
(III)  Acceptance of illness scale

Appendix (B)  Distribution of scores on the NAS (version 1) for the reliability study

Figure 4  NAS A - Self esteem scale
Figure 5  NAS B – Attitudes to disability/illness scale
Figure 6  NAS C – Anxiety / depression scale
Figure 7  NAS D – Locus of control scale
Figure 8  NAS E – Acceptance of disability/illness scale
Figure 9  NAS F – Self efficacy scale
Figure 10  NAS G - Attributions scale
Chapter One

1. **INTRODUCTION.**

1.1(a) **Adjustment to disability/illness.**

The study of adjustment is important from both the theoretical and clinical viewpoints. Theoretically, adjustment as a construct is a major area of research in the study of human behaviour. Clinically as noted by Shontz (1978), 'the study of adjustment stems from the desire to apply psychological insights ...to help patients gain maximum benefit from rehabilitation care'. Unfortunately despite this aim, there is no apparent consistency of approach to the study of adjustment to traumatic events.

In addition Thompson (1989) claimed that 'none of the previous research was based on a theoretical approach to understanding psychological adjustment to stressful events.' This lack of a theoretical basis for previous research has contributed to inconsistencies in the research findings and limited the clinical utility of the findings. Related to this Dodds, Ferguson, Ng, Flannigan, Hawkes and Yates (1994) note, 'terms such as adjustment and motivation are used vaguely in practice and have been used to cover a multiplicity of phenomena.'

There is no clear or consistent operational definition of adjustment and this has lead to difficulties interpreting the research findings. The importance of clarity in conceptualisation is also acknowledged and a definition of adjustment is proposed.

1.1(b) **Definition of adjustment.**

The research literature has seen a recent expansion of studies looking at various aspects of adjustment: for example, the influence of different types of illness on the adjustment process (Revenson and Felton 1981) and the influence of psychological variables on adjustment (Kendall and Terry 1996). Despite this development surprisingly few researchers have attempted to define their conceptualisation of adjustment. Therefore research findings are not always directly comparable, as it cannot be assumed that researchers have a shared understanding and acceptance of the conceptual basis of the term adjustment. Outside of the psychological literature adjustment has been defined as 'the attempt to assess loss and harmonise
discrepancies' (The Concise English Dictionary 1993), and as 'the extent to which the individual is satisfied with his/her level of performance in various areas', (Johnson and Newton 1987). These definitions, although focusing on one or two aspects of adjustment, fail to encompass the range and complexity of this construct. Alternatively, Katz and Lyerly (1963) define adjustment as 'bringing into proper relation behaviour to circumstances or one’s self to one’s environment; to free from discrepancies or differences'. However even this definition fails to convey the conceptual complexity of the concept of adjustment. Dodds (1994) proposes that adjustment is multi-factorial involving processes on physical, psychological, emotional and functional levels. It is also viewed as an outcome that is amenable to intervention (Shontz 1978). There is currently no generally agreed definition of adjustment, therefore for the purposes of this study the following definition of the term adjustment is put forward:

‘Adjustment is a multi-dimensional construct. It refers to both the process of behavioural, cognitive, emotional and social adaptation to positive and negative life changes, and to the outcome of this process.’

In order to counteract some of the weaknesses in the literature pointed out above, it is important to highlight several factors relating to the concept of adjustment. Firstly, as pointed out by Treischmann (1974), rehabilitation is not synonymous with adjustment. In support of this view, Partridge and Johnston (1989) note that ‘any factor that undermines the person’s ability to apply optimal effort to the rehabilitation process, e.g. poor adjustment, is likely to negatively influence the rehabilitation outcome. This implies that level of adjustment is one factor that can influence the outcome of rehabilitation but by itself it does not equate to rehabilitation. Secondly adjustment is often indexed by other variables such as self-esteem, acceptance and coping ability. Research focusing on these variables e.g. self-esteem (Garske and Thomas 1992) Emerson 1981), indicate that self-esteem and acceptance are key constructs underpinning adjustment but similarly to the concept of rehabilitation they do not equate to adjustment. Coping ability is another variable that has sometimes been associated with adjustment (Felton and Revenson 1984, Moore, Stambrook and Peters 1989). Research findings are inconsistent, but generally there is no implication that coping ability and adjustment are interchangeable constructs.
Despite the above limitations adjustment to brain injury and/or chronic illness and disability is regarded as an important topic in the health and neuropsychology field. Attempts have been made to apply the theoretical understanding of adjustment gained from the stress and coping literature (e.g. Lazarus and Folkman 1984), to the study of adjustment in people with brain injuries and/or chronic neurological illnesses (Kendall and Terry 1996). This has resulted in a clearer conceptualisation of factors underpinning the adjustment process. The present review of the literature attempts to identify and critically examine some of the key variables highlighted as underpinning the construct of adjustment e.g. self-esteem, depression, coping and self-efficacy. The relationship between these variables as key factors in adjustment will also be critically analysed. As a consequence of the lack of consensus regarding the use of the term adjustment, some of the indexes used in empirical research to assess adjustment and/or related constructs will be made explicit during this review to avoid confusion.

1.1(c) Theories of adjustment.

According to Russell (1981), approaches to adjustment to disability can be divided into person-orientated approaches and social-environment approaches. Person-orientated approaches focus primarily upon what happens for the person in dealing with a disability, whereas the latter approaches look mainly at the influence of external situations on the person with a disability. These ideas are also applicable to adjustment to brain injury, with the brain injury itself viewed as the main disability.

(i) Person-orientated approaches.

Within the person-orientated approach two separate explanatory paradigms have developed.

Behavioural adjustment: According to proponents of this approach a person’s level of adjustment can be judged solely from their behaviour and is not related to how they think or feel (Fordyce 1971). Adjustment involves dealing with the changed ability to physically behave in the same way as before. The process of adjustment therefore involves the learning, over time, of new reinforcers and behaviours and new ways of achieving some goals. This suggestion is also supported by Wilkinson (1989), as it
shifts the focus away from emotional reactions such as depression/denial which are often regarded as pivotal to the adjustment process.

*Mental adjustment:* The focus here is on the internal psychological life of the individual. Theories of mental adjustment are primarily psychodynamic in orientation. As summarised by Russell (1981) how a person defends against and then comes to terms with objectionable internal and external events (*e.g* a brain injury) is a major concern of this approach. The process of mental adjustment is seen as taking place in stages. The most common stages are described as (i) initial shock, (ii) retreat or denial, (iii) grief, mourning or depression, (iv) reactions against dependency, and (v) eventual adjustment (Kerr and Thompson 1972, Dunn 1975). This approach has been criticised on several grounds. Firstly there is very little empirical evidence to support the view that people automatically go through these stages in their response to traumatic events. For example, although Dunn clearly describes the behaviours that people are perceived to exhibit at each of the stages he does not present any empirical evidence to suggest that this is indeed the case. A similar criticism can be levied at Kerr and Thompson (1972). They carried out a study of the adjustment level of 181 patients admitted to a unit for people with paraplegia over a ten year period. They concluded that 77% of their sample made a good to excellent recovery (i.e. were well adjusted). Unfortunately they failed to operationally define adjustment. In addition they did not state explicit criteria for their ratings of a person’s level of adjustment. These ratings were subjectively devised by the researchers rather than based on the use of an empirically derived assessment measure. Also, as noted by Russell (1981) other researchers have found that psychological responses such as depression or denial are not necessarily present as part of the adjustment reaction (Cook 1976, Lawson 1976).

Along similar lines attempts to explain the psychological factors/determinants underpinning the adjustment process have utilised bereavement models as an explanation for the expected and perceived reaction to loss. Proponents of this model (*e.g* Segal 1995, Parkes 1972) believe that grief results from the individual having to give up some past reality. According to Segal (1995) ‘the development of new ways of thinking, behaving, and living cannot take place without grief for the old’ This implies that adjustment to changed life circumstances *e.g* resulting from a brain injury or neurological condition, necessitates a period of mourning for real or imagined
losses. As with the mental adjustment theorists, espousers of bereavement based explanations e.g Parkes (1972) and Krueger (1984), suggest that the individual will undergo a series of stages in coming to terms with their loss. These stages are:

1. Shock;
2. Retreat, denial or disbelief;
3. Grief/mourning and depression;
4. Hostility and anger;
5. Adjustment.

The bereavement model has been criticised on similar grounds to the mental adjustment model. Firstly, as noted earlier, there is no consistent evidence to suggest that people necessarily go through all of the stages proposed by the model. In addition although there is some evidence that significant psychological distress is associated with a disability this is not consistent. Some studies have supported this assumption; e.g Motet-Grigoras and Schuckit (1986) found higher levels of depression in a group of congenitally disabled male students compared with non-disabled male students. Assessment was by structured interview and clinical diagnosis. In addition several studies have reported significant depression in up to 25-30% of stroke survivors e.g. Robinson and Downside 1984, Wade, Legh-Smith and Hewer 1987). In the head injured population an even higher figure is reported: according to Hinckeldy and Corrigan (1990), approximately 60% of people with closed head injury report depressive symptomology within the first five years of their recovery. These findings suggest that depression may be a key indicator of poor adjustment. Unfortunately none of the studies mentioned attempt to delineate the influence of depression/dysphoric mood on the adjustment process. Also it is not clear from these findings whether depression/dysphoric mood is synonymous with poor adjustment or just one potential indicator of poor adjustment.

Follow-up studies are important in determining the longer-term emotional outcome of brain injury. Carers reported emotional distress in their head injured relatives up to five years post injury (Brooks, Campsie, Symington, Beattie and McKinlay 1986). In contrast, other studies have reported that disabled people do not report higher than expected levels of distress (Cameron, Gnadinger, Kostin and Kostin 1973, Weinberg and Williams 1978). There are several reasons for the inconsistency in these findings. Firstly the former study obtained reports from the carers’ perspective, whilst the latter study used self-report data. In addition there are methodological difficulties in some
of the early studies. For example Weinberg and Williams (1978) surveyed delegates attending a conference for people with disabilities. The choice of respondent may have biased the results towards more articulate, politically active people with disabilities who may have been more well-adjusted. Consequently their conclusions might have limited applicability, as they do not necessarily represent the views of people who are at different points in their adjustment. In addition many early studies do not take important contributory factors into account e.g. whether a condition is congenital or acquired, or the type of disability resulting from it. Generalisation is therefore limited. However although the 'loss/bereavement' model has proved insufficient as an overall explanatory model of adjustment to ABI/neurological illness, this does not exclude its applicability in individual cases.

(ii) Social-environmental approaches.

According to Russell (1981) 'social-environmental approaches look primarily at the influence of external situations on the person with a disability. The idea that reality is socially constructed offers a basis for socio-environmental explanations for adjustment to disability'. Of primary importance in this construction is attitudes towards and acceptance of people with disabilities and/or brain injuries. Findings from the rehabilitation literature have revealed a mixture of both positive and negative responses (e.g. English 1971, Kutner 1971). Perceptions of disabled people as different can lead to attempts to portray them as tragi-heroes battling with their disabilities. On the other hand it can produce a negative stigmatising attitude which emphasises perceived weaknesses rather than strengths. Many of these perceptions of people with disabilities are gleaned from media images whereby disabled people are viewed as either saintly heroes or monsters (Elliott and Byrd 1982). Of course people with disabilities also have access to these ideas and images and may therefore also view themselves and/or other people with disabilities in a negative way.

Attitudes towards disability have a significant impact upon the part of adjustment involving acceptance (Dodds et al 1991,1994, Russell 1981,). In addition Linowski and Dunn (1974) assessed the relationship between acceptance of disability and attitudes towards disability. Using the Acceptance of Disability Scale they concluded that the manner in which disabled people view disability in general (i.e. their attitude) bears a relationship to how they view/accept themselves. As noted above, societal
attitudes towards disability are generally negative. Beliefs about and acceptance of
disability are directly influenced by these attitudes. Acceptance may be limited or
more difficult when the object of acceptance is something that is stigmatised by
others (Vash 1975). A model incorporating some of the important psychological
factors interacting in the adjustment process has been developed by Dodds et al
(1994). They found a reciprocal relationship between attitudes and acceptance.
Attitudes appeared to have an effect on the variables of internal self worth, (as
indexed by self-esteem, anxiety and dysphoria) and feelings of control (as indexed by
self-efficacy and locus of control) via acceptance. It would thus appear that
acceptance of disability is a complex concept which is influenced by multiple factors.

(iii) Cognitive approaches.

The key role played by cognitions in the development and maintenance of
psychological distress has been amply documented (e.g. Beck 1976, Ellis1962).
Research findings have consistently shown that conditions such as depression and
anxiety are associated with cognitive distortions that increase the likelihood of
negative thinking about the self, the world and the future (Beck 1967). Similar
distortions have been noted in people who have difficulties adjusting to a
disability/brain injury. As proposed by Dodds et al (1994), 'distress is produced by a
set of consciously held but erroneous beliefs about the self (e.g. life is not worth
living as a disabled person), together with true perceptions of incompetence
(i.e.decreased functioning) that may initially reinforce one another'. He argues that it
is these inaccurate beliefs about the self reinforced by decreased competency in
performing everyday activities that produce the cognitive distortions that lead to
adjustment difficulties.

In relation to the issue of competency, Figueiredo and Frank (1982) postulate that
'all conditions that psychotherapy attempts to relieve have in common
demoralisation'. The individual's perception of subjective incompetence is viewed as
one factor/variable in the development of demoralisation. These researchers claim
that subjective incompetence together with distress produces demoralisation. They
state that distress is manifested as symptoms such as anxiety, sadness, and anger.
These symptoms are also associated with difficulties in adjustment. Consequently
adjustment difficulties can be viewed as a complex form of psychological distress.
Figueiredo and Frank define subjective incompetence as 'a state of self perceived incapacity to act at some minimal level according to some internalised standard in a specific stressful situation'. A physical disability can make it difficult or impossible to perform everyday tasks that have previously been performed with ease. This discrepancy between past and present abilities can produce feelings of demoralisation which may lead to difficulties with adjustment.

A key factor in the adjustment process appears to be the person’s ability to re-define him/herself in the light of experience and changed circumstances (Wright 1983). As noted by Bannister and Fransella (1980) ‘psychological distress is caused by the continued use of disordered constructs in the face of their invalidity’. Therefore difficulties in adjustment to brain injury/physical disability may be the result of the adherence to an outdated and inappropriate set of beliefs about the self.

_Cognitive adaptation theory (CAT)._ This theory has been developed by Taylor (1983) to explain how people respond to threatening events. According to Taylor most people hold generally optimistic views about themselves and about the world. CAT proposes that ‘when an individual has experienced a personally threatening event, the readjustment process focuses 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 enhance one’s self-esteem’. As the theory implies adjustment/adaptation occurs primarily at the cognitive level. The person’s thoughts about themself and their world directly influence this process. Taylor suggests that the strategies used to determine the response to a threatening event are based on illusions. By this she means that people use various cognitive distortions e.g. cognitive dissonance to enable them to cope with threatening events. Far from being counter-productive Taylor suggest that these illusions help people to cope with crises and are vital both in the initial and ongoing response to threat. From this theory it can be inferred that people who have positive illusions (i.e. misperceptions of strengths and weaknesses) about their abilities following acquired brain injury should be better adjusted than those who have a realistic perception of their abilities.

Although CAT was developed as a result of work with cancer survivors, it is equally applicable to the adjustment of people with brain injuries (Thompson, Sobolew-Shubin, Graham and Janigian1989). A brain injury can be viewed as a threatening
event which could have an impact on one's sense of control over life events and on one's self-esteem. Similarly to Taylor (1983) Thompson et al (1989), propose that successful adjustment depends on maintaining or restoring a sense of meaningfulness, optimism, and control. In their study scales derived from cognitive adaptation theory are used to measure perceptions of meaningfulness, control and hope. The study findings support CAT in that depression was found to be significantly related to the variables of meaningfulness, hope and perceived control over social relationships. This suggests that adjustment difficulties may well be a consequence of the reduced ability to make a constructive cognitive interpretation of the meaning and implications of acquired brain injury. However as this was a retrospective correlational study causality cannot be assumed and it could equally be the case that depression could lead to a negative interpretation of the meaning and implication of ABI.

(iv) Integrative approach.

This approach encompasses both personal and socio-environmental factors. According to advocates of this approach adjustment is a product of situational and individual personality factors. Moos and Tsu (1977) proposed that adjustment is based upon the interaction between cognitive appraisal of the situation produced by the disability, adaptive tasks required by the disability and the coping skills the person possesses. Adjustment is seen as taking place in the context of various personal and background factors, disability-related factors, social-environmental and physical factors.

Earlier theories of psychological adjustment following disability/chronic illness, for example stage theories, tended to be limited in focus. Attempts to explain the process of adjustment by suggesting a circumscribed set and pattern of emotional responses to physical disability/brain injury have proved shortsighted. There is now a growing awareness of the importance of the interaction between the person and their environment. It is apparent that researchers who advocate the integrative approach (for example Kendall and Terry 1996) view adjustment as a complex multi-factorial process. Some of these factors e.g. the use of constructive coping skills, and perceptions of self-efficacy have been identified as playing a pivotal role in the process of adjustment and will be discussed in more details in the following section.
1.2 Psychological variables and their relationship to psychological adjustment.

1.2(a) Coping and adjustment.

A person’s ability to cope with and manage change is increasingly recognised as a vital factor in adjustment in a wide range of physical conditions and psychosocial situations. Lambert (1981) highlighted the importance of coping ability in recovery from physical illness by proposing that ‘an uncomplicated recovery to maximum possible functioning will be facilitated by positive personality and coping resources.’ Folkman and Lazarus (1986) state that ‘coping refers to the person’s cognitive and behavioural efforts to manage (reduce, minimise, master or tolerate) the internal and external demands of the person-environmental transaction that is appraised as taxing or exceeding the person’s resources’. Therefore in order for coping behaviours to be activated, one must perceive that there is a discrepancy between one’s usual pattern of behaviour and the current situation. Coping behaviours are then generated in an attempt to rectify this situation.

The terms adjustment and coping are often used interchangeably in the literature, however the relationship between coping and adjustment has not been clarified. In addition Wilkinson (1989) notes that, these terms are ill-defined to describe successful psychological reactions to disability. In other words there are no clear or consistently used definitions of these constructs in the literature and therefore their influence on psychological reaction to disability is difficult to determine. There have been, however, recent attempts to utilise findings from research into stress and coping to inform the development of models of adjustment to neurological conditions. For example in relation to closed head injury (CHI), Kendall and Terry (1996) have developed a theoretical framework which proposes that psychosocial adjustment following CHI is influenced initially by the primary appraisal of the injury as threatening psychosocial well-being, and secondly by the appraisal of available coping resources. In addition Hermann, Freyholdt, Fuchs and Wallesch (1997), attempted to examine various aspects of the relationship between illness and coping behaviour. Although not explicitly stated they appear to operationalise adjustment by the measurement of changes in several areas including psychosocial factors e.g.
changes in social activity and/or in employment, and psychological alterations e.g. changes in mood and concentration. Only modest correlations were found between coping strategies used and degree of psychosocial changes. This finding suggests that the relationship between adjustment and coping is far from clear-cut and therefore it is inappropriate to use the two terms interchangeably.

Much of the earlier research focused on how people responded to a range of stressful situations encountered in everyday life. One aim of this research was to delineate the factors that had an important bearing on coping behaviour. Various psychological and psychosocial variables have been the focus of attention, for example the availability of social support (Thoits 1986). In parallel with this line of enquiry Lazarus (1966), Lazarus and Folkman (1984) put forward a cognitive-phenomenological theory of stress and coping. They proposed that ‘two processes mediate the stressful events that a person encounters in daily living and the emotional outcomes: cognitive appraisal and coping’. Cognitive appraisal is defined as the process through which people evaluate both the significance of a specific stressful encounter for their wellbeing (primary appraisal) and the options for coping (secondary appraisal). This conceptual analysis has provided the starting point for much of the research into how people cope with stress. Coyne, Aldwin and Lazarus (1981) described the coping process as ‘a dynamic constellation of many acts’. These acts are viewed as transactional variables because they involve interactions between the person and the environment. (Folkman, Lazarus, Gruen and DeLongis 1986) postulate that successful coping will be facilitated by positive personality and coping resources’ e.g. a sense of mastery and interpersonal trust.
Various aspects of the coping process, for example, strategy selection, coping behaviours and outcome of interactions have been studied in relation to adjustment. In terms of strategy selection traditionally there has been a distinction between problem-focused coping and emotion-focused coping (Folkman and Lazarus 1980). However Carver, Scheier and Weintraub (1989) believe that this distinction is too simplistic and have therefore proposed a more detailed breakdown of coping strategies into thirteen categories using principle component factor analysis. They suggest that this supports the assumption that people dealing with stress experience a relatively wide range of coping impulses including both sides of a mutually exclusive dichotomy such as acceptance and denial. This finding illustrates the complexity of the factors underpinning the coping response. Nevertheless it appears that 'coping' as a psychological construct has potential utility in delineating the variables impacting on adjustment to brain injury and chronic illness.

As noted by Felton and Revenson (1984), a role for coping in explaining psychological adjustment to illness has been demonstrated by several studies, (e.g. Lambert 1981). Felton and Revenson have studied the influence of illness controllability, (i.e. how responsive an illness is to personal and/or medical attempts at control) and coping strategies on adjustment to chronic illness. Although the authors did not specifically define the concept of adjustment, it appears to consist of two components as measured by an 8-item acceptance of illness scale and a 5-item measure of the affective components of well being. Their study focused on two coping strategies; information seeking and wish-fulfilling fantasies. They found that illness controllability had a significant impact on adjustment. In addition information seeking was associated with better adjustment, whilst wish-fulfilling fantasies was associated more with poorer adjustment. However in regard to the overall effect of coping on psychological adjustment to chronic illness they found only a modest effect. This suggests that although coping behaviour may be influential, it is not sufficient to account for the variability in adjustment to chronic illness and/or brain injury.
Several researchers have explored the relationship between coping and other psychological variables that might influence adjustment. Coyne et al (1981) for example, examined the interplay between depression and coping in a non-clinical population. They found that depressed people tended to go over a problem repeatedly and to seek informational and emotional support before acting. However they were no more likely than non-depressed people to view themselves as helpless to change stressful everyday events. This finding has been supported by similar findings reported by Folkman and Lazarus (1986). They conclude that this is contrary to the learned helplessness model (Abrahamson, Garber and Seligman 1980) which predicts that people with high levels of depression are more likely to perceive situations as uncontrollable than those with low levels of depression.

Hermann et al (1989, 1997) carried out research on depression and coping in a neurological population (people with either Parkinson’s Disease or Cerebrovascular Accident (CVA). They found that participants in their study employed active coping strategies (e.g. gathering information about the illness) regardless of the type of illness. In addition they noted that the severity of depressive symptoms did not correlate with the number of coping strategies used in either group. From this finding it can be inferred that if depression is one indicator of poor adjustment then there is no predictable relationship between the number of coping strategies used and adjustment.

In general these findings illustrate the complexity of the relationship between the many factors impinging on adjustment.
1.2(b) Self esteem.

Self-esteem is a multi-dimensional psychological variable that is known to impact on many aspects of psychological development. It is sometimes used interchangeably with other related constructs such as self-concept, self-image and self-acceptance. In fact Coopersmith (1967) states that self esteem is one of the two constructs that make up our self-concept, the other being the self image. Coopersmith highlighted the importance of self-esteem, he viewed it as a concept of central relevance to the understanding of the individual's functioning. In addition other researchers have restated the importance of self-esteem as a major factor in healthy psychological functioning. For example Combs, Avilla and Purkey (1971), note that 'a positive view of self provides an inner strength from which a person may deal more effectively with the exigencies of life'. In addition Heinemann and Shontz (1982) postulate that high self-esteem influences the propensity of individuals to emphasise competencies over limitations, abilities over disabilities, and feelings of worth and dignity over feelings of hopelessness and resignation. This suggests that positive self-esteem might act as a buffer to mitigate the effects of traumatic events. In this way it is thought to have a direct influence on the process of adjustment to ABI.

The development of self-esteem comes from two sources; a sense of self worth acquired during childhood, and the perception of one's own competence in everyday life (Coopersmith 1967). According to Linkowski and Dunn (1974) self-esteem refers to the congruence between an individual's actual self-concept and ideal self. Despite attempts such as this one to define self-esteem, Crandall (1973) claims that there is great diversity in how the construct of self-esteem has been used. This has sometimes lead to contradictory findings in the literature on factors affecting self-esteem. It can therefore be seen that self-esteem is not a fixed characteristic like height for example, but is continually influencing and being influenced by the person's life experiences. Carpenter (1996) proposes that self-esteem is a composite of numerous positive and negative thoughts and feelings, incorporating physical, psychological, social and/or spiritual characteristics of the self. These thoughts and feelings are subjective perceptions that provide the individual with a unique and highly personalised view of the self.
Researchers looking at different aspects of self-esteem originally regarded it as a global, undifferentiated construct (e.g. Rosenberg 1979, Marsh 1986). This led Rosenberg to develop the Self-Esteem Scale which was conceived as a unidimensional scale. However this view has been challenged by more recent research that suggests that self-esteem as a construct is multi-dimensional. Tafordi and Swann (1995) developed a self-liking, self-competence scale based on the model of self-esteem put forward by Diggory (1966). This proposes that two separate criteria of self-valuation need to be identified: firstly self-valuation based on social approval and acceptance and secondly self-valuation based on an objective evaluation of abilities. According to Tafordi and Swann self-liking is the part of self-esteem that is socially dependent as it represents the internalised reactions of others. It is our affective judgement of ourselves, our approval or disapproval of ourselves, in line with these internalised social values. Self-competence on the other hand, is the overall sense of oneself as capable, effective, and in control. As noted by Tafordi and Swann, it stems from the successful manipulation of one’s environment and from the realisation of goals. This echoes the views of Burke (1983) who proposed that self-esteem is based upon an assessment of one’s ability to achieve goals.
A brain injury can negatively impact on self-esteem in at least two ways. The term 'brain injury' conjures up a variety of negative stereotypes, which are manifest in the reactions, and attitudes, of some individuals to people with brain injury. These reactions will influence the self-liking component of self-esteem, as it is more dependent on social approval. In addition the individual with acquired brain injury (ABI) may well hold some of these stereotyped views him or herself. This proposition is supported by the research literature. Using findings from research on acceptance of disability, Linkowski and Dunn (1974) note that perception of disability is a significant and central aspect of the self-concept. Acceptance of illness also appears to be major factor in maintaining self-esteem. Wright (1983) has observed that attempting to cover up a physical disability is a coping strategy used by some people who find it hard to accept their disability. However it becomes harder to cover up a disability as the underlying illness increases in severity, as is potentially the case with MS and other progressive conditions. In addition as a result of physical and cognitive disabilities people with brain injuries are often unable to perform everyday activities as effectively or efficiently as prior to their injury. This is likely to directly influence the self-competence aspect of self-esteem. Dodds et al (1991) point out that lowered self-esteem can result from the perception of incompetence at tasks previously taken for granted. This also relates to the self-competence aspect of self-esteem, which is directly related to perceived success/failure at carrying out activities and achieving goals. It is therefore likely that people with ABI are particularly vulnerable to the risk factors for reduced self-esteem.
Although there is a sizeable body of knowledge relating to self-esteem in general, there are relatively few studies that focus on self-esteem in neurological populations. As noted by Kendall and Terry (1996), very few empirical studies have examined the specific relationship between self-esteem and other aspects of psychosocial outcome following closed head injury. This is somewhat surprising because as noted by Garske and Thomas (1992), understanding the problems associated with traumatic brain injury is extremely important because of the possible impact on eventual psychosocial adjustment. In order to address this issue they studied the relationship between self-esteem, depression and satisfaction with rehabilitation. An inverse relationship was found between scores on a measure of self-esteem (the Rosenberg Self-Esteem Scale) and scores on a depression measure (Beck Depression Inventory) i.e. low self-esteem was associated with high levels of depression. In addition a positive relationship between satisfaction with rehabilitation and self-esteem was also reported. However the direction of causality especially in regards to the relationship between satisfaction with rehabilitation and the other two variables is unclear.
Walsh and Walsh (1987, 1989) have studied the relationship between self-esteem and adjustment in people with multiple sclerosis (MS). This research is based on Matson and Brooks (1977) model of adjustment to chronic illness in adults. This model is derived from Kubler-Ross' (1969) 'stage' model of death and dying. The stages of adjustment are conceptualised as denial, resistance, affirmation and integration. Healthy adjustment to chronic illness is viewed as the process of movement forward from one stage to another. A brief assessment tool derived specifically for the study indexed adjustment. This contained four statements that related directly to the four stages of adjustment proposed by Matson and Brooks e.g. 'It is difficult to accept that this is happening to me. It just can't be' (representing denial). Participants were asked to circle the statement that best described their present attitude toward the illness. Based on their response to these statements the participants were divided according to their stage of adjustment. Walsh and Walsh found that self-esteem (as measured by the Rosenberg scale) was lower for those in denial. Overall they observed that significant loss of self-esteem only occurred when activity was restricted and was accompanied by visible evidence of the disease. In addition those who were more accepting of the reality of the disease and who were able to integrate the reality of it into their self-concept had higher levels of self-esteem. This suggests that for people with MS self-esteem can be maintained if the disease does not have a major impact on factors that affect self-image. However as noted earlier the 'stage theory of adjustment has been criticised on several grounds, in particular the notion that healthy adjustment entails encountering and dealing with the various stages outlined by stage theorists has been questioned. It cannot be assumed therefore that the measure used to index adjustment in the Matson and Brooks study, accurately reflected the adjustment levels of participants in their study.
1.2(c) Depression and adjustment.

According to the proponents of the ‘loss’ model of adjustment to disability, depression is an inevitable part of the grieving process (e.g. Segal 1995). However the model itself and this view in particular has been challenged by Dodds et al (1991). As noted in the general section on adjustment (page 11), this model has been criticised on several grounds. Of particular note is the contention that neither grieving nor depression is an inevitable part of the adjustment process (Wilkinson 1986). Despite this note of caution, depression as a reaction to disability/chronic illness, is frequently reported in research studies (e.g. Wade et al 1987, Minden and Schiffer 1991). This suggests that depression whether or not related to adjustment, is observed to be a common reaction to disability/illness.

Depression as a psychological/psychiatric phenomenon is of interest to a wide range of researchers and clinicians. However it is beyond the scope of this present thesis to provide a comprehensive review of the literature on depression. The intention therefore is to briefly summarise some of the major cognitive theories relating to the development of depression. In addition research findings relating to different neurological populations will be selectively reviewed. However it is acknowledged that psychoanalytic theories and social-structural theories have also contributed to our understanding of depression.
Within the last forty years several theories have been developed to account for various psychological disorders including depression and anxiety (e.g. Beck 1967, 1976, Abramson, Metalsky and Alloy, 1989). As a result there has been a significant increase in the theoretical understanding of factors contributing to the development of depression. One of the most influential theories has been Beck’s cognitive theory of depression (Beck 1976). This theory maintains that depression results from the habitual use of negative thinking patterns that lead to certain affective states. These thinking patterns are referred to as ‘cognitive distortions’ and include: overgeneralisation, which is the assumption that different events will inevitably have the same outcome; personalisation, which is the interpretation of negative events as reflecting personal responsibility; and selective abstraction, which is the selective attending to negative aspects of one’s experience. Underlying this pattern of negative thinking is a set of dysfunctional assumptions. Beck also developed the notion of the cognitive triad: negative thoughts about the self, the world and the future. This triad provides the focus for the expression of distorted thinking. There is evidence that depressed mood is associated with dysfunctional thinking in the general population (Beck, Rush Shaw and Emery 1979). Similar findings have been reported in various clinical populations’ e.g. in people with MS, (Minden, Orav and Reich 1987), and in people with rheumatoid arthritis (RA), Smith, Peck, Milano and Ward 1988, Smith, Peck and Ward 1990).

Similar to Beck’s cognitive theory, the Learned Helplessness model of depression focuses on how people appraise situations/events. Learned helplessness refers to the psychological state in which certain individuals expect that their efforts to control or predict outcomes of situations will be ineffective (Abramson, Seligman and Teasdale 1978). As a result these individuals become helpless and are at increased risk for depression. According to this model the development of depression is most closely associated with the tendency to make global internal and stable attributions (refer to page 38 for definitions of these terms). Consistent with Beck’s proposal, the Learned Helplessness model predicts that depressed people are more likely to personalise and over-generalise negative events.
Both the learned helplessness model of depression and Beck’s cognitive model have significantly influenced the understanding and treatment of depression. Despite this neither theory is without criticism. As regards Beck’s theory, Taylor and Brown (1988) and Hughes (1997) have questioned the notion that depressed people misconstrue their interpersonal world. This point is particularly pertinent to people with neurological conditions. A progressive condition or an acquired brain injury can lead to the development of depression reflecting organic damage and/or a secondary reaction to disability/illness. As a neurological condition may be associated with a number of significant negative life changes e.g. loss of work or reduced earning power and/or change in family role. The view that depression is primarily caused by the misinterpretation of events is disputed i.e. it may be a realistic perception of loss or change.

Various criticisms have been levied at the Learned Helplessness model of depression. This model was developed from laboratory based studies with animals and healthy humans. Coyne, Aldwin and Lazarus (1981) point out that proponents of this theory attempt to relate well-defined laboratory variables to speculations about more vaguely delineated clinical phenomena. In addition Lazarus and Launier (1978), have argued that laboratory studies do not provide descriptive ecological information concerning the problems, resources and constraints faced by people with depression.

In order to address some of the limitations outlined above, Coyne et al (1981) have attempted to elaborate on the impact of coping responses in the development and maintenance of depression. They postulate that the problems of depressed persons are not based merely in their cognitions or perceptions of their circumstances, but in their transactions with their environment. In a series of studies Coyne (1976) Coyne et al, 1981), found that depressed people tended to cope by seeking emotional and informational support and by wishful thinking. However they did not report more self-blame or feelings of helplessness as would be predicted by the learned helplessness model. In addition Coyne et al (1981) has suggested that depressed people display distress and solicit support from others in a way that stimulates a depressive social process. The findings from this research indicate that a comprehensive model of depression needs to take into account not only a person’s cognitions, but also their interpersonal interactions.
Factors associated with the development and maintenance of depression have been studied in various neurological populations. Several researchers have studied the prevalence of depression in MS survivors. As early as 1926, Cotrell and Wilson suggested that affective disturbances were the most important clinical feature of MS. More recently Schiffer, Caine, Bamford and Levy (1983) and Minden, Orav and Reich (1987) have estimated that the prevalence rate of major depression following onset of MS is between 25 and 54%. The discrepancy in reported prevalence rate is most likely due to the different measures used to assess depression. Despite this limitation it appears that depression is a common sequela in a significant proportion of people with MS. This notion is supported by Shnek, Foley, LaRocca, Smith and Halper (1995) who note that a wide range of responses occur with depression and emotional distress being the most common. Depression in this population tends to be moderately severe and patients are reported to be more angry, irritable and worried than self-critical, withdrawn and disinterested (Joffe, Lippert, Gray, Sawa and Horvath 1987, Minden et al 1987). Schubert and Foliart (1993), carried out a meta-analysis of five controlled studies of depression in MS. This analysis supported the hypothesis that MS patient groups have higher rates of depression than comparison groups.

From a theoretical perspective the development of depression in a neurological population is a complex process. This is the consequence of the potential role of both organic and reactive factors in causation. Indeed as Minden and Schiffer (1991) note, there is no way of knowing whether the depression is due primarily to organic changes resulting from disease activity or from the psychological reaction. They suggest that depression in MS patients may be the result of the interaction between biological, psychological and social factors. Depression has been viewed as one, but not the only manifestation of poor adjustment (Dodds et al 1991). Therefore the reportedly higher prevalence rate of depression in the MS population compared to a general community population is one factor that would increase the likelihood of adjustment difficulties developing. In addition depression has been linked to the unpredictability of symptoms, disease course and outcome. These have long been recognised as major factors affecting adjustment to MS (Cotrell and Wilson 1926).
On a cautionary note, Nyenhuis, Rao, Zajecka, Luchetta, Bernardin, and Garron (1995) observe that measures such as the (BDI) include items that reflect both depression and general symptoms of MS. They suggest that the inclusion of non-mood symptoms in self-report depression scales may artificially raise both prevalence rates and severity ratings. Using a measure of depression developed specifically for people with MS and excluding somatic items, they found that the prevalence rate of depression was significantly lower when measured by their mood scales than by the Beck Depression Inventory (BDI).

Prevalence studies aimed at identifying rates of depression should ideally be based on techniques designed to detect depression e.g. psychiatric interview based on the Present State Examination (Wing, Birley, Cooper, Graham and Isaacs, 1967). The BDI and other similar self-report instruments were designed to measure the severity of mood disorders and are therefore inappropriately used in prevalence studies. Nyenhuis et al also point out that DSM-IV guidelines recognise the potential bias that neurological conditions present in the diagnosis of depression because of the overlap in symptoms. This is not only applicable to the detection of depression in MS but also to other neurological conditions and it emphasises the importance of the careful selection of measurement tools. It is possible that previous studies have overestimated the prevalence of depression in people with MS because of the selection of inappropriate measurement tools.
The incidence and prevalence of depression following cerebrovascular accident (CVA) has been widely studied. Folstein, Maiberger and McHugh (1977) found that CVA was more likely than an orthopaedic disability to be associated with depression. In addition approximately 23 percent of stroke survivors have been found to be depressed in both hospital and community samples (Ebrahim and Nouri 1987, Wade et al 1987). In the latter study which used a self-report measure of depression, the Wakefield Depression Inventory (WDI), (Snaith, Ahmed, Mehta, and Hamilton 1971) Wade et al found that approximately 50% of people who were depressed soon after CVA were also depressed at one year. This suggests that post stroke depression (PSD) is a common result of stroke and not infrequently develops into a chronic condition. However the concerns highlighted above regarding the detection of depression in MS also apply to this population in that the measurement tool used may have lead to an overestimation of the incidence of depression. As the authors do not provide detail of any other method used to detect depression in their sample, their results must be interpreted with caution.

Similar to the position with MS-related depression; there has been some debate about the factors underlying PSD. In a series of studies Robinson and Szetela (1981), Robinson, Kubos, Starr, Rao and Price (1984a) found an association between lesion location and depression following CVA. In people with left hemisphere strokes anterior lesions were most commonly associated with depression. Posterior lesions were significantly associated with depression in the right hemisphere stroke survivors. Robinson et al concluded that there is a neural basis to PSD. They suggest that a possible cause of PSD in people with left anterior lesions is the asymmetrical depletion of the monoaminergic pathways in the frontal lobe. This leads to a depletion in the catecholamine concentrations in the brain.
The biochemical/organic view of PSD has not gone unchallenged. Gainotti (1992), for example, has criticised the conclusions on several grounds. Firstly, he points out that the monoaminergic pathway is not lateralised to the left hemisphere. Consequently, Robinson et al's hypothesis should predict that a depletion in this system will lead to depression following both right and left anterior lesions. In fact Robinson et al (1984a) note that the findings of increased depression associated with posterior lesions of the right hemisphere runs counter to what would be predicted from this hypothesis. In addition other researchers have failed to find similar correlations between lesion location and depression (Ebrahim et al, 1987, Wade et al 1987). In fact Ebrahim et al point out that the conclusions reached by Robinson et al were based on small numbers of subjects and therefore may well have been spurious.

Gainotti also disputes the appropriateness of the view that major PSD is a form of endogenous depression. He points out that some of the typical symptoms of endogenous depression (e.g. self-reproach and feelings of guilt) are generally absent in PSD. As an alternative to the biogenic hypothesis, Gainotti postulates that PSD is primarily a psychological reaction to CVA. It is similar but not identical to the catastrophic reaction of patients with lateralised brain injury resulting from CVA. In part it is the result of the person's awareness of the consequences of CVA and it's effects on interpersonal and psychosocial functioning (Primeu 1988). It is likely that a combination of both psychological and neurophysiological factors will eventually be identified as major contributors to the development of PSD in the majority of cases.
Research into PSD has produced equivocal findings about the possible underlying factors. Somewhat surprisingly there are relatively fewer studies of the incidence and causation of depression following Traumatic Brain Injury (TBI). Based on the few published studies, prevalence rates for depression in this group range from 6% to 33% (Rutherford, Merret and McDonald 1977, Mckinlay, Brooks, Bond, Martinage and Marshall 1981, and Federoff, Starskein, Forrester, Geisler, Jorge, Arndt and Robinson 1992). Using clinical interviews relating to DSM III criteria for major depression, Varney, Martzke and Roberts (1987) found a high incidence of depressive symptoms amongst TBI survivors when compared to an orthopaedic control group. This finding lead the researchers to conclude that closed head injury is associated with a significantly increased risk of major depressive disorder. Federoff et al (1992) studied post TBI depression from a neuroanatomical perspective. Following on from their work on PSD, they have attempted to delineate the neuroanatomical correlates of depression following TBI. Significant association was found between lesion location and the development of depression. Similarly to their findings regarding PSD, the presence of a left anterior lesion correlated most strongly with major depression. In addition parietal-occipital lesions of the right hemisphere increased the probability of developing depression. The authors conclude that the left dorsolateral frontal cortex and left basal ganglia may be critical structures relating to the regulation of mood. Based on a follow-up study of the participants in the Federoff et al study, Jorge, Robinson, Arndt, Starskein, Forrester, and Geisler (1993) found that post TBI depression can develop up to at least one-year post trauma. Additionally, there was a sub-group of participants who had become chronically depressed. Pre-morbid social functioning was found to have the most consistent relation to depression. According to the authors, this suggests that those patients with poor social adjustment and social dissatisfaction prior to the brain injury may have had a disproportionately negative response to the brain injury. Alternatively, people with poor social adjustment are likely to have fewer social networks to offer social support after ABI. This might lead to a more negative response to ABI.
Generalisation from these two studies is limited by some of the participant characteristics. The high incidence of personal history of pre-morbid psychiatric disorder (not specified) makes it difficult to determine whether the reported depression was due to TBI or to the pre-existing psychiatric condition. In addition data was not consistently collected from a suitable comparison group, therefore it is difficult to assess how the incidence and prevalence of depression in this group compare with non-neurological medical populations. However, as noted earlier Varney et al (1987) did find a significantly higher rate of depression in a TBI group compared to orthopaedic controls.

1.2(d) Self-efficacy.

Response to acquired brain injury is both varied and complex. Consequently the process of adjustment can include different behavioural and emotional states. As noted previously, until quite recently adjustment had been viewed primarily in terms of a loss model. This model directly associates adjustment with the grief response. However self-efficacy theory and other related constructs e.g. locus of control provide an alternative conceptualisation of the psychological factors underlying the construct of adjustment.
Self-efficacy theory was developed to provide a framework for the understanding of methods of producing behavioural change (Bandura (1977). This theory is based on the assumption that psychological procedures serve as means of creating and strengthening expectations of personal efficacy. It is postulated that personal effectiveness can be distinguished from expectations about outcomes. Bandura defines outcome expectancy as a person’s estimate that a given behaviour will lead to certain outcomes. An efficacy expectation is the conviction that one can successfully execute the behaviour required to produce the outcome. According to Tedman, Thorton and Baker (1995), thought has a prominent role in self-efficacy theory because it is pivotal to the ability to generate belief in self-capability. Although the theory was developed from work on phobia and anxiety reduction, it is also applicable to people with acquired brain injury undergoing neurological rehabilitation. ABI can result in disability in various domains (e.g. cognitive, physical and communicative). As a result of this a person’s perception of personal efficacy may be altered. Consequently abilities that have previously been taken for granted may be lost or elicited inconsistently. According to Dodds (1989), the recognition of a reduction in or loss of abilities may produce feelings of incompetence. Perception of reduced efficacy can have a demotivating effect on the person and might result in low self-esteem, depression, and other altered affective states.
Wasseem (1992) undertook a study of the relationship between self-efficacy and adjustment to disability in MS. The notion that adjustment to MS is a process of integration of the disability into the individual's persona (Matson and Brooks 1977), underpins this study. Several measures were used to determine level of efficacy and adjustment. These consisted of a self-report measure of confidence in performing specific behaviours, e.g. taking medications (The Self Efficacy for Adjustment Behaviours Scale (SEABS)), a measure of outcome expectation (Outcome Expectancy Scale (OES)), and the Bell Disability Scale of Adjustment (Bell 1967), a general measure of adjustment to disability. Although severity of illness was the strongest predictor of adjustment, the SEABS was also found to be a significant predictor of this variable. However this finding must be interpreted with caution due to potential sample bias. Recruitment to the study was from a support group (51%) or from people attending for a clinic appointment. It is possible that people with high levels of self-efficacy are more likely to join self-help groups and were therefore over-represented in the study sample. This possibility is supported by the findings from the self-report measures with high mean scores for the total SEABS (maximum total score equals 130, actual mean equals 112.74 with a standard deviation of 17.23, range not reported). Similarly the results indicate high mean scores on the OES (maximum score equals 30, mean reported equals 26.5, standard deviation 3.92). Therefore it cannot be assumed from this study that people with low scores on measures of self-efficacy might be more poorly adjusted.

Self-efficacy was one of a number of psychological variables under scrutiny in a study carried out by Shnek et al (1995). They found that depression in people with MS was significantly related to high scores on measures of learned helplessness (a 5 item MS Attitudes Index (MSAI)) and cognitive distortions (as measured by the Cognitive Errors Questionnaire), and lower scores on a measure of perceived self-efficacy (a modified version of the Arthritis Beliefs Scale). As noted by Shnek et al, conceptually there is a strong relationship between learned helplessness and self-efficacy. Learned helplessness can be viewed as the result of substantially reduced perceptions of self-efficacy and outcome expectancy. However the results of this study may have reduced applicability due to methodological limitations. For example as noted by the authors, none of the measures used have been validated in an MS population.
In order to examine the core beliefs and level of self-efficacy of people with epilepsy, Tedman et al (1995) conducted a series of semi-structured interviews with an outpatient population. Information was elicited regarding core beliefs about the impact of epilepsy. From this data a 23-item self-efficacy questionnaire was devised. However all the questionnaire items refer to general aspects of self-efficacy e.g. 'you manage running the household on your own', and therefore do not specifically relate to self-efficacy for epilepsy. This questionnaire was administered to a group of outpatients along with the following scales: The Hospital Anxiety and Depression Scale (HADS) Zigmond and Snaith 1983); an Adjustment to Epilepsy scale (AES) which contained subscales for mastery, self-esteem, affect balance stigma and impact of epilepsy (Baker 1992); and two scales measuring knowledge of epilepsy. The authors found that people with epilepsy had lower self-efficacy and higher depression and anxiety when compared to a control group. In addition self-efficacy was positively correlated with adjustment as indexed by the mastery, self-esteem, positive affect and impact of epilepsy subscales of the AES. The authors suggested that low self-efficacy is associated with poorer adjustment, as determined by lower scores on the sub-scales of the AES. These findings are similar to those reported by Wasseem (1992) in regard to people with MS and suggest that concepts about self-efficacy as indicated by core beliefs, are an important component in emotional adjustment to neurological conditions/ABI. This also supports the suggestion of Dodds et al 1991, that high levels of self-esteem associated with better adjustment. Although research into the relationship between self-efficacy and adjustment to acquired brain injury/chronic neurological illness is quite sparse, early indications suggest that perception of self-efficacy may be a significant factor in the adjustment process.
1.2(e) Attributions

Attributional theory was originally put forward as an explanation for individual differences in causal inferences relating to situational events (Weiner 1986). In essence the attribution construct refers to ‘a tendency to make particular kinds of causal inference, rather than others, across different situations, and across time (Metalsky and Abrahamson 1981). Research into the attributional construct has delineated three dimensions of causal attributions: (i) the global-specific dimension (whether an attribution is general across situations or specific to a situation), (ii) the internal-external dimension (whether events are perceived as the results of factors internal to the person or due to external factors), and (iii) the stable-unstable dimension (whether events are viewed as resulting from permanent or temporary factors). Attribution theory has conceptual links with both self-efficacy theory and locus of control. All three approaches attempt to explain human behaviour by examining the influence of self-referent thoughts and beliefs. However both self-efficacy and locus of control theories highlight expectation for successful/unsuccessful outcomes as a key motivating factor in eliciting behaviour. Attributional theory on the other hand emphasises the situational determinants of causal beliefs.
Attributional theory has provided the impetus for research into a variety of psychological phenomena. Most well known is the development of the learned helpless model of depression devised by Abrahamson et al (1978), Seligman, Abramson, Semmel and von Bayer (1979), (refer to page 27 for more details). This model introduced the concept of attributional style to explain why some people are more vulnerable to developing depression. However some components of the model have not been validated by research findings. Kelley and Michela (1980) note that many situational factors may influence a person's causal inferences for a specific event (e.g. information about social norms). In addition the reliability and validity of the questionnaire designed to measure attributional style (the Attributional Style Questionnaire (ASQ) Peterson, Semmel von Baeyer, Abramson, Metalsky and Seligman,1982) was examined by Cutrona, Russell and Jones (1985) and found to be low. Furthermore the attributional style model only partially accounted for the relationships among the items on the ASQ. These findings call into question the conceptual basis of the ASQ. Cutrona et al concluded that a wide range of factors, other than the broad personality disposition of attributional style, may lead to variations in the causal attributions that people make for a given event. The concept of attributional style as a personality trait is also disputed. According to Cutrona et al, attributions are best viewed as specific examples of behaviour-situation units. They therefore recommend that the measurement of attributions should be situation/event specific. An earlier study by Bulman and Wortman (1977), evaluating causal attributions for spinal cord injury, indicates that some researchers were already aware of the need to focus on specific factors relating to attributions and to avoid overgeneralisation regarding individual causal attributions. Recently, researchers appear to have taken account of the recommendations of Cutrona et al by focusing on attributions for specific events.
Several studies have focused on the possible influence of attributions about blame for accidents or illness on coping and adjustment (e.g. Westbrook and Nordham 1986, Bordieri, Comninell and Drehmer 1989). Although attributions relating to perceived responsibility for an accident or illness might be assumed to have some relationship to adjustment the findings have not been consistent. In the Bulman and Wortman (1977) study quoted earlier, attributions were characterised according to whether they focused more on self-blame, blaming others, situational blame or attributing the accident to chance. The findings indicated that self-blame and/or feeling that the accident was unavoidable were both related to better coping as judged by professional staff. The authors explain this finding in terms of the participant’s attributions regarding the frequency of engagement in the activity during which the injury was sustained. That is, the participants appeared to blame themselves, but coped better with the accident, if the activity was something they often engaged in and which had known risks attached. Bordieri et al (1989) examined the relationship between type of disability/illness and attributions of blame. In this study rehabilitation graduates were asked to examine fabricated vocational evaluation reports. They rated the disabled persons as coping better/better adjusted, if the attribution of blame by the character appeared to be consistent with the perceived cause of the accident, i.e. paraplegia associated with an accident was significantly associated with perceptions of better coping, if the accident was attributed to chance. However if the disability was a result of a heart attack then self-blamers were seen as coping better. The findings appear to be inconsistent with the findings of Bulman and Wortman as regards attributions of blame following paraplegia. However different methodologies were employed in the two studies described. In contrast to the former study Bordieri and his associates only looked at two types of blame, ‘self’ blame and ‘chance’ blame. In addition perception of coping and adjustment was measured by a four-item questionnaire, whereas the former study used a single rating (based on a 16 point scale with endpoints of ‘coped extremely well and coped very poorly) to determine how each person was coping with their disability. In the latter study written case studies were given to rehabilitation graduates, whilst in the former study rehabilitation professionals gave their views about clients they were familiar with. In addition the Bulman and Wortman study did not evaluate effect of different type of disabilities. These studies are therefore not directly comparable. In addition the use of a third-party to judge the coping ability of the disabled person may not reflect the disabled person’s view of their coping. As noted by Wortman (1983) it will not be
easy to make judgements about how effectively a person is coping with a particular crisis because decisions about what constitutes effective coping are often tied up with questions of values. The inconsistencies in the literature indicate that the relationship between attributions and adjustment to disability may be more complex than previously thought. It does seem however that attributions made in specific contexts may have an influence on adjustment and coping.

1.2(f) Locus of Control

Locus of control (LOC) is another construct that is conceptually linked to self-efficacy (Lefcourt 1991). Rotter (1966) originally proposed it as a psychological construct. He hypothesised that the effect of a reward following some behaviour depends on whether or not the person perceives a causal relationship between his own behaviour and the reward. According to Rotter 'internal' LOC is signified by perception of an event as contingent upon one's own behaviour or relatively permanent characteristics. In contrast, when reinforcement is viewed as following one's action, but not entirely contingent upon it, this is termed 'external' LOC. The LOC concept is derived from social learning theory (Rotter 1960). In this theory reinforcement acts to strengthen an expectancy that a particular behaviour or event will be followed by that reinforcement in the future. The concept of expectancy as it relates to specific behaviours is pivotal to the understanding of the LOC construct. It is the expected outcome of the behaviour in terms of the reinforcement it produces which determines whether the behaviour will be employed in the future.
Since Rotter's original ideas were put forward a substantial number of research papers relating to LOC have followed. As noted by Lefcourt (1991), in general a more internal LOC is associated with a variety of positive behaviours including, amount of information seeking (Lefcourt and Wine 1969), pursuit of valued goals (Levenson 1974) and alertness (Lefcourt et al 1973). In contrast external LOC is more often associated with depression, anxiety and reduced coping abilities (Weiner 1986). Despite this apparent consistency in the research findings, there have been concerns about the interpretation of the nature of LOC and its measurement. Rotter (1975) suggested that researchers had put undue emphasis on LOC as a dichotomous personality trait. This had lead to the belief that people either had an internal or external LOC. However as he pointed out, it was never the intention that the LOC construct should be regarded as a bimodally distributed variable. In fact Rotter assumes that 'something approximating a normally distributed curve would describe the populations that he was interested in'. This suggests that LOC is probabilistic, i.e. some people are more likely to attribute outcomes internally/externally across a range of situations. However this tendency is continuously varied throughout the population rather than bimodally distributed. In addition he notes that expectancy is only one of the three major determinants of behaviour. Also of importance is the value of the reinforcement and the psychological situation. Erroneous conclusions regarding the constructiveness of an internal versus external LOC may be reached if the value of the reinforcement to the individual is not taken into consideration. Rotter (1975) and Phares (1976) recommend that researchers focus on specific populations in order to maximise the predictive capabilities of measures of LOC.

Following on from the earlier studies that used global measures of LOC, recent studies have used more specific measures aimed at targeted populations. Several studies have attempted to elucidate the relationship between LOC and factors potentially related to adjustment e.g affective state and other aspects of psychosocial outcome. However this type of research is subject to conceptual difficulties. Rotter (1975) states that the relationship between LOC and adjustment is complicated and adjustment is in fact a value concept and any relationship must depend on its definition. Although he does not explain this point further he appears to assume that the judgement of poor/good adjustment is influenced by the values of the judge. Wortman (1983) makes a similar claim in relation to effective and ineffective coping. These points highlight the importance of using reliable and valid measurement tools based on clear operational definitions of psychological variables.
In the health field research has been carried out on the influence of locus of control on factors such as psychosocial outcome in chronic illness (Nagy and Wolfe 1983, Affleck, Tennen, Pfeiffer and Fifield 1987) and adjustment following spinal cord injury (Shadish, Hickman and Arvick 1981). Bearing in mind the recommendations of Rotter (1975), these studies have used assessments specifically designed to measure health related LOC beliefs. In general an internal locus of control has been associated with more positive adjustment to long-term disability and management of chronic illness. However as noted by Rotter (1975) several earlier studies (e.g. Efran 1963, Phares, Ritchie and Davis 1968) suggest that ‘internals’ tend to repress (forget?) failures and unpleasant experiences. It is not clear whether this finding is valid, and if more recent researchers are aware of it. It does however imply that conclusions drawn from more recent studies may be based on the misinterpretation of a positive correlation between internal LOC and better adjustment. Additionally, there is no consistent conceptualisation of the term adjustment therefore comparison between the results of different studies is problematic.
From a neurorehabilitation perspective, Partridge and Johnston (1989) investigated the hypothesis that a higher internal LOC would be predictive of a faster and more complete recovery from physical disability in stroke survivors. LOC was measured using a nine item self-report scale specifically designed for the study (the Recovery Locus of Control Scale). The experimental hypothesis was supported in that Recovery LOC was found to predict progress that could not be explained by initial severity of the patient's disability. Moore and Stambrook (1995) investigated the relationship between a number of variables including LOC and outcome in a follow-up study of TBI survivors. They found that internal LOC was significantly associated with improved quality of life as defined by scores on a measure of physical and psychosocial outcome (the Sickness Impact Profile), and a measure of emotional outcome (the Profile of Mood States). As this was a correlational study no assumptions can be made regarding causality and it may be the case that better outcomes increase people's internal LOC. As these studies used measures, which assessed different aspects of health LOC the results are not directly comparable. Although appearing to produce similar findings, in fact they relate to different LOC beliefs. Despite these limitations the majority of studies relating to health based LOC indicate that an internal LOC is associated with more positive psychological outcomes relating to level of adjustment, affective state and coping styles. However the criticisms raised by Rotter (1975) as noted above must be taken into account when interpreting the research findings.
1.2(g) Awareness of deficits.

The question of awareness of deficit is an extremely important one in research into emotional adjustment following ABI. The term anosagnosia was first proposed by Babinski (1914) to refer to lack of knowledge, awareness, or recognition of disease. The term lack of insight has been put forward more recently to refer to diminished awareness of neuropsychological deficits. Unawareness of deficit or lack of insight can lead people with brain injuries to grossly underestimate their difficulties. If one is unaware or has limited insight into deficits resulting from ABI then there will fewer perceived changes to adjust to. In addition lack of insight can also have a major influence on the process and outcome of rehabilitation (Brooks and Lincoln 1984, Cicerone and Tupper 1986). Lack of motivation for rehabilitation (Anderson, Bourestom, Greenberg and Hildyard 1974) failure to implement compensatory strategies and adherence to unrealistic goals have all been reported in the literature.

Conceptualisations of unawareness/lack of insight can broadly be divided into neuroanatomically based and psychologically based theories. McGlynn and Schacter (1989) have comprehensively reviewed this area. They found that the majority of investigators have attributed anosagnosia to either focal brain lesions or diffuse brain damage that disrupts the functioning of a mechanism or mechanisms necessary for normal awareness of a neuropsychological deficit. In contrast other investigators have proposed that anosagnosia primarily reflects motivated use of the psychological defense mechanism of denial (e.g Weinstein and Kahn 1955). McGlynn and Schacter conclude that there is no specific type of impairment that leads to unawareness. However some cognitive impairments (e.g. memory dysfunction) may lead to inconsistent recall of the extent and severity of deficits arising from ABI, thereby having an indirect influence on perceived level of adjustment for some people.

Researchers have documented the problems presented by reduced insight/unawareness in people with closed head injuries. Prigatano and Fordyce (1986) found a positive association between neuropsychological impairment and self-ratings of competence in patients with traumatic brain injury. Higher subjective ratings of competence also correlated with lower levels of emotional distress. This suggests that whilst participants in this study were unaware of the extent of their neuropsychological deficits this had a buffering effect on their emotional wellbeing.
In order to study changes in perception of difficulties over time, Godfrey Partridge, Bishari and Knight (1993) assessed emotional wellbeing and insight in a cross-sectional sample of people with closed head injury (CHI). Emotional adjustment was indexed by scores on the Zung Depression Scale (Zung 1965), the Anxiety Trait scale of the State-Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg and Jacobs, 1983) and the Rosenberg Self-Esteem Inventory (Rosenberg 1965). Moderate to severe head injury groups at different times post-trauma were compared to an orthopaedic control group. The six-month post-onset CHI group reported fewer behaviour problems, neuropsychological impairment and emotional distress than the one and two-three years post-onset CHI groups. Additionally, this group did not differ from the controls on any of the measures used. In contrast both the one and two-three year post-trauma group reported significantly more behavioural problems and emotional distress than the control group. These results suggest that lack of insight into difficulties may be more common in the short-term post-acute phase following CHI; however by one year post-trauma awareness has increased and this is concomitant with increased emotional distress. Godfrey et al concluded that as there was no correlation between severity of head injury as measured by scores on the Glasgow Coma Scale (Jennet and Teasdale 1981) and Computerised Tomography (CT) abnormalities, and participants reports’, organic damage alone cannot account for these findings. They therefore conclude that there is a psychological component to lack of insight and that this is a form of motivated denial. However as they did not look at the influence of locus of brain damage on the results obtained, the possibility of organic reasons for the lack of insight in some cases cannot be ruled out.

Lack of awareness or reduced insight into difficulties has been consistently reported in the literature. Importantly there does appear to be a relationship between level of insight and emotional adjustment. A major goal of rehabilitation efforts is to increase/improve functioning in areas of deficit. This is a more realistic aim if clients are aware of their difficulties. However the drive to increase awareness must be tempered by sensitivity to the emotional/psychological functioning of the person. As noted by Godfrey et al ‘the challenge is to support and develop the patients’ emerging understanding of their disabilities while minimising a negative emotional response’. 
1.3(a) The relationship between cognitive functioning and adjustment.

The influence of cognitive functioning on adjustment to ABI has been of some interest to researchers in the field of neurological rehabilitation. It is of particular importance because of the high incidence of both cognitive impairment and emotional distress reported in this population (e.g. Robinson et al 1984b for stroke, Brooks 1984 for TBI). A brief review of the literature indicated that some researchers have found a negative correlation between level of cognitive functioning and emotional wellbeing following TBI. Allen and Ruff (1990) report that as the degree of cognitive impairment increases, it has been found that the individual’s judgement about their circumstances and abilities becomes less accurate. This view is supported by similar findings reported by Prigatano and Fordyce (1986). However Robinson et al (1984b), and Downhill and Robinson (1994) have reported the opposite finding. Both studies reported a positive correlation between emotional distress as indexed by severity of depression and cognitive impairment as measured by the mini-mental state examination, following stroke. However they also noted that cognitive impairment was also significantly associated with the number of years of education. In addition both major depression and cognitive impairment were significantly related to age. Therefore these findings may only apply to older adults. The contradictory findings may be a result of the differing neurological samples used. Whilst the former studies focused on TBI the latter studies used samples from the stroke population. TBI is known to be associated with diffuse brain damage to the fronto-temporal brain region. The executive and cognitive changes sometimes associated with this type of damage include impairments in attention and memory functioning and personality and behavioural problems, (Brooks 1984). Unawareness of personality and cognitive changes is frequently observed in head-injured patients (Bond 1984). In contrast the focal damage produced by strokes is more often associated with lack of awareness of specific physical disabilities such as hemiplegia (Cutting 1978, Bisiach,Valler, Perani, Papagno and Berti 1986). The contradictions in the literature suggest that the relationship between cognitive impairment and depression is far from straightforward.
1.4(a) The influence of physical/functional disability on mood and adjustment.

Physical disability is defined as 'any restriction, or loss of ability to perform an activity in the manner or within the range considered normal for a human being (World Health Organisation 1980). Disability of varying types and severity is a fairly common occurrence following acquired brain injury (e.g. Jonson and Gleave 1987, Moscato, Trevisan and Willer 1994). Several studies have found a significant relationship between physical disability and mood disorder. For example Susset, Vobecky and Black (1979), found a moderate positive correlation between an index of physical functioning (developed by the authors) and self assessment of mood/attitude to disability in a mixed group of participants including some with stroke or MS. More recently, Wade et al (1987) and Ng, Chan and Straughan (1995) have reported negative correlations between scores on a measure of physical disability, the Barthel Activities of Daily Living Scale (Mahoney and Barthel 1965), and depression as indexed by the Wakefield self-report depression inventory.

Galynker, Prikhojan, Philips, Focseneanu, Ieronimo and Rosenthal (1997) reported a similar finding however this did not reach significance. Although these results suggests that mood is significantly associated with severity of physical disability, the findings from the literature are not consistent. Negative findings have been reported in several studies; for example Lezak (1987) and Jorge et al (1993), found no correlation between severity of physical disability and emotional well-being following TBI. Similar findings have been reported for stroke patients (Robinson, Starr and Price 1984). The discrepancy in results reported may be influenced by the different measures used to assess mood. In addition several of the studies use the Hamilton Depression Rating Scale (HDRS) (Hamilton 1960), which as Primeau (1988) points out, includes many somatic items which may lead to the over-reporting of depression in a neurological population. A similar criticism has been levied at the Beck Depression Inventory (Nyenhuis et al 1995). The diversity of measures used in different studies together with significant differences in sample sizes makes the interpretation of the research findings extremely difficult.
1.5 Conclusion.

From this selected review of the literature it is apparent that there are many psychological factors relating to the construct of adjustment. Some of these factors such as attitudes towards and acceptance of disability/illness may be viewed as integral factors underpinning the construct of adjustment. Other variables such as self-esteem and self-efficacy have a significant influence on these factors. However it is hypothesised that there is a reciprocal relationship between the two factors seen as integral to adjustment and the other variables such as self-esteem, self-efficacy and mood. A model of adjustment is presented below which aims to articulate the relationship between some of the subordinate constructs relating to adjustment as summarised in the literature.
Figure 1: The relationship between key variables for psychological adjustment

Adjustment

Acceptance
- Affective state
- Self esteem

Attitude
- Self efficacy
- Locus of control
- Attributions
In this model the constructs are arranged hierarchically to illustrate the relationship between adjustment and the sub-ordinate constructs that impact on adjustment. This model utilises the definition of adjustment put forward by Antonak (1993). It is postulated that acceptance is a key variable and has a major impact on the process of adjustment. It is hypothesised that affective states such as anxiety and depression have an indirect influence on adjustment via acceptance, as does self-esteem. Attitudes towards disability are envisaged to be another major influence on the adjustment process. It is hypothesised that three variables, self-efficacy, locus of control and attributions will influence adjustment through the attitudes variable. These variables all relate to how people view their personal environment and how much in control they feel. Acceptance and attitudes are perceived as having a reciprocal relationship.

1.6 Neurological rehabilitation.

Advances in medical interventions have enabled significantly more people to survive the whole spectrum of brain trauma than would previously have been the case. According to Greenwood and McMillan (1993), the need for services to provide rehabilitation for people with brain injuries emerged during the first twenty years after the Second World War. As large numbers of brain injured people survived the war because of improved medical care, the need for specialist rehabilitation became apparent. Since this initial recognition of need, rehabilitation services have developed in a piecemeal and haphazard way (Greenwood and McMillan 1993). As a consequence, there is often a lack of co-ordination between services and no consensus as to the most appropriate ways of measuring the outcome of rehabilitation.
'Rehabilitation' is the term used to describe the services and interventions seen as most appropriate for people with brain injuries. The World Health Organisation (WHO) states that 'rehabilitation implies the restoration of patients to the highest level of physical, psychological and social adaptation attainable. It includes all measures aimed at reducing the impact of disabling and handicapping conditions and at enabling disabled people to achieve optimum social integration' (WHO 1986). Although this description encompasses a broad spectrum of domains, until quite recently the main emphasis of most rehabilitation services was on physical rehabilitation (Livingston 1986, McMillan and Greenwood 1993). However it is now increasingly recognised that the most pervasive consequences of brain injury include behavioural and emotional changes (Thomsen 1987, Prigatano and Fordyce 1986). In addition these type of difficulties have been found to be associated with sub-optimal outcomes of rehabilitation and are often responsible for the exclusion of people with brain injuries from conventional rehabilitation services.

In order to cater for the wide range of deficits that are encountered after brain injury, McMillan and Greenwood (1993) recommend that a range of services should be provided. This includes both acute and post acute in-patient rehabilitation and also non-residential rehabilitation. These services should also cater for progressive neurological conditions e.g multiple sclerosis. During the acute stage after brain injury the emphasis is usually on improving medical status and on physical concerns. In the post acute stage it is more feasible to shift the emphasis to include the rehabilitation of any cognitive, emotional and behavioural deficits. Greenwood and McMillan (1993) view rehabilitation as a 'problem solving educational process by which a disabled person achieves optimal physical, psychological and social function'. In order to achieve this aim rehabilitation must be delivered in a planned and consistent way with strong collaboration between the therapists and the person receiving rehabilitation. Wilson (1994) suggests that there are several approaches to rehabilitation as outlined below;

- Restoration of function
- Anatomical re-organisation
- Avoiding problem areas
- Functional adaptations/alternative solutions
- Making better use of existing skills
- Self-help and support groups.
The effectiveness of any one of these approaches will depend on the deficits and difficulties experienced by the individual and his/her stage of rehabilitation. However as noted by Rose and Johnson (1996), all aspects of rehabilitation and community integration require some degree of learning and adjustment to environmental changes. Often adjustment difficulties are not readily apparent when a person is in hospital or newly diagnosed (Wade et al 1987). In addition as highlighted earlier, the emphasis in the acute stage is primarily on establishing medical stability and beginning physical rehabilitation. It is frequently not until the person with brain injuries returns home that adjustment difficulties become more prominent. Therefore in terms of the timing of interventions it is often more appropriate to attempt to intervene once the individual is in the post-acute stage. McMillan and Greenwood (1993) recommend that people who return home should have access to out-patient rehabilitation facilities where the aim is to minimise the secondary effects of loss of confidence, anxiety and low mood, all potential indicators of poor adjustment. However it must also be pointed out that adjustment difficulties can emerge at any stage of the rehabilitation process. This notion is supported by the findings of McColl, Lei and Skinner (1995) who studied the relationship between social support and coping after spinal cord injury. They observed differential effects of social support on coping depending on time post-onset. The authors asserted that an awareness of the ways in which social support at different time points and coping relate to each other may lead to a better understanding of the pattern of behaviour and adjustment. Although interventions should not be exclusively targeted at the post acute community rehabilitation stage, it is likely that many of the secondary effects (e.g. low mood) referred to by McMillan and Greenwood will present as difficulties during this time.

1.6(b) The relationship between psychological factors and outcome of rehabilitation.

This selected review of the literature focuses on the relationship between specific aspects of outcome of rehabilitation and various psychological variables that may potentially influence this outcome. It is acknowledged that other variables such as return to work or alternatives to this have also been used as determinants of outcome. However there is a reasonable consensus as to the psychological benefits of incorporating occupational and leisure activities as outcome variables (e.g. Melamed, Grosswasser, Stern 1992). It was therefore decided to focus on areas were research findings are less well established.
The measurement of outcome following neurorehabilitation has been the subject of debate for several years (Anderson et al 1974, Livneh 1988). As Rose and Johnson (1996) point out, 'the multiple demands for information on different aspects of outcome have made it difficult to arrive at an operational definition of outcome'. This suggests that outcome will be defined and measured in different ways according to the components of rehabilitation focused on. Consequently findings from different studies may not always be directly comparable.

In addition there is very little research on the relationship between psychological factors such as self-esteem and outcome of rehabilitation. However a review of the available literature indicates that several of the variables thought to underpin adjustment have been associated with various aspects of rehabilitation outcome. For example Garske and Thomas (1992) studied self-esteem following TBI. They found a significant positive association between self-esteem as indexed by the Rosenberg Self-Esteem Scale (RSES), and scores on the Social Need Satisfaction (SNS) subscale of the Rehabilitation Need and Status Scale (RNSS) (Kravetz 1973). This scale was developed to measure the subjective state of rehabilitation experienced by patients. The SNS subscale provides a measure of the frequency with which a person participates in and maintains social contacts and their satisfaction with these contacts.

Melamed et al (1992) reported a significant correlation between scores on the Acceptance of Disability Scale (Linowski 1971), and several subscales of the RNSS in a post-TBI group. The subscales relevant to adjustment include the satisfaction with social contact scale (described above) and the Emotional-Security Need Satisfaction scale, which provides a measure of the frequency with which a person experiences feelings such as sadness or anxiety. Additionally, the attitude of the disabled person towards disability has been highlighted as an important factor influencing certain aspects of rehabilitation. Wright (1983), reported that disabled people who have a negative attitude towards disability are more likely to try to hide their disabilities and therefore less likely to socialise with others. Although acquired brain injury (ABI) does not always lead to a visible physical disability, the stigma attached to ABI may lead some people to react in a similar way.

Although several studies have focused on depression following ABI very few studies have looked at the impact of depression or anxiety on rehabilitation outcome. Mixed findings have resulted from the available research. For example Galynker et al (1997) found that stroke patients who had high scores on a measure of indifference and apathy also had a tendency to have high scores on a measure of depression, the Hamilton Depression Rating Scale (HDRS)). They also had lower scores on a measure of rehabilitation outcome (The Functional
Independence Measure). In addition, Ng, Chan and Straughan (1995) found a significant correlation between level of depression as measured by the HDRS and functional impairment as measured by a modified Barthel ADL index. However no correlation between depression as measured by the HDRS and scores on the John Hopkins Functioning Inventory index of ADL (Robinson and Szetela 1981) was found in a study of depression following TBI (Jorge et al 1993). The inconclusive findings in the literature indicate a need for further investigation of this area.

In general previous findings relating to the relationship between psychological variables such as acceptance of disability/illness and outcome of rehabilitation have been inconsistent. This may be the result of several factors such as, the different conceptualisation of outcome as indicated by the diversity of tools used to index this variable. Also time post-onset has varied, with some studies evaluating participants who are in the acute stage post-onset, whilst others have focused on more long-term follow-up. The inconclusive nature of the findings illustrates that the relationship between outcome of rehabilitation and psychological factors is far from straightforward.
CHAPTER TWO:

2 RATIONALE FOR THE PRESENT RESEARCH.

Adjustment to acquired brain injury (ABI) is clearly a complex multi-component process, involving various psychological factors. As significantly more people survive previously fatal neurological trauma, the impact of residual physical, psychosocial, cognitive and functional disabilities/handicaps takes on even greater importance. According to the psychosocial model of disability (Wright 1983), the central aim of the rehabilitation process should be the promotion of healthy adjustment to residual difficulties (Wade 1992). In order to achieve this aim it is vitally important that adjustment difficulties are accurately identified and appropriate and timely interventions are offered. In addition the psychosocial model views healthiness as a continuum. According to Broome (1995), this model has some advantages to the chronically ill/disabled person for whom coping is the best possible outcome, if they cannot expect to be cured.

Psychological reactions to ABI are extremely variable. The presence of cognitive impairment is one additional complicating factor in determining adjustment to ABI. Cognitive deficits are likely to impact on the very abilities that are needed to successfully manage the myriad changes that often follow ABI (e.g. capacity for rational thought and the ability to generate hypotheses about alternative courses of action). In addition cognitive impairment has been associated with unrealistic appraisal of competence in everyday activities (Prigatano and Fordyce, 1986). Lack of insight into difficulties may paradoxically protect against poor adjustment, as there are fewer perceived problems to adjust to. Adjustment is understandably a complex process with various factors such as cognitive impairment contributing to the complexity. As pointed out by Ponsford, Sloan and Snow (1995), there has been relatively little documentation of the consequences of ABI from the point of view of the person who sustains the injury. Thus this is an area worthy of study because of its potential to help elucidate the relationship between ABI, adjustment and rehabilitation outcome. In addition the possible impact on neurorehabilitation services is worth considering especially in light of the potential it gives for proactive intervention to prevent or alleviate long term psychological morbidity following ABI.
In a series of studies investigating adjustment to visual impairment, Dodds et al (1991, 1993, 1994) proposed that psychological adjustment is a multi-factorial process. They argued that important factors contributing to adjustment to visual impairment include attitudes towards impairment, level of self-esteem and acceptance of impairment. Some of these factors have been extensively studied in non-brain injured populations, but have not been well studied in a neurological population. In order to extend the applicability of models relating to psychological health, illness and disability it is important to undertake studies with people with brain injuries and cognitive impairment. This study focuses on the emotional and cognitive components of the adjustment construct. It is acknowledged that behavioural and social components are also of importance and are likely to have a direct influence on adjustment.
2.1 Purposes of the present studies.

There are very few reliable and well-validated measures available to assess adjustment to disability resulting from brain injury. There is even less research into the effects of cognitive impairment on adjustment. The purposes of this study are (i) to investigate the reliability and validity of an existing measure of adjustment (the Nottingham Adjustment Scale (NAS)) with a neurological population; (ii) to explore the relationship between cognitive impairment and adjustment; (iii) to assess the utility of sub-scales of the NAS in predicting outcome of rehabilitation. If it is found that level of adjustment does predict the course of progression in rehabilitation, the early identification of patients with good or poor prognoses using a validated measure could enable the most appropriate interventions to be targeted to the needs of the different subgroups.

Study I and II were undertaken to establish the reliability and validity of the NAS. The efficacy of the NAS as a predictor of rehabilitation outcome was explored in study III.

2.2 STUDY I: Reliability study.

This study was undertaken to establish the test-retest reliability of the NAS. In addition the influence of cognitive functioning on responses to the NAS subscales was also examined to determine whether level of cognitive functioning affected reliability of responding. The Ravens Standard Progressive Matrices (RSPM) was chosen to give a measure of nonverbal reasoning ability as an index of general cognitive functioning. As reliability of responding may be affected by attention and memory deficits, tests of these cognitive functions were also selected.
2.3 METHOD.

2.3(i) Description of measures used.

(a) Measure of Adjustment.

The Nottingham Adjustment Scale (NAS).

This self-report measure of psychological adjustment was developed by Dodds et al (1991). It is derived from published self-report measures of various psychological constructs (as described below). Dodds et al administered these measures to 50 participants with visual impairments. Item-total correlations were calculated for each of the measures. Only items with an item-total correlation of 0.5 or above were retained for inclusion in the NAS.

The following subscales are included in the NAS:

(a) Anxiety and Depression (12 items e.g. “Have you recently felt constantly under strain?”), derived from the General Health Questionnaire 28 (Goldberg 1981).

(b) Self-esteem (9 items, e.g. “I take a positive attitude towards myself”), derived from the Rosenberg self-esteem questionnaire (Rosenberg 1965).

(c) Attitudes to Blindness (7 items, e.g. “Most visually impaired people are dissatisfied with themselves”), derived from the Attitudes towards Disabled Persons scale (Yuker, Block and Campbell 1960).

(d) Locus of Control (4 items, e.g. “It’s what I can do to help myself that’s really going to make all the difference”), derived from the Recovery Locus of Control scale (Partridge and Johnston 1989).

(e) Acceptance of Disability (9 items e.g. “Because of my eye problem, I have little to offer other people”), derived from the Linowski Acceptance of Disability questionnaire (Linowski 1971).

(f) Self-efficacy (8 items, e.g. “When I decide to do something, I go right to work on it”), derived from the Sherer Self-Efficacy questionnaire (Sherer, Madaux, Mercadante, Prentice-Dunn, Jacobs and Rogers 1982).
(g) Attributions (6 items, e.g. “Any successes I've had have been due to outside influences”), developed by Dodds et al (1991). High scores on this subscale equals more internal attributions.

Alpha coefficients were computed for the retained items to establish the homogeneity of each scale and were found to range from 0.72 to 0.92. Responses are scored on a five point likert scale with the score range from 1 to 5. The minimum score ranges from 4 to 9 with a maximum score ranging from 20 to 45 for different subscales, with higher scores indicating greater subjective adjustment.

The NAS was devised to measure the process and end point of adjustment and to enable the rehabilitation process to be geared to individual needs (Dodds et al 1991). This measure of adjustment was chosen for the current study as it appears to meet the need for a multi-dimensional measure that is focused on the individual in a rehabilitation context.

With the permission of the author the wording was modified for use here to make it more applicable to a neurological population. The phrase ‘visual impairment’ was replaced with ‘disability/illness’ and the subscales were presented in the following order: subscale A (self-esteem), subscale B (attitudes to disability/illness), subscale C (anxiety and depression), subscale D (locus of control), subscale E (acceptance), subscale F (self-efficacy), and subscale G (attributions).

Refer to appendix A (i) for a copy of the modified NAS

b) Cognitive tests:

(i) Raven's Standard Progressive Matrices (RSPM) 2nd edition. This is a measure of non-verbal reasoning ability used to index non-verbal intelligence, developed by Raven, Court and Raven (1993). There are 5 subtests of increasing difficulty, and total scores range from 0 to 60. The higher the overall score the higher the presumed level of non-verbal reasoning ability.
(ii) **Doors and People Test (D&P).** This series of tests was developed by Baddeley, Emslie and Nimmo-Smith (1994) to assess various aspects of memory functioning. Four sub-tests from this battery (the People Test, Doors Test, Names Test and Shapes Test), were used to measure immediate verbal and non-verbal recall and recognition. Higher scores on the subtests indicates better memory functioning.

(iii) **Trailmaking test parts A and B (TMA, TMB) (Reitan 1958)** was used to tap visual attention, mental flexibility, ability to suppress a salient response tendency and mental tracking. These are timed tests therefore higher scores equal greater response times and poorer cognitive functioning.

2.3(ii) **Participants.**

Participants were 50 adults (31 males and 19 females), with acquired brain injury either attending for rehabilitation at a community based rehabilitation centre or attending community based self-help groups. Details of the rehabilitation service are outlined in the details of participants section of study III. Participants from the self-help groups were either involved in a local stroke group or the local branch of Headway (for people with head injuries). The age range of the participants was 24 to 77.

2.3 (iii) **Procedure.**

The NAS was administered twice 7-16 days apart. Both verbal and written instructions were given for completing the NAS. Participants were encouraged to self-administer the NAS, however the NAS was completed with the help of a trained rehabilitation assistant or carer if required. Cognitive assessments were conducted over a period of two weeks at the beginning of rehabilitation.

2.3 (iv) **Exclusion criteria.**

Clients with major speech and/or language impairment as assessed by a speech and language therapist.

Clients with a history of alcohol misuse.

Clients with a history of untreated major mental illness.
Clients with severe global cognitive impairments (i.e. general cognitive functioning below the 5th percentile) as assessed by a clinical neuropsychologist.

2.4 RESULTS.

2.4 (i) Demographic data.

Demographic details are summarised in table 1 and 2 below. There were insufficient details available regarding severity of illness/injury and therefore this information is not reported. However the majority of people attending for rehabilitation have moderate to severe brain injuries/neurological conditions. 30 participants were married (60%), 15 were single (30%), with 2 divorced (4%) and 3 widowed (6%).

Table 1: Details of age at time of study and months post-onset for whole sample.

<table>
<thead>
<tr>
<th>Age at study</th>
<th>Mean (years)</th>
<th>sd (years)</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at study</td>
<td>49</td>
<td>13</td>
<td>24-77</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time post –onset (in months).</th>
<th>Mean</th>
<th>sd</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>31</td>
<td>1-127</td>
<td></td>
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</tbody>
</table>

There was no sex difference as regards age at the time of the study or time post-onset.
Table 2: Diagnostic profile of reliability study participants.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>frequency</th>
<th>percentage</th>
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<tbody>
<tr>
<td>Left *CVA</td>
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<td>22</td>
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<tr>
<td>Right CVA</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Brainstem CVA</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Bilateral CVA</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Unspecified CVA</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Subarachnoid haemorrhage</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Multiple Sclerosis</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Tumour</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Traumatic Brain Injury</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>**Other</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

*CVA equals Cerebrovascular Accident.

**other diagnoses include hydrocephalus, cerebellar ataxia, meningitis, encaphalitis and post-hypoxic brain damage (all with N=1)
Just under half of the sample (46%) had a diagnosis of CVA, the next largest diagnostics groups were TBI and MS which represented 14% and 10% of the sample respectively. There was a mixture of other diagnoses with small numbers represented in the sample. This reflects the variety of clients referred to the rehabilitation service at the time.

2.4 (ii) NAS data

a) Distribution of scores.

b) Test-retest stability.

a) The responses on the subscales of the NAS were all normally distributed as illustrated by figures 4 to 10 (appendix B). Therefore parametric statistics are used throughout the analyses.

b) Test-retest reliability was computed using Pearson’s correlations to compare the NAS subscales at time one and two. The results are summarised below in Table 3.

There was an interval of at least one week between administrations with a range of 7 to 16 days and a median interval of 9 days.
Table 3 Pearson’s Correlation Coefficient for the NAS subscales (test-retest reliability).

<table>
<thead>
<tr>
<th>NAS subscale</th>
<th>correlation coefficient</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>self-esteem</td>
<td>0.86</td>
<td>***</td>
</tr>
<tr>
<td>attitudes</td>
<td>0.71</td>
<td>***</td>
</tr>
<tr>
<td>anxiety/depression</td>
<td>0.70</td>
<td>***</td>
</tr>
<tr>
<td>locus of control</td>
<td>0.41</td>
<td>***</td>
</tr>
<tr>
<td>acceptance</td>
<td>0.83</td>
<td>***</td>
</tr>
<tr>
<td>self-efficacy</td>
<td>0.75</td>
<td>***</td>
</tr>
<tr>
<td>attributions</td>
<td>0.62</td>
<td>***</td>
</tr>
</tbody>
</table>

*** = p < 0.005

As recommended by Guildford (1973) a cut-off point of 0.70 was used to determine an acceptable level of correlation. Five of the subscales have acceptable reliability at or above this level. The remaining two subscales, Locus of control and Attributions have correlation coefficients below 0.70. Paired t-tests were also computed to check for any significant discrepancy in mean scores on the NAS subscales from time I to time II. Table 4 below summarises these results.
Table 4: Mean scores time one and two for each NAS subscale.

<table>
<thead>
<tr>
<th>NAS subscale</th>
<th>Mean time 1</th>
<th>Mean time2</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-esteem</td>
<td>30.78</td>
<td>31.38</td>
<td>-1.8</td>
</tr>
<tr>
<td>Attitudes</td>
<td>22.24</td>
<td>21.82</td>
<td>.6</td>
</tr>
<tr>
<td>Anxiety/depression</td>
<td>38.36</td>
<td>38.62</td>
<td>-.25</td>
</tr>
<tr>
<td>Locus of control</td>
<td>16.5</td>
<td>16.44</td>
<td>.13</td>
</tr>
<tr>
<td>Acceptance</td>
<td>31.14</td>
<td>30.64</td>
<td>.77</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>29.24</td>
<td>29.42</td>
<td>-.26</td>
</tr>
<tr>
<td>Attributions</td>
<td>19.34</td>
<td>18.06</td>
<td>2.33*</td>
</tr>
</tbody>
</table>

* = p < 0.05

As can be seen, for only one scale (Attributions) was there a significant difference between scores on the two occasions.

(c) Intercorrelations between subscales of the NAS.

Pearson's correlations between the seven NAS scales are shown in Table 5 for the 50 participants. There are a number of correlations above 0.5 indicating that certain factors that Dodds argued underlie the construct of adjustment are inter-related e.g. self-esteem with attitudes towards disability, acceptance of disability/illness and self-efficacy. Acceptance is significantly associated with five of the other subscales. However some of the correlations between different subscales were not significant.
### Table 5: Inter-correlations between subscales of the NAS.

<table>
<thead>
<tr>
<th>NAS subscales</th>
<th>NAS A self-esteem</th>
<th>NAS B attitudes</th>
<th>NAS C anxiety/Depression</th>
<th>NAS D locus of control</th>
<th>NAS E acceptance</th>
<th>NAS F self-efficacy</th>
<th>NAS G attributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAS B</td>
<td>0.48 ***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAS C</td>
<td>0.41 ***</td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAS D</td>
<td>0.42 ***</td>
<td>0.41 ***</td>
<td>0.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAS E</td>
<td>0.62 ***</td>
<td>0.47 ***</td>
<td>0.38 **</td>
<td>0.53 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAS F</td>
<td>0.51 ***</td>
<td>0.36 **</td>
<td>0.14</td>
<td>0.32 *</td>
<td>0.55 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAS G</td>
<td>0.24</td>
<td>0.29 *</td>
<td>-0.13</td>
<td>0.26</td>
<td>0.22</td>
<td>0.10</td>
<td></td>
</tr>
</tbody>
</table>

* = p < 0.05  
** = p < 0.01  
*** = p < 0.005

Overall this suggests that further clarification is needed regarding the factor structure of the NAS. In order to explore further whether or not the scales tap truly discrete aspects of psychological functioning the usual procedure would be to conduct a factorial analysis. However it has been demonstrated empirically that a minimum sample size of 100 is needed with two to three participants per variable, to give a reliable factor structure in analysing questionnaire data (Kline and Barrett 1993). The number of participants in the reliability study was too small to fulfil this requirement, consequently factor analysis was not undertaken with the data. It is acknowledged that a larger sample size is needed to examine the factor structure of the NAS within a neurological population.
2.4 (iii) Effect of cognitive functioning on reliability of NAS responses.

The aim of this part of the study was to assess the possible impact of cognitive functioning on the reliability of responses on the NAS subscales. For each scale a change score from time one to time two was computed and squared to index individual stability in scoring. This stability score was correlated with an index of cognitive functioning. The Ravens Standard Progressive Matrices (RSPM) was taken as the main index of cognitive functioning as this is a widely recognised measure of non-verbal intelligence and one attempted by nearly all participants. In addition correlations were computed between responses on the NAS subscales and results of the other cognitive assessments for those participants who completed each of the other cognitive tests. No significant correlations were found between scores on the RSPM or any of the other cognitive measures and the NAS stability indices. For illustration Table 6 below states the correlations between the NAS stability indices and the RSPM.

Table 6: Correlations between the NAS stability indices and the RSPM.

<table>
<thead>
<tr>
<th>NAS subscale</th>
<th>Correlation with RSPM N=48</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-esteem</td>
<td>.07</td>
</tr>
<tr>
<td>Attitudes to disability</td>
<td>-.00</td>
</tr>
<tr>
<td>Anxiety/depression</td>
<td>.11</td>
</tr>
<tr>
<td>Locus of Control</td>
<td>-.06</td>
</tr>
<tr>
<td>Acceptance of illness</td>
<td>.09</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>-.07</td>
</tr>
<tr>
<td>Attritions</td>
<td>-.26</td>
</tr>
</tbody>
</table>
2.5 DISCUSSION.

According to the American Congress of Rehabilitation Medicine (Johnston, Keith and Hinderer 1992), insufficient attention has been paid to the psychometric properties of measures, for example validity, reliability, standardisation and scalability. One aim of the present study was to address some of these concerns by ascertaining the reliability of the NAS with a mixed neurological population.

As the sample included very small numbers for the majority of diagnostic groups represented it was not feasible to take diagnosis into account when analysing the data. It is noted that with greater representation of the different diagnostic groups it is possible that some of the findings might apply to some diagnostic groups but not to others. However one of the main aims of the present study was to determine the reliability of the NAS in a mixed neurological population as is typically seen in a community based neurorehabilitation service. Further research will be needed to determine the reliability of the NAS for individual diagnostic groups.

Results of the test-retest reliability study indicate that five subscales of the NAS (self-esteem, attitudes, anxiety/dysphoria, acceptance and self-efficacy) have acceptable reliability ranging from 0.70 to 0.85 (Table 3). The reliability co-efficients of the remaining two subscales (Locus of Control and Attributions) were below acceptable levels. In addition paired t-tests compared scores on each of the NAS subscales at times one and two (Table 4). This was undertaken to highlight any significant differences in group means over the test-retest period which might indicate instability of measurement. The results indicate that for six of the subscales there was no significant change in the group mean from first to second administration. There was a significant difference in group means for the Attributions subscale further suggesting that this scale is not a reliable or stable index of attributional style. It is therefore concluded that five of the NAS subscales (self-esteem, attitudes to disability/illness, anxiety/depression, acceptance of disability/illness and self-efficacy) have both acceptable test-retest reliability and demonstrate stability of measurement.
The reliability of the Attributions and the Locus of Control (LOC) subscales was below the pre-determined level of acceptability. One possible reason for this is that these two variables are based on abstract constructs that rely on the individual’s ability to hypothesise about future outcomes (e.g. ‘I have little or no control over my progress from now on’); or alternatively to determine how best abstract statements such as ‘Any successes I’ve had have been due to outside influences’, apply subjectively. Abstract reasoning ability is known to be sensitive to brain injury (Lezak 1996). It may be the case therefore that the LOC and Attributions subscales are measuring deficits in reasoning rather than assessing the individual’s belief system in a reliable manner.

The NAS consists of conceptually linked scales as derived with a visually impaired sample. As the present study aimed to undertake a systematic appraisal of the NAS as an index of adjustment in a neurological population it was thought to be important to look at a number of potential variables underpinning adjustment in this population. In addition in the interest of applicability to a clinical population it was decided to examine how the separate NAS subscales related to other variables such as outcome of rehabilitation and level of physical disability. However it may be that administering any one of the subscales would provide a sufficient index of psychological adjustment and this may be desirable from a logistical point of view. Alternatively, it may be that some aspects of adjustment are more amenable to intervention and this issue is addressed in study III.

When undertaking research with people with ABI the possibility that level of cognitive functioning may influence the findings must be taken into account. This is especially important when self-report measures are employed. McKinley et al (1981) point out that cognitive deficits may compromise the validity of self-report methods used with individuals with brain injuries. In addition as noted by Moore and Stambrook (1995), complex scales are typically much less valid in a brain injured population and can account for unreliable findings. The present study investigated this possibility by examining the relationship between different aspects of cognitive functioning and the reliability of responses on each of the NAS scales. The results indicate that there was no significant correlation between the aspects of cognitive functioning assessed and the stability of responses on any of the NAS subscales. In general the results of the present study indicate that the reliability of the NAS as a measure of adjustment is not affected by cognitive functioning.
In light of these results the NAS was modified to exclude the Locus of Control and Attributions subscales. In addition as recommended by Dodds et al (1993) on the basis of a factor analysis of the NAS, subscale C (anxiety/depression) was divided into two separate subscales (Depression and Anxiety) and one item was dropped from the depression subscale as it did not load on any of the factors. This revised six subscale (44 items) version of the NAS was used in studies II and III. Refer to appendix A(ii) for a copy of the short form of the modified NAS.
CHAPTER THREE.

3.1 STUDY II: Construct validation.

As noted in the Description of Measures section of Study I the content validity of the NAS was established in a visually impaired population by Dodds et al (1991). However it cannot be assumed that these findings will generalise to other populations and therefore the present study attempted to establish preliminary construct validity of specific subscales of the NAS in a neurological population. Scores obtained for subscale A (self-esteem) were compared with scores on a widely used measure of self-esteem, the Culture Free Self–Esteem Inventory (Battle 1981). In addition the anxiety and depression subscales of the NAS were compared with the relevant subscales of the Hospital Anxiety and Depression Scale (Zigmond and Snaith 1983). The Acceptance of Disability/Illness subscale was compared with the Acceptance of Illness Scale (Felton and Revenson 1984).

The Attitudes towards Disability/illness and the Self-Efficacy subscales of the NAS were not included in the validity study. As noted previously the Attitudes to Disability/illness subscale was originally derived from the Attitudes towards Disability Scale (ATDS) (Yuker et al 1960). The validity of the ATDS was established by Yuker et al in the initial administration of the scale to people with disabilities (including neurological conditions). At the time of the present study there appeared to be only one measure of self-efficacy in a neurological population; The Self-Efficacy Questionnaire (Tedman et al 1995). Unfortunately instructions for this questionnaire was not available.

3.2 METHOD.

3.2 (i) Description of measures used.

a) Measure of adjustment.
The revised NAS was used. This contains six subscales (Self-Esteem, Attitudes towards Disability/illness, Anxiety, Depression, Acceptance of Disability/illness and Self-Efficacy). All the subscales are described in the Description of Measures section of Study I.
c) Measures of self-esteem and mood.

(i) The Culture Free Self-Esteem Inventory (CFSEI) 2nd edition. This forty item inventory was developed by Battle (1981). The reported test-retest reliability is 0.81. Research has been carried out on the relationship between self-esteem as measured by the CFSEI and various psychological factors. For example (Battle 1978) found a negative correlation between scores on a depression inventory and the CFSEI. In addition Battle, Yeudall and Blowers (1979) compared self-esteem as measured by an earlier version of the CFSEI in a neurological versus a non-neurological population. This study found that participants with brain injuries scored lower on the CFSEI than non brain-injured participants, although this result was not significant.

(ii) The Hospital Anxiety and Depression scale (HADS) was developed by Zigmond and Snaith (1983), in order to screen for psychiatric disorder in people attending non-psychiatric hospital departments. The scale consists of seven items measuring anxiety symptoms and seven items measuring depression. Each item is scored on a 4 point scale (0 to 3) with a scoring range for each subscale of 0 to 21. The higher the score for a subscale the greater the severity of anxiety and/or depression. The authors excluded from the scale any items that could be symptomatic of a purely physical disorder. According to Ponsford et al (1995) this makes it more suitable for assessing mood disorder following acquired brain injury than other available measures e.g the Beck Depression Inventory. The item-total correlations for the anxiety items range from 0.41 to 0.76, while the item-total correlation for the depression scale items range from 0.30 to 0.60. The HADS has been used as a screening tool in several research studies involving a stroke population (e.g Johnson, Burvil, Anderson, Jamrozik, Stewart-Wayne and Chakera 1995, O’Rourke, MacHale, Signoini and Dennis1998). Both studies report acceptable sensitivity levels for the HADS. The reliability of the HADS has been examined by Visser, Koudstall, Erdman, Deckers, Passchier and Grobbee (1995) in a small sample of stroke patients (N=16). They report a test-retest correlation of 0.89 for the anxiety scale and a correlation of 0.87 for the depression scale.
A review of the literature by Hermann (1997) indicates that there are more than 200 published studies worldwide using the HADS. No substantial differences have been found between the HADS and other rating scales in detecting depression and anxiety in various populations, such as patients attending a dermatology clinic (Lewis and Wessely 1990) and patients attending either medical or psychiatric out-patients (Bramley, Easton, Morley and Snaith 1988).

Two studies have compared the sensitivity and specificity of the HADS and the GHQ in detecting depression following a stroke. Johnson et al (1995) found that although the HADS had an acceptable sensitivity level when compared with the Geriatric Depression scale and the GHQ 28, the specificity of both the HADS anxiety and depression subscales was below acceptable levels. However, in a later study, O'Rourke et al (1998) found that the HADS and the GHQ 30 exhibited similar levels of sensitivity and specificity in a stroke sample. These differing findings may result from the use of different forms of the GHQ and/or the different cut-off points used.

(iii) The Acceptance of Illness Scale (AIS) was developed by Felton and Revenson (1984), as part of a study of coping with chronic illness. This is a brief measure that can be self-administered or completed with help. It consists of 8 items assessing respondents' acceptance of their disability/illness. Responses are scored on a five point scale from 1 to 5, with higher scores indicating greater levels of acceptance. Total score ranges from 8 to 40. Felton and Revenson report an alpha co-efficient of .83 for the scale, however reliability data is not reported, (refer to appendix A (iii) for an example of the AIS). Wright, Brownbridge, Fielding and Stratton (1990) have confirmed the uni-factorial structure of the AIS in a sample of 200 consecutive end-stage renal failure patients. However, there are no published studies using the AIS with a neurological population.

3.2(ii) Details of Participants.

The validation study was carried out with 49 participants from the rehabilitation centre. This sample was recruited independently from the study I sample. The age range of the participants was 25 to 68 years, with a mean age of 48.7 years and a standard deviation of 11.52. The sample consisted of 25 men and 24 women. Time post-injury/onset ranged from one month to 456 months with a mean of 56.6 months and a standard deviation of 97 months. Table 7 below summarises the diagnostic data.
Table 7: Diagnostic details of validity sample.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left CVA</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>Right CVA</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Bilateral CVA</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>CVA (unspecified)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Multiple Sclerosis</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>TBI</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Tumour</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>*Others</td>
<td>7</td>
<td>14</td>
</tr>
</tbody>
</table>

*other diagnoses includes Parkinsons Disease, hydrocephalus and post-hypoxic brain damage (all with N=1).

3.2 (iii) Procedure.

Participants completed the NAS, HADS, CFSEI and the AIS during the first week of rehabilitation.

3.2 (iv) Exclusion criteria.

As for Study I section 2.3 (iv)
3.3 RESULTS.

Table 8 below summarises the results of correlations between specific NAS subscales and the selected measures of self-esteem, anxiety, depression and acceptance of illness.

Table 8: Pearson’s correlations for selected NAS subscales and self-report measures.

<table>
<thead>
<tr>
<th>NAS section</th>
<th>comparison measure</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-esteem</td>
<td>CFSEI</td>
<td>.58***</td>
</tr>
<tr>
<td>Anxiety</td>
<td>HADS (anxiety)</td>
<td>-.59***</td>
</tr>
<tr>
<td>Depression</td>
<td>HADS (depression)</td>
<td>-.51***</td>
</tr>
<tr>
<td>Acceptance</td>
<td>AIS</td>
<td>.68 ***</td>
</tr>
</tbody>
</table>

*** p < 0.001 level.
N equals 49 for all comparisons.

3.4 DISCUSSION.

As noted by Lewis and Wessely (1990) self-report measures can be validated in several ways. One such method is to compare the results obtained from the self-report tool with an established gold standard e.g. a relevant observer rated measure. In the case of acquired brain injury there are very few measures that have been specifically designed with this population in mind. In addition the reliability and validity of measures designed for non-neurological populations is not always established in a neurological population. As several factors can affect the reliability and validity of a measure when used with this population e.g. cognitive impairment, it is important to establish the psychometric properties of a scale before it is advocated for use with a neurological population.

In order to determine aspects of the construct validity of the self-esteem, anxiety/depression and acceptance subscales of the NAS, data from these subscales was compared with data obtained using previously published measures of self-esteem (the CFSEI), mood (the HADS), and acceptance of illness (the AIS). The results indicate that there are significant correlations between the NAS and all the comparison measures.
The CFSEI has been extensively used in studies assessing self-esteem in various populations e.g. with schoolchildren (Battle 1976), and with people with depression (Battle 1978). In addition Battle et al (1979) published details of a study using the CFSEI in a neurological population. Although there are some limitations with this study, (for example the presence of brain injury was determined solely by neuropsychological test performance), it does represent an attempt to measure self-esteem in a neurological population. The significant positive correlation between scores on the CFSEI and the self-esteem subscale of the NAS suggests that they are tapping the same construct. In addition as noted in the description of measures subscale, the NAS self-esteem subscale was derived from the Rosenberg Self-Esteem Scale (RSES). The RSES is widely used in research into self-esteem and its reliability and validity are well established e.g. Reynolds (1988). It has also been used to assess self-esteem in people with either multiple sclerosis or spinal cord injury (Kinney and Coyle 1992), and Traumatic Brain Injury (Garske and Thomas 1992). In these studies the RSES was observed to correlate significantly with other measures used to index self-esteem e.g. levels of depression and life satisfaction measures. This would suggest that it is measuring a related construct.

The lack of previous research into the validity of self-report measures used to assess self-esteem in a neurological population suggest that only tentative conclusions can be made about the validity of the NAS self-esteem subscale. However the fact that it is derived from a scale that has been used to index self-esteem in people with brain injuries, together with the finding that it is positively correlated with a published measure of self-esteem goes some way towards establishing the construct validity of this NAS subscale. The NAS does represent an advance on other measures since its psychometric properties in a neurological population have been investigated in the present study.
As noted earlier the NAS anxiety and depression subscales were derived from the GHQ 28. The GHQ was designed to detect psychiatric disorders in non-psychiatric settings (e.g. general practice). It is a scaled version of the GHQ 60 and its development is described by Goldberg and Hillier (1979). The psychometric properties of the GHQ 28 have been examined in a neurological population. DePaulo, Folstein and Gordon (1980) reported a test-retest correlation of .89. In addition the estimated sensitivity of the GHQ ranges from 80% to 92% and the specificity estimates range from 81% to 92% (Rabins and Brooks 1981; Bridges and Goldberg 1986). In the development of the original NAS subscale for Anxiety and Depression only the 12 items of the GHQ 28 with item-total correlations at or above 0.5 were retained by Dodds et al (1991), in order to improve the homogeneity of the scale.

As indicated in the results section there was a significant negative correlation between the anxiety items of the NAS (subscale C) and the HADS anxiety subscale. Similarly there was a significant negative correlation between the HADS depression subscale and the corresponding NAS subscale. This is in the expected direction as high scores on the NAS anxiety and depression subscales indicate low levels of anxiety and depression (i.e. better adjustment), and low scores on the HADS represent low levels of anxiety and depression. It is therefore tentatively concluded that the NAS anxiety and depression subscales have acceptable construct validity.

Although the reliability and validity of the AIS has not been established in a neurological population, it has been used to look at acceptance of chronic illness in other clinical populations e.g. people with rheumatoid arthritis (Felton and Revenson 1984) people with renal failure (Wright et al 1990). The evidence suggests that it is indexing acceptance of illness in clinical populations. Therefore the significant correlation between the AIS and the shortened version of the Acceptance of Disability Scale as used in the NAS, provides some support for the construct validity of the NAS acceptance subscale.
CHAPTER FOUR.

4.1 STUDY III: The NAS as a marker and predictor of outcome.

In light of the findings of the reliability and validity studies, the revised version of the NAS was used in a study of the outcome of neurorehabilitation. As noted by Rose and Johnson (1996) 'all aspects of rehabilitation and community re-integration require some degree of learning and adjustment to environmental changes'. One aim of this study was therefore to evaluate the relationship between adjustment and outcome of rehabilitation. Specifically the utility of the NAS as a predictor of rehabilitation outcome will be examined. Secondly although earlier research primarily focused on improvements in physical functioning, more recent research has taken a broader perspective. Several studies have pointed out the importance of a focus on improving adjustment to disability/illness as a valid aim of rehabilitation efforts (for example, McGrath, Marks and Davis 1995). Therefore a further aim of the present study was to examine the relationship between subjective perception of adjustment as measured by the NAS and other variables that are known to impact on rehabilitation outcome i.e. cognitive functioning and physical disability.

There is paucity of available findings regarding the relationship between adjustment and outcome of neurorehabilitation. Consequently one of the aims of the present study is to explore the relationship between adjustment as indexed by the NAS and changes in function over the rehabilitation period. In addition the utility of the NAS to measure change in adjustment levels over the rehabilitation period will also be examined as will the relationship between adjustment and other variables such as cognitive functioning and physical disability. In order to guide the data analysis the following hypotheses will be tested:

I. Responses on subscales of the NAS at intake will be negatively associated with outcome of rehabilitation as assessed by a validated measure of change in functioning: The Brain Injury Community Rehabilitation Outcome (BICRO), Powell et al 1998).

II. There will be a positive association between level of cognitive functioning and psychological adjustment to ABI/neurological illness at intake.

III. Presence of physical disability will not be correlated with level of adjustment as indexed by subscales of the NAS at intake.
As the predictive utility of the NAS is unknown, it was decided to use the AIS as a comparison measure in determining the relationship between adjustment and outcome as indexed by the BICRO.

4.2 METHOD.

4.2(i) Description of measures used.

a) Measures of Adjustment.
The revised NAS and the AIS as described in Study II.

b) Measure of physical disability/activities of daily living.
The Barthel Activities of Daily Living Index was originally developed by Mahoney and Barthel (1965). It is designed to document the presence and extent of disability. It has face validity i.e. the areas covered are usually included in assessments of activities of daily living and several studies have established the construct validity of this tool (Legh-Smith, Wade and Langton-Hewer 1986, Wade and Langton-Hewer 1987). Studies reporting on the reliability of the Barthel indicate that in general its reliability is good, with a reported coefficient of concordance \( = 0.93 \), (Collins, Wade, Davis and Horn (1988), and inter-observer correlations ranging from 0.80 to 0.99 across individual items (Shinar, Gross, Bronstein, Licata-Gehr, Eden, Cabrera, Fishman, Roth, Barwick and Kunitz 1987). In addition the self-report method of obtaining data was found to be only slightly less reliable than information from a trained observer (Collin et al 1988). Using a modified scoring system (Ng et al 1995) scores on this measure range from 0 to 20, the higher the score the greater the level of physical independence.
c) Measure of functional change.

The Brain Injury Community Rehabilitation Outcome scale (BICRO-39) (Powell, Becker and Greenwood 1998), was developed to measure outcome following community based rehabilitation. It consists of eight subscales covering physical, functional, social, occupational and psychological aspects of daily living as detailed below. It is a self-report measure examining the respondents’ perception of their functioning in these domains following their accident illness/ injury. It can be completed by the respondent or a nominated person e.g. a carer.

Subscales and sample items of the BICRO-39.

Subscale (A) Personal Care (score range 0 to 30).
  e.g. How much help or assistance from other people do you need with getting into and out of bed.

Subscale (B) Mobility (score range 0 to 30).
  e.g. How much help or assistance from other people do you need with going to local shops.

Subscale (C) Self-Organisation (score range 0 to 30).
  e.g. How much help or assistance do you need from other people with keeping track of money.

Subscale (D) Contact with Partner/own children (score range 0 to 10)
  e.g. How often do you spend time with your partner/spouse.

Subscale (E) Contact with parents/siblings (score range 0 to 15).
  e.g. How often do you spend time with a sister or brother.

Subscale (F) Socialising (score range 0 to 30).
  e.g. How often do you spend time socialising with people/family at home.

Subscale (G) Productive Employment (score range 0 to 20).
  e.g. How much time do you spend doing unpaid or voluntary work.
Subscale (H) Psychological Well-being (score range 0 to 30).

  e.g. How often do you feel hopeless about the future.

The questionnaire was specifically designed to provide a multi-dimensional
assessment of the functioning of people with acquired brain injury when they have
returned to living in the community. As such it appears to be a suitable measure for
assessing the outcome of community based rehabilitation. The BICRO-39 scales have
test-retest reliability coefficients exceeding 0.75 and alpha coefficients ranging from
0.55 to 0.95 (Powell et al 1998). Using the BICRO-39 scales with a similar sample to
the current study sample (Powell et al 1998), indicated that individuals varied for the
desirable direction of change on two of the scales (scale D contact with partner/ own
children and scale E contact with parents/sibling). Group mean scores on these scales
did not show a significant change over a period of rehabilitation. It was therefore
decided to omit these scales for the purpose of this study.

d) Measures of cognitive functioning.

The RSPM as described in the description of measures section study I.
The Mill Hill Vocabulary Scale form 2 senior (2nd edition) (MHVS) (Raven, Court and Raven
1993). This is test of the individual’s knowledge of word meanings and it is used to index
verbal intelligence. Scores on this test range from 0 to 34.
4.2 (ii) Details of Participants.

The participants who took part in study II (validity study) also agreed to be given the research questionnaires (NAS, AIS and BICRO), at the end of rehabilitation. An additional twenty-one participants were recruited during the study period (total N=70, 36 men and 34 women). The age range was 25 to 70 years with a mean of 48.5 years and a standard deviation of 12 years. The mean time post-onset was 47 months (range 1 to 456 months) 64% of the sample were married (n=45), 21% were divorced (n=15), 14% were single (n=10) and one person was widowed.

The age range of the outcome study participants is similar to that of the reliability and validity study participants. The most frequent diagnostic group included in the study was CVA (41%). However there is a noticeable shift in the diagnostic pattern between the reliability and outcome study. Whereas a diagnosis of multiple sclerosis (MS) was assigned to only five (10%) of the reliability study participants, this had reached a figure of twenty (28.5%) at the outcome study. This reflects the changing criteria for referral to the neurorehabilitation team, which has lead to an increase in referrals for people with MS. The diagnostic details of the participants are outlined in table 9. It was not possible to obtain details regarding the severity of the injury/illness e.g Glasgow Coma Scale score and/or Post -Traumatic Amnesia measures, as this information was not always available and/or reliable.
### Table 9: Diagnostic details of the outcome sample.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left CVA</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>Right CVA</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Bilateral CVA</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Brainstem CVA</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TBI</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>MS</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>Tumour</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Parkinson’s Disease</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hydrocephalus</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>*MSA</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>*ICH</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Post hypoxia</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hydrocephalus</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

*MSA = multi-systems atrophy.
*ICH = intra-cerebral haemorrhage.

#### 4.2 (iii) The rehabilitation programme.

The neurorehabilitation service is a community-based service. It consists of occupational therapy, physiotherapy, clinical psychology, and speech and language therapy. Clients enter a multi-disciplinary programme of rehabilitation for a period of 10 to 14 weeks. Each programme is individually tailored to the needs and goals of the clients and can include both individual and group interventions.
4.2 (iv) Procedure.

The NAS, AIS, and the BICRO were given to participants in the first week of rehabilitation. Cognitive assessments were administered during the first two weeks of rehabilitation. A trained therapy assistant administered the Barthel during the second or third week of rehabilitation. Participants completed the NAS, AIS and the BICRO for a second time at the end of rehabilitation.

4.3 RESULTS.

4.3(i) Changes in level of functioning from start to end of rehabilitation.

In order to obtain information on the change in functioning over the period of rehabilitation, scores on each BICRO subscale were compared at the beginning and end of rehabilitation. Paired t-tests were used to ascertain the significance of the change over time in scores on each subscale. The results are summarised in Table 10.
Table 10: Difference between BICRO subscale means at the beginning and end of rehabilitation.

<table>
<thead>
<tr>
<th>BICRO subscale</th>
<th>N</th>
<th>Mean BICRO score and standard deviation Beginning of rehab</th>
<th>Mean BICRO score and standard deviation End of rehab</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal care (A)</td>
<td>69</td>
<td>5.0 8</td>
<td>2.8 5</td>
<td>3.3***</td>
</tr>
<tr>
<td>Mobility (B)</td>
<td>68</td>
<td>20.3 8</td>
<td>14.9 9</td>
<td>6.2***</td>
</tr>
<tr>
<td>Self organisation (C)</td>
<td>68</td>
<td>10.9 8</td>
<td>8.4 8</td>
<td>3.4***</td>
</tr>
<tr>
<td>Socialising (F)</td>
<td>58</td>
<td>18.0 5</td>
<td>16.7 7</td>
<td>1.7</td>
</tr>
<tr>
<td>Employment (G)</td>
<td>58</td>
<td>18.4 2.5</td>
<td>17.4 3</td>
<td>2.8**</td>
</tr>
<tr>
<td>Psychological well-being (H)</td>
<td>58</td>
<td>12.7 6</td>
<td>11.1 6</td>
<td>2.2*</td>
</tr>
</tbody>
</table>

* = p<0.05  
** = p < 0.01  
*** = p <0.005

Significant change from beginning to end of rehabilitation was seen on five subscales of the BICRO (personal care, mobility, personal organisation, employment and psychological well-being).
4.3(ii) **Relationship between adjustment at intake and change in functioning over the rehabilitation period.**

The NAS subscale scores at the beginning of rehabilitation were correlated with the BICRO change scores from start to end of rehabilitation. The BICRO change scores were computed by subtracting the beginning of rehabilitation score on each BICRO scale from the end of rehabilitation score; a positive score indicates improvement. To minimise the risk of obtaining spurious results due to the large number of correlations a Bonferroni correction was applied. Under this procedure the accepted level of significance was 0.002. The results are detailed in Table 11. Only one correlation (self-esteem and the self-organisation change score) approximated this level of significance (p = 0.003).

**Table 11: Correlations between NAS subscales at the beginning of rehabilitation and BICRO change scores at the end of rehabilitation.**

<table>
<thead>
<tr>
<th>NAS Subscales</th>
<th>Personal care</th>
<th>Mobility</th>
<th>Self organisation</th>
<th>Socialisation</th>
<th>Productive Employment</th>
<th>Psychological well-being</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self esteem</td>
<td>-.08</td>
<td>-.34</td>
<td>-.41</td>
<td>-.30</td>
<td>-.08</td>
<td>-.20</td>
</tr>
<tr>
<td>Attitudes to disability</td>
<td>-.00</td>
<td>-.07</td>
<td>-.06</td>
<td>-.09</td>
<td>.17</td>
<td>-.02</td>
</tr>
<tr>
<td>Anxiety</td>
<td>-.11</td>
<td>-.17</td>
<td>-.30</td>
<td>-.20</td>
<td>-.07</td>
<td>-.102</td>
</tr>
<tr>
<td>Depression</td>
<td>-.11</td>
<td>-.18</td>
<td>-.27</td>
<td>-.20</td>
<td>-.06</td>
<td>-.03</td>
</tr>
<tr>
<td>Acceptance of disability/illness</td>
<td>.07</td>
<td>-.25</td>
<td>-.33</td>
<td>-.16</td>
<td>-.22</td>
<td>-.27</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.24</td>
<td>-.02</td>
<td>-.04</td>
<td>-.26</td>
<td>-.02</td>
<td>-.03</td>
</tr>
</tbody>
</table>

Similar comparisons between the AIS scores at the beginning of rehabilitation and the BICRO change scores did not reveal any significant association between these two measures.
4.3(iii) Relationship between level of adjustment and cognitive functioning at the beginning of rehabilitation.

In order to assess the relationship between level of adjustment at the beginning of rehabilitation and level of cognitive functioning correlations were computed between the NAS subscales (time one) and scores on the cognitive measures. The results are summarised in table 12 below. Due to the number of correlations a Bonferroni correction was applied with the significance level set at $p < 0.004$.

Table 12: Pearson's correlations between the NAS subscales at the beginning of rehabilitation and scores on the RSPM and MHVS.

<table>
<thead>
<tr>
<th>NAS subscale</th>
<th>Correlation with RSPM</th>
<th>MHVS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-esteem</td>
<td>.16</td>
<td>.15</td>
</tr>
<tr>
<td>Attitudes</td>
<td>.36***</td>
<td>.37***</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.05</td>
<td>.03</td>
</tr>
<tr>
<td>Depression</td>
<td>.18</td>
<td>.09</td>
</tr>
<tr>
<td>Acceptance</td>
<td>.20</td>
<td>.10</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.41***</td>
<td>.20</td>
</tr>
</tbody>
</table>

*** $p < 0.004$

N=63 for RSPM correlations.
N=62 for MHVS correlations.

There was a significant positive correlation between two of the NAS variables at the beginning of rehabilitation (attitudes and self-efficacy) and scores on the RSPM. The correlation between attitudes and the MHVS scores was also significant.
In order to further explore the relationship between level of cognitive functioning and perception of adjustment the sample was divided into two groups for each cognitive measure. The groups were categorised according to whether the participants had achieved a score above or below the 10th percentile on the cognitive test used. Independent t-tests were used to identify any group differences between mean scores on each NAS subscale. Again a significance level of 0.004 was specified due to the number of comparisons for each NAS subscale. The results are summarised below in table 13.

Table 13: Comparison of mean scores on the NAS subscales by level of cognitive functioning.

<table>
<thead>
<tr>
<th>NAS subscale</th>
<th>RSPM &lt;11th percentile (group 1)</th>
<th>RSPM &gt;10th percentile (group 2)</th>
<th>T</th>
<th>MHVS &lt;11th Percentile (group 1)</th>
<th>MHVS &gt;10th Percentile (group 2)</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-esteem</td>
<td>M</td>
<td>M</td>
<td>2.9***</td>
<td>M</td>
<td>M</td>
<td>.89</td>
</tr>
<tr>
<td>Attitudes</td>
<td>18.7</td>
<td>23</td>
<td>3.2***</td>
<td>19</td>
<td>23</td>
<td>2.9***</td>
</tr>
<tr>
<td>Anxiety</td>
<td>11.7</td>
<td>13.6</td>
<td>1.6</td>
<td>12.6</td>
<td>13.4</td>
<td>.68</td>
</tr>
<tr>
<td>Depression</td>
<td>17.7</td>
<td>20.9</td>
<td>2.7</td>
<td>19</td>
<td>20</td>
<td>1.0</td>
</tr>
<tr>
<td>Acceptance of illness</td>
<td>26.8</td>
<td>31.3</td>
<td>2.29</td>
<td>28.5</td>
<td>30.3</td>
<td>.96</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>26.3</td>
<td>30.6</td>
<td>2.48</td>
<td>27.4</td>
<td>29.3</td>
<td>1.1</td>
</tr>
</tbody>
</table>

*** p <0.005

When the sample was divided into two groups according to level of cognitive functioning, significant differences between group means were identified on two of the NAS subscales at the beginning of rehabilitation. Participants with RSPM scores at or below the 10th percentile (group 1) had significantly lower mean scores on the Self-Esteem and Attitude to Disability/illness subscales. In addition, group 1 also showed a trend towards significantly lower mean scores on the Self-Efficacy subscale (p = 0.01). Participants with mean MHVS scores at or below the 10th percentile also had significantly lower mean scores on the attitudes subscale.
As cognitive functioning is known to be differentially affected by different types of brain damage, e.g. diffuse injury versus focal injury, independent sample t-tests were undertaken to compare scores on cognitive test by diagnostic groups. There was no significant difference between stroke survivors and the other diagnostic groups on either cognitive test used. Similar results were obtained when participants with MS were compared with the other diagnostic groups.
4.3(iv) Relationship between level of physical disability and NAS subscales at the beginning of rehabilitation.

This relationship was examined by computing Pearson’s correlations between the Barthel ADL index and each of the NAS subscale scores at the beginning of rehabilitation. Table 14 below summarises the results. The Barthel was found to positively correlate with two of the NAS scales at the beginning of rehabilitation, self-esteem and acceptance of disability/illness.

Table 14: Correlations between the Barthel ADL scale and each NAS subscale at the beginning of rehabilitation.

<table>
<thead>
<tr>
<th>NAS subscale</th>
<th>Correlation with Barthel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-esteem</td>
<td>.33*</td>
</tr>
<tr>
<td>Attitudes</td>
<td>.21</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.06</td>
</tr>
<tr>
<td>Depression</td>
<td>.03</td>
</tr>
<tr>
<td>Acceptance</td>
<td>.40*</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.18</td>
</tr>
</tbody>
</table>

* p < 0.006
4.3(v) Changes in level of adjustment from start to end of rehabilitation.

Paired sample t-tests were used to identify any changes in the group means for NAS subscales from the beginning to the end of rehabilitation. The details are outlined in table 15 and figure 1 below. Higher scores on a subscale at the end of rehabilitation indicate an improvement in that aspect of adjustment. The results indicate that self-esteem, anxiety and depression all show a small but significant improvement in mean scores from the beginning to end of rehabilitation.

Table 15: Comparison of group means on each NAS subscale at the beginning and end of rehabilitation.

<table>
<thead>
<tr>
<th>NAS subscale</th>
<th>Start mean</th>
<th>End mean</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>self-esteem</td>
<td>27</td>
<td>29</td>
<td>-2.1*</td>
</tr>
<tr>
<td>attitudes</td>
<td>20.6</td>
<td>20.3</td>
<td>.46</td>
</tr>
<tr>
<td>anxiety</td>
<td>12.6</td>
<td>15</td>
<td>2.97**</td>
</tr>
<tr>
<td>depression</td>
<td>20.4</td>
<td>22</td>
<td>-3.25**</td>
</tr>
<tr>
<td>acceptance</td>
<td>28</td>
<td>29</td>
<td>-1.15</td>
</tr>
<tr>
<td>self-efficacy</td>
<td>28</td>
<td>28.2</td>
<td>-0.33</td>
</tr>
</tbody>
</table>

* = p < 0.05  
** = p < 0.005
Figure 1: Comparison of beginning and end of rehabilitation NAS scores.
4.3(v)a  **Effect of diagnosis on adjustment.**

It is possible that the diagnosis of the participants may have had an effect on the level of adjustment from start to end of rehabilitation. Therefore in order to determine whether this was the case, the mean change score on each NAS subscale for each of the two main diagnostic groups was compared with the mean change score for all the other diagnostic groups combined. There was no significant difference between those with a diagnosis of stroke and the other diagnostic groups, or those with MS and the other diagnostic groups.

4.4  **DISCUSSION.**

The analysis of data from this study was structured around a series of hypotheses as detailed in the introduction to this study.

4.4 (i) **Hypothesis one**

There will be a negative association between scores on the NAS and outcome of rehabilitation as measured by the BICRO.

Six scales from the BICRO-39 were used in the present study (personal care, mobility, self-organisation, socialisation, productive employment, psychological well-being). The association between selected NAS subscales and BICRO scales is evaluated in this discussion.

An examination of the correlations matrix between BICRO change scores and baseline NAS subscale scores (Table 11) indicates that overall there was only one significant correlation; the negative correlation between the self-organisation change score and self-esteem at the beginning of rehabilitation. These two variables had a moderate association ($r = -.41, p = 0.003$) This correlation approximated the a-priori level of significance ($p = 0.002$). As this is a negative correlation it indicates that higher levels of self-esteem at the beginning of rehabilitation is significantly associated with improvement in perceived functioning in self-organisation from start to end of rehabilitation.
The relationship between adjustment to disability/illness and the ability to organise important aspects of one’s life (e.g. finances and appointments), has not been researched in the literature. As pointed out by Wilkinson (1989), people who may not be intellectually able to manage their affairs have often been overlooked in research into adjustment following ABI. Consequently there are no available research findings to indicate why there should be a significant relationship between the level of self-esteem and perceived change in self-organisation. However one suggestion from the literature may indirectly relate to the present finding. According to Heinemann and Shontz (1982), high self-esteem influences the propensity of individuals to emphasise competencies over limitations. This implies that individuals with higher levels of self-esteem are more likely to focus on their competencies than people with lower levels of self-esteem. It may therefore be the case that people with high self-esteem are more attuned to improvements in specific areas of functioning, for example self-organisation, than people with lower levels of self-esteem. This is only a tentative suggestion and the need for further research is acknowledged.

There were no significant correlations between the remaining BICRO change scores and any of the NAS subscales. This result warrants further discussion as some of the previous studies have reported positive correlations between variables such as self-esteem, depression and acceptance of disability/illness and scores on measures of rehabilitation outcome. Garske and Thomas (1992) for example, in a study examining self-esteem following TBI, found a positive correlation between perception of physical health and self-esteem. However physical health as defined in their study relates more to physical wellbeing and the reporting of health related symptoms (e.g. headaches) than to mobility related change in function. Physical health therefore refers to a more specific aspect of physical wellbeing than mobility factors as assessed by the BICRO. The finding from the Garske and Thomas study is therefore only indirectly comparable with the results from the present study.
Another aspect of previous research worth further comparison with the present study findings is the relationship between attitudes to disability and social contact. Previous researchers have found that people with acquired disabilities often hold negative views about disability and are less likely to socialise with other people (Labi, Philips and Gresham 1980, Wright 1983.). From this it was expected that a more positive attitude towards disability would correlate with increased social contact from start to end of rehabilitation. As noted the correlation between these two variables failed to reach significance. This indicates that in this study attitudes towards disability at the beginning of rehabilitation did not influence change in frequency of social contacts from start to end of rehabilitation.

The relationship between levels of depression and outcome of rehabilitation has been the focus of several studies. A positive correlation between functional disability in general and level of depression has been reported for stroke patients admitted to in-patient rehabilitation facilities (Ng et al 1995, Galynker et al 1997). However there may be several reasons for the negative results in the current study. Previous studies have looked at the association between depression and functional ability as assessed by rehabilitation therapists at the beginning of rehabilitation, whereas the present study focused on depression and changes in subjectively perceived level of function from beginning to end of rehabilitation. It may well be that the discrepancy in results between the positive findings described in some previous research and the findings of the present study is the result of differing methodologies. Specifically, the difference in time when mood and functional abilities are measured combined with the fact that rehabilitation outcome is assessed from different perspectives (i.e. patient versus therapist perspective). In addition the different settings (i.e. hospital versus community) and the different measures used may all be influential in the lack of concordance between the present study findings and the previous literature.
As noted earlier feelings of competence in aspects of daily life e.g managing finances, was associated with higher levels of self-esteem. It was of clinical interest therefore to highlight the relationship between self-organisation and another variable that is often associated with self-esteem namely, level of depression, for further investigation. Although there was a negative correlation between the two variables it did not reach the pre-defined significance level. This indicates that reduction in perceived dependence on others for help with organisational tasks is not significantly associated with lower levels of depression at the beginning of rehabilitation. As there is very little research relating to this area the reasons for this result are unclear. Competence to manage one’s daily life is an important determinant of return to independent living, any factor that is associated with improvement in this area will need to be identified and targeted for intervention.

Findings from the literature indicate that the use of community facilities and participation in social activities may be influenced by degree of acceptance of disability, and attitude towards disability (Labi et al 1980). Willingness to participate in activities that promote functioning in these areas would therefore be expected to be associated with higher scores on the NAS attitudes and acceptance scales at the beginning of rehabilitation.
The relationship between Acceptance of Disability/illness and change scores on the BICRO socialising scale was also of clinical interest because of the observation that rehabilitation clients who appear to be more accepting of their disability/illness seem to be more willing to socialise with family and friends. However the correlation between the two variables failed to reach significance. This indicates that in this study acceptance of disability/illness at the beginning of rehabilitation is not associated with changes in the frequency of social contacts by the end of rehabilitation. This is in contrast to the findings of Melamed et al (1992), who reported a significant positive correlation between acceptance of disability and scores on a measure of frequency of social contact. One reason for the contradictory findings may be the different time periods involved. Participants in the Melamed et al study were assessed one to two years after discharge from rehabilitation hospital, there is no published data on their intake 'acceptance of disability' scores. In contrast the present study focused on predictions of change, therefore participants were assessed at the beginning and end of their rehabilitation. It may be the case that frequency of social contact changes with time post-rehabilitation, with longer time post-rehabilitation associated with more frequent contact.

A pivotal role has been ascribed to the individual's sense of self-efficacy as a factor influencing rehabilitation outcome (Dodds 1989). Barnwell and Kavanagh (1997) have also studied the relationship between self-efficacy and participation in social activities. The participants in their study were people with MS not receiving active rehabilitation. They found that subjective prediction of ability and confidence in participation in social activities was significantly positively correlated with actual participation over a two-month period. In the present study however there was no significant correlation between self-efficacy and change in level of functioning on any of the BICRO scales. One possible reason for this could be that the NAS self-efficacy scale focuses on very general aspects of this construct. Whilst in the Barnwell and Kavanagh study their self-efficacy measure looked specifically at self-efficacy for social activities. Nevertheless this negative finding suggests that the relationship between self-efficacy and outcome of rehabilitation is far from clear-cut.
The overall conclusion from the findings of this part of the study is that in general outcome of rehabilitation as measured by perceived change in functioning on the BICRO outcome scales, is difficult to predict from levels of psychological adjustment at the beginning of rehabilitation. This is not surprising, as outcome of rehabilitation has been found to be influenced by a variety of factors, for example medical complications (Anderson Bounestrom, Greenberg and Hildyard 1974) and level of physical disability (Thorngren, Westling and Norrvig 1990). It was found however that one psychological variable, self-esteem, was significantly associated with one of the outcome variables measured in this study, self-organisation. This would suggest that level of self-esteem at the beginning of rehabilitation might be influence change in this area of functioning.

4.4 (ii) Hypothesis 2

There will be an association between level of cognitive functioning and psychological adjustment to ABI/neurological illness.

The Progressive Matrices (RSPM) and the Mill Hill Vocabulary Scale (MHVS) were used as the main cognitive indices. Moderate but significant positive correlations were found between scores on the RSPM and two of the NAS subscales at the beginning of rehabilitation; Attitude towards Disability/illness and Self-Efficacy (Table 12). The correlation between MHVS scores and Attitudes was also significant. This indicates that there is an association between cognitive functioning as measured by the RSPM and the MHVS and specific aspects of adjustment, i.e. attitudes and self-efficacy. None of the other correlations between cognitive functioning and NAS subscales were significant.
In view of the equivocal findings of the current study, further analysis of the data was undertaken. This was done in order to determine more directly any effect of level of cognitive functioning on the results obtained. For each cognitive test the sample was divided into two groups: Group A consisted of participants with scores above the 10th percentile on the test. Group B consisted of participants with scores at or below the 10th percentile. Independent T-test comparison of the group means was undertaken for each of the cognitive tests to identify any significant differences in group means. The results as summarised in Table 13, indicate a tendency for higher levels of cognitive functioning to be associated with higher levels of subjective adjustment on the self-esteem and attitudes subscale of the NAS. There was also a trend towards significance for the self-efficacy subscale. These results add further support to the conclusion that there is a relationship between level of cognitive functioning and aspects of psychological adjustment. More specifically, a lower level of cognitive functioning is associated with more negative attitudes towards disability and lower levels of self-esteem at the beginning of rehabilitation.

The results of this part of the analysis have produced mixed findings and the second hypothesis is only partially supported. Whilst there appears to be no overall relationship between cognitive functioning and adjustment at the beginning of rehabilitation, it is apparent that specific aspects of subjective adjustment (self-esteem, attitudes to disability/illness) are associated with cognitive functioning. In general these results are more consistent with the findings of studies that indicate that there is an association between specific factors that index adjustment e.g. level of depression and cognitive functioning (Robinson, Lipsey, and Pearlson 1984b, Wade et al 1987 and Downhill and Robinson 1994). Findings from these studies indicate that lower levels of cognitive functioning are associated with higher levels of depression in stroke survivors.
As noted earlier there are differential findings in the literature according to whether the sample has a diagnosis of stroke or TBI. These findings imply that the self-awareness of stroke survivors is generally less affected by cognitive impairment than for TBI survivors. As a consequence of this stroke survivors may be able to give a more accurate appraisal of their level of psychological adjustment following acquired brain injury. Therefore one possible reason for the results obtained in the present study, may be the high percentage of participants with a diagnosis of stroke (40%). However the results of the present study indicate that there is no difference in mean scores between participants who have had a stroke and those with other diagnoses in terms of cognitive functioning or change scores on the NAS subscales. In addition the comparison between participants with MS (the second largest diagnostic group) and the other participants revealed similar non-significant findings. This tentatively suggests that for the present sample the association between cognitive functioning and specific components of adjustment is not necessarily an artifact of the type of diagnosis.

4.4 (iii) Hypothesis 3

Presence of physical disability will not be associated with perception of adjustment.

Previous research findings regarding the relationship between physical/functional disability and adjustment are inconsistent. For example Melamed, Ring and Najenson (1985) found a significant association between functional status as measured by the Kenny Self-care Evaluation (Schoening, Anderegg, Bergstrom, Fonda, Steinke and Ulrich 1965) and acceptance of disability in stroke survivors. In addition Matson and Brookes (1977) found that increased physical disability was associated with activity restriction and lower self-concept. In contrast, Feibal and Springer (1982) did not find an association between depression as assessed by nurses, and scores on the Katz ADL scale (Katz, Ford, Moskowitz, Jackson and Jaffe (1963) in stroke survivors.
This relationship was therefore further explored by examining the association between physical disability as measured by the Barthel ADL index and the NAS scores at the beginning of rehabilitation. The results of the present study indicate that people with greater physical dependence on others have lower levels of self-esteem and are less accepting of their disability/illness. This supports the findings of Melamed et al and Matson and Brookes as outlined above. One explanation for this finding may be related to the process of adjustment as postulated by Wright (1983). She has developed a task-orientated model of adjustment to disability. In this model vital components underpinning successful adjustment include the ability to de-emphasise physical abilities and the extent to which the effects of disability are confined to the physical impairment itself. It may be the case therefore that the more severe the physical disability the harder it is to carry out the tasks highlighted by Wright as necessary for successful adjustment.

4.4(iv) Changes in adjustment over the rehabilitation period.

As the primary purpose of the NAS is to index level of adjustment it was decided to examine the ability of this measure to reflect a change in the level of adjustment over the rehabilitation period. The results of the paired t-test comparisons (Table 14) indicate that there was significant change in scores from start to end of rehabilitation on three of the subscales (self-esteem, anxiety and depression). The present study did not attempt to control the type or amount of intervention during the rehabilitation period. Therefore it is not clear what factors are associated with the changes noted on these three aspects of adjustment. Of equal importance is the fact that there is no significant change on three subscales (attitudes to disability/illness, acceptance and self-efficacy). It may be the case that the rehabilitation process, including work on adjustment to acquired brain injury, has differential effects on the various sub-components of adjustment. However a fully controlled intervention study would be needed to explore this further.
CHAPTER FIVE.

5.1 Summary of findings.

• Five of the NAS subscales had acceptable (0.70 or above) test-retest reliability in a mixed neurological population.

• As a result the following subscales were retained for inclusion in a modified version of the NAS; self-esteem, attitudes to disability/illness, anxiety, depression, acceptance of disability/illness and self-efficacy.

• Correlations between the NAS stability indices (square of the difference from first to second administration) with cognitive tests of non-verbal intelligence, memory and attention indicated that the reliability of responding on the NAS was not affected by cognitive functioning.

• The construct validity of four of the retained subscales (self-esteem, anxiety, depression and acceptance of disability/illness) was suggested by significant correlations between these subscales and widely used measures of the constructs.

• There was a significant correlation between self-esteem at the start of rehabilitation and change in perceived functioning on the self-organisation scale of the Brain Injury Community Rehabilitation Outcome measure (BICRO).

• None of the other correlations between the NAS subscales and the BICRO change scores reached significance.

• Level of cognitive functioning was significantly associated with three of the NAS subscales at the beginning of rehabilitation (self-esteem, attitudes to disability/illness and self-efficacy).

• The direction of the relationship indicates that higher level of cognitive functioning is associated with greater self-esteem, a more positive attitude towards disability/illness and greater self-efficacy at the start of rehabilitation.

• Greater level of physical disability was associated with lower levels of self-esteem and acceptance of disability/illness.

• There was significant change on three of the NAS subscales (self-esteem, anxiety and depression) from beginning to end of rehabilitation indicating improvements in adjustment in these areas.
CONCLUSION

The findings from study I (reliability study) and study II (validity study) suggest that the revised six subscale version of the NAS is a reliable and valid measure of adjustment in a mixed neurological population. The reliability of the NAS is not affected by cognitive functioning as assessed with specific tests of non-verbal intelligence, memory and attention. This is of some significance as impairment in various areas of cognitive functioning can affect insight into difficulties and therefore the ability to realistically appraise subjective adjustment.

A model of the psychological variables underpinning the adjustment process was proposed in the introduction section (page 50). In this model it was postulated that acceptance and self-esteem are key constructs underpinning adjustment. The intercorrelational matrix of the NAS subscales (page 67) indicates that several subscales of the NAS are intercorrelated suggesting that these scales are not mutually exclusive. This is not surprising as it is known that some of these constructs share variance in common and therefore tend to be associated to varying degrees. The strongest relationship was between self-esteem and acceptance ($r=0.62$). This suggests that in contrast to the original model proposed, attitudes to disability/illness is not a key construct underpinning adjustment. As self-esteem has a much stronger association with acceptance, this variable may be as influential as acceptance in shaping the adjustment process. A revised version of the proposed model of adjustment is detailed below.
Figure 3: A revised model of the relationship between key variables for psychological adjustment

- Attitudes
- Adjustment
- Acceptance
- Self esteem
- Affective state
- Self efficacy
As it was not appropriate to conduct more in-depth analysis of the data e.g. factor analysis, the proposed model highlights significant associations between variables, however it does not imply causal relationships. Although it is hypothesised that self-esteem and acceptance are key variables in the adjustment process, this would have to be tested by a prospective study.

As regards predicting outcome of rehabilitation, the self-esteem subscale of the NAS was significantly associated with change scores on the BICRO self-organisation scale. However there were no other correlations between the NAS scales at the beginning of rehabilitation and change in perceived function by the end of rehabilitation. This finding indicates that the relationship between adjustment to acquired brain injury and outcome of rehabilitation is difficult to predict. One reason for this may be that many different factors impinge on the process of rehabilitation e.g. the participants’ expectations of the rehabilitation service and the amount of family support available.

As noted above, cognitive functioning is one factor that has to be taken into account when assessing psychological adjustment in a brain-injured population. In this study cognitive functioning was found to be associated with three of the NAS subscales at the start of rehabilitation (self-esteem, attitudes to disability/illness and self-efficacy). Lower cognitive functioning was associated with lower group mean scores on the three NAS subscales indicating poorer adjustment as indexed by these subscales. However the interpretation of the data is not clear-cut. As noted earlier previous research into this area has produced mixed findings. Studies supporting the current findings of an association between psychological and cognitive functioning have looked specifically at the relationship between cognitive functioning and depression. In the present study however there was no correlation between these two variables. In addition it must be noted that level of cognitive functioning was not associated with two of the other NAS subscales (anxiety and acceptance). This finding appears to support previous research suggesting no association between cognitive functioning and psychological variables such as depression. However a review of the available literature did not reveal any research that focused on the relationship between cognitive functioning and the three NAS variables positively associated with cognitive functioning in the present study. Therefore it is difficult to make a direct comparison of the findings of the present study with previous research. It is therefore
concluded that further investigation is needed before conclusions can be drawn regarding the relationship between adjustment and cognitive functioning.

There were equivocal findings in regard to the sensitivity of the NAS to changes in adjustment over the period of rehabilitation. Although three of the subscales (self-esteem, anxiety and depression) did show significant improvements in scores from start to end of rehabilitation, the other three subscales did not show similar improvements. As this was not a controlled intervention study it is difficult to draw firm conclusions from these findings. It may be the case however that factors that index psychological adjustment are differentially affected by multi-disciplinary rehabilitation.

It is concluded that subscales of the NAS may have some clinical utility in monitoring adjustment levels over a rehabilitation period but this will require further investigation using controlled clinical trials.

**Limitations of the present studies.**

- Due to the range of diagnoses included in each study sample there is a possibility that the findings may not apply to some diagnostic groups. The small number of participants included from some of the diagnostic groups means that it was not feasible to fully investigate this possibility. However separate comparisons of the two main diagnostic groups (CVA and MS) with all the other diagnostic groups indicates that there was no difference in results on either level of adjustment over the rehabilitation period or in cognitive functioning.

- The limitations of using self-report measures to assess psychological functioning has been highlighted by several authors, for example Rotter (1975) points out that responses to questionnaires may be consciously or unconsciously distorted. However as Moore and Stambrook (1995) assert, 'the patient’s perception and reports of difficulties is a valuable source of clinical information and self reports commonly drive interventions.

- A key issue in the literature is whether psychological adjustment is uni or multi dimensional. Although the present research did not address this issue directly it may have been useful to carry out a factor analytical study of the NAS with a neurological sample. However as previously noted for the purposes of
establishing the clinical utility of the sub-components of the NAS with a neurological population the subscales of the NAS were evaluated separately.
APPENDICES.

Appendix (A) Examples of Measurements to be used

I NAS Version 1 (revised for use in current research
(II) NAS version 2 (modified short form)
(III) Acceptance of illness scale

Appendix (B) Distribution of scores on the NAS (version 1) for the reliability study

Figure 4 NAS A - Self esteem scale
Figure 5 NAS B – Attitudes to disability/illness scale
Figure 6 NAS C – Anxiety / depression scale
Figure 7 NAS D – Locus of control scale
Figure 8 NAS E – Acceptance of disability/illness scale
Figure 9 NAS F – Self efficacy scale
Figure 10 NAS G - Attributions scale
**NOTTINGHAM ADJUSTMENT SCALE** - Revised

**SECTION A. Instructions:** Please decide how much you agree:disagree with the statements below by choosing one of the following options: A=strongly agree; a=agree; * = don't know; d=disagree; D=strongly disagree. Put a tick in the appropriate column next to each statement.

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<tbody>
<tr>
<td>1.</td>
<td>On the whole, I am satisfied with myself.</td>
<td>A</td>
<td>a</td>
<td>*</td>
<td>d</td>
</tr>
<tr>
<td>2.</td>
<td>At times I think I am no good at all.</td>
<td></td>
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<tr>
<td>3.</td>
<td>I am able to do things as well as most other people.</td>
<td></td>
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<tr>
<td>4.</td>
<td>I certainly feel useless at times.</td>
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<tr>
<td>5.</td>
<td>I feel that I do not have much to be proud of.</td>
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<tr>
<td>6.</td>
<td>I feel that I am a person of worth; at least on an equal plane with others.</td>
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<tr>
<td>7.</td>
<td>I wish I could have more respect for myself.</td>
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<tr>
<td>8.</td>
<td>All in all, I'm inclined to feel that I'm a failure.</td>
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<tr>
<td>9.</td>
<td>I take a positive attitude towards myself.</td>
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**SECTION B. Instructions:** Please decide how much you agree:disagree with the statements below by choosing one of the following options: A=strongly agree; a=agree; * = don't know; d=disagree; D=strongly disagree. Put a tick in the appropriate column next to each statement.

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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Disabled people are used to failing at most things they do.</td>
<td>A</td>
<td>a</td>
<td>*</td>
<td>d</td>
</tr>
<tr>
<td>2.</td>
<td>Most disabled people are constantly worried about what might happen to them.</td>
<td></td>
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<tr>
<td>3.</td>
<td>Most disabled people keep a lot of things to themselves.</td>
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<td>4.</td>
<td>Most disabled people feel that they are worthless.</td>
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<tr>
<td>5.</td>
<td>Disabled people are generally more easily upset than non disabled people.</td>
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<tr>
<td>6.</td>
<td>Most disabled people are dissatisfied with themselves.</td>
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<td>7.</td>
<td>Most disabled people believe that their disability is the worst thing that could happen to them.</td>
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</table>
SECTION C. Instructions: Please decide how much each question applies to you by choosing one of the following options: A = not at all; B = a little; C = moderately; D = extremely. Put a tick in the corresponding column next to each question. (Recently = in the last 2 weeks).

1. Have you recently been feeling run down and out of sorts?

2. Have you recently felt that life is entirely hopeless?

3. Have you recently felt that you are ill?

4. Have you recently been thinking of yourself as a worthless person?

5. Have you recently felt constantly under strain?

6. Have you recently found everything getting on top of you?

7. Have you recently felt that life is not worth living?

8. Have you recently been feeling nervous or strung up all the time?

9. Have you recently found yourself wishing that you were dead and away from it all?

10. Have you recently thought of the possibility of doing away with yourself?

11. Have you recently found at times you couldn’t do anything because your nerves were so bad?

12. Have you recently found that the idea of taking your life keeps coming into mind?
### SECTION D. Instructions: Please decide how much you agree: disagree with the statements below by choosing one of the following options: A = strongly agree; a = agree; * = don’t know; d = disagree; D = strongly disagree. Put a tick in the appropriate column next to each statement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>A</th>
<th>a</th>
<th>*</th>
<th>d</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It’s what I can do to help myself that’s really going to make all the difference.</td>
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<tr>
<td>2. It’s up to me to make sure I make the best of my future in these circumstances.</td>
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<tr>
<td>3. My own contribution to my rehabilitation doesn’t amount to much.</td>
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<tr>
<td>4. I have little or no control over my progress from now on.</td>
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### SECTION E. Instructions: Please decide how much you agree: disagree with the statements below by choosing one of the following options: A = strongly agree; a = agree; * = don’t know; d = disagree; D = strongly disagree. Put a tick in the appropriate column next to each statement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>A</th>
<th>a</th>
<th>*</th>
<th>d</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Because of my disability/illness, I feel miserable most of the time</td>
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<tr>
<td>2. It makes me feel very bad to see all the things non disabled people can do which I cannot.</td>
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<tr>
<td>3. Because of my disability/illness, I have little to offer other people.</td>
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<tr>
<td>4. Because of my disability/illness, other people’s lives have more meaning than my own.</td>
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<tr>
<td>5. I feel satisfied with my abilities, and my disability/illness doesn’t bother me too much.</td>
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<tr>
<td>6. Almost every area of life is closed to me because of my disability/illness.</td>
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<td>7. My disability/illness prevents me from doing just about everything I really want to do and from being the kind of person I really want to be.</td>
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<td>8. In just about everything, my disability/illness is so annoying that I can’t enjoy anything.</td>
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<td>9. Often there are times when I think about my disability/illness, and it upsets me so much that I am unable to think of or do anything else.</td>
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**SECTION F. Instructions:** Please decide how much you agree/disagree with the statements below choosing one of the following options: A=strongly agree; a=agree; *=don't know; d=disagree; D=strongly disagree. Put a tick in the appropriate column next to statement.

<table>
<thead>
<tr>
<th>A</th>
<th>a</th>
<th>*</th>
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<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I give up on things before completing them.</td>
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<tr>
<td>2. If something looks too complicated, I will not even bother to try.</td>
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<tr>
<td>3. When I decide to do something, I go right to work on it.</td>
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<tr>
<td>4. When trying to learn something new, I soon give up if I am not initially successful.</td>
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<tr>
<td>5. I avoid trying to learn new things when they look too difficult for me.</td>
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<td>6. Failure just makes me try harder.</td>
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<tr>
<td>7. I give up easily.</td>
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<tr>
<td>8. I do not seem capable of dealing with most problems that come up in life.</td>
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**SECTION G. Instructions:** Please indicate how often each statement refers to you by choosing one of following options: A = always: B = often: C = sometimes: D = rarely: E = never.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tbody>
<tr>
<td>1. Any successes I have had have been due to good fortune.</td>
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<td>2. When things go wrong it’s because of circumstances beyond my control.</td>
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<tr>
<td>3. Any successes I’ve had have been due to outside influences.</td>
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<tr>
<td>4. Any successes I’ve had have been due to the fact that circumstances have happened to be right.</td>
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<td>5. If things go well it’s just good luck.</td>
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<tr>
<td>6. If things go well it’s because the system has helped me.</td>
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NOTTINGHAM ADJUSTMENT SCALE - REVISED

SECTION A  Instructions: Please decide how much you agree/disagree with the statements below by choosing one of the following options: A = strongly agree; a = agree; * = don't know; d = disagree; D = strongly disagree. Put a tick in the appropriate column next to each statement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>A</th>
<th>a</th>
<th>*</th>
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<td>2. At times I think I am no good at all.</td>
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<td>3. I am able to do things as well as most other people.</td>
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<td>4. I certainly feel useless at times.</td>
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<tr>
<td>5. I feel that I do not have much to be proud of.</td>
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<td>6. I feel that I am a person of worth; at least on an equal plane with others.</td>
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<tr>
<td>7. I wish I could have more respect for myself.</td>
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<tr>
<td>8. All in all, I'm inclined to feel that I'm a failure.</td>
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<tr>
<td>9. I take a positive attitude towards myself.</td>
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</tbody>
</table>

SECTION B: Instructions: Please decide how much you agree:disagree with the statements below by choosing one of the following options: A = strongly agree; a = agree; * = don't know; d = disagree; D = strongly disagree. Put a tick in the appropriate column next to each statement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>A</th>
<th>a</th>
<th>*</th>
<th>d</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Disabled people are used to failing at most things they do.</td>
<td></td>
<td></td>
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<tr>
<td>2. Most disabled people are constantly worried about what might happen to them.</td>
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<tr>
<td>3. Most disabled people keep a lot of things to themselves.</td>
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<tr>
<td>4. Most disabled people feel that they are worthless.</td>
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<tr>
<td>5. Disabled people are generally more easily upset than non-disabled people.</td>
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<tr>
<td>6. Most disabled people are dissatisfied with themselves.</td>
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<tr>
<td>7. Most disabled people believe that their disability is the worst thing that could happen to them.</td>
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</tr>
</tbody>
</table>
**SECTION C. Instructions:** Please decide how much each question applies to you by choosing one of the following options: A = not at all; B = a little; C = moderately; D = extremely. Put a tick in the corresponding column next to each question. (Recently = in the last few weeks).

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you recently been feeling run down and out of sorts?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Have you recently felt that you are ill?</td>
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<tr>
<td>3. Have you recently felt constantly under strain?</td>
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<tr>
<td>4. Have you recently found everything getting on top of you?</td>
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<tr>
<td>5. Have you recently been feeling nervous or strung up all the time?</td>
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<td></td>
</tr>
</tbody>
</table>

**SECTION D. Instructions:** Please decide how much each question applies to you by choosing one of the following options: A = not at all; B = a little; C = moderately; D = extremely. Put a tick in the corresponding column next to each question. (Recently = in the last few weeks).

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you recently felt that life is entirely hopeless?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Have you recently felt that life is not worth living?</td>
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<tr>
<td>3. Have you recently thought of the possibility of doing away with yourself:</td>
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<tr>
<td>4. Have you recently found at time you couldn't do anything because your nerves were so bad?</td>
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<td></td>
<td></td>
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<tr>
<td>5. Have you recently found yourself wishing that you were dead and away from it all?</td>
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<tr>
<td>6. Have you recently found that the idea of taking your life kept coming into mind?</td>
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</tr>
</tbody>
</table>
**SECTION E. Instructions:** Please decide how much you agree:disagree with the statements below by choosing one of the following options: A = strongly agree; a - agree; * = don't know; d = disagree; D = strongly disagree. Put a tick in the appropriate column next to each statement.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>a</th>
<th>*</th>
<th>d</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Because of disability/illness, I feel miserable most of the time.</td>
<td></td>
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<tr>
<td>2. It makes my feel very bad to see all the things non-disabled people can do which I cannot.</td>
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<tr>
<td>3. Because of my disability/illness, I have little to offer other people.</td>
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<tr>
<td>4. Because of my disability/illness, other people's lives have more meaning than my own.</td>
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<tr>
<td>5. I feel satisfied with my abilities, and my disability/illness doesn't bother me too much.</td>
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<td>6. Almost every area of life is closed to me because of my disability/illness.</td>
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<tr>
<td>7. My disability/illness prevents me from doing just about everything I really want to do and from being the kind of person I really want to be.</td>
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<tr>
<td>8. In just about everything, my disability/illness is so annoying that I can't enjoy anything.</td>
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<tr>
<td>9. Often there are times when I think about my disability/illness, and it upsets me so much that I am unable to think of or do anything else.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### SECTION F. Instructions
Please decide how much you agree:disagree with the statements below by choosing one of the following options: A = strongly agree; a = agree; * = don't know; d = disagree; D = strongly disagree. Put a tick in the appropriate column next to each statement.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>a</th>
<th>*</th>
<th>d</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<tr>
<td>2.</td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
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<tr>
<td>5.</td>
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<tr>
<td>6.</td>
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<tr>
<td>7.</td>
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<tr>
<td>8.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

1. I give up on things before completing them.
2. If something looks too complicated, I will not even bother to try.
3. When I decide to do something, I go right to work on it.
4. When trying to learn something new, I soon give up if I am not initially successful.
5. I avoid trying to learn new things when they look too difficult for me.
6. Failure just makes me try harder.
7. I give up easily.
8. I do not seem capable of dealing with most problems that come up in life.

nas2/carol
INSTRUCTIONS: Please respond to each of the following items by choosing the number from 1 to 5, on the adjacent scale, which you feel best describes you. Then circle the number you have chosen. There are no right answers to any of the questions.

For example:

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Strongly disagree</th>
</tr>
</thead>
</table>

1. I have a hard time adjusting to the limitations of my illness/disability

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Because of my health, I miss the things I like to do most

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. My illness/disability makes me feel useless at times

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Health problems make me more dependent on others than I want to be

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td></td>
<td></td>
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</tbody>
</table>

5. My illness/disability makes me a burden on my family and friends

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. **My health does not make me feel inadequate**

| Strongly agree | 5 | 4 | 3 | 2 | 1 | Strongly disagree |

7. **I will never be self-sufficient enough to make me happy**

| Strongly agree | 1 | 2 | 3 | 4 | 5 | Strongly disagree |

8. **I think people are often uncomfortable being around me because of my illness/disability**

| Strongly agree | 1 | 2 | 3 | 4 | 5 | Strongly disagree |

Please check that you have answered ALL of the questions
Appendix B

Figure 4

NAS1A; distribution: Normal

Figure 5

NAS1B; distribution: Normal
**Figure 6**

NAS1C; distribution: Normal

**Figure 7**

NAS1D; distribution: Normal
Figure 8: NAS1E; distribution: Normal

Figure 9: NAS1F; distribution: Normal
Figure 10  

NAS1G; distribution: Normal

Frequency

Category (upper limits)
Figure 10

NAS1G; distribution: Normal

Frequency

Category (upper limits)
BIBLIOGRAPHY


rehabilitation after brain injury (pp. 1-17). Baltimore: John Hopkins University Press.


