

by

LOUISE BIRKETT-SWAN

A thesis submitted to the University of Leicester

For the degree of

DOCTORATE IN CLINICAL PSYCHOLOGY

June 2006

UMI Number: U221196

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



UMI U221196

Published by ProQuest LLC 2013. Copyright in the Dissertation held by the Author.
Microform Edition © ProQuest LLC.

All rights reserved. This work is protected against
unauthorized copying under Title 17, United States Code.



ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

CONTENTS

MOOD, AWARENESS AND EXECUTIVE FUNCTIONING FOLLOWING TRAUMATIC BRAIN INJURY: A REVIEW

	Page
INTRODUCTION	15
Awareness	17
<i>Neurologically based theories</i>	20
<i>Psychologically based theories</i>	23
<i>Integrated theories</i>	25
Mood	30
<i>Depression</i>	31
<i>Anxiety Disorders</i>	32
<i>Contributing factors</i>	34
<i>Difficulty in examining mood</i>	36
Executive Functioning	39
<i>Models of Executive Functioning</i>	40
<i>Methods of assessment</i>	46
<i>Ecologically valid tests of executive function</i>	47
INTERACTION OF MOOD, AWARENESS AND EXECUTIVE FUNCTION	49
<i>Studies of Executive function and Awareness</i>	50
<i>Awareness and Mood</i>	51

<i>Awareness, Mood and Executive Function</i>	51
SUMMARY	52
REFERENCES	55

FIGURES

Figure 1. Causes of TBI admitted to a neurorehabilitation service (Dawson, 2003)	16
Figure 2. Schacter's (1990) DICE model	22
Figure 3. Pyramid Model of Awareness (Crosson et al., 2000)	27
Figure 4. Comprehensive Dynamic Interactional Model (Toglia and Kirk, 2000)	29
Figure 5. Baddeley and Hitch's Working Memory Model (1974)	41
Figure 6. Norman and Shallice's Model of Information Processing (1980)	43
Figure 7. A Framework for understanding Executive Control, (Stuss, 1991)	45

AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN EXECUTIVE FUNCTION, PSYCHOLOGICAL DISTRESS AND AWARENESS FOLLOWING ACQUIRED BRAIN INJURY

INTRODUCTION	76
<i>Awareness</i>	77
<i>Psychological Distress</i>	78
<i>Executive Functioning</i>	80
<i>Interactions of psychological distress, awareness and executive functioning</i>	82
Aims	88
Hypotheses	89
METHOD	91
Participants	91
Procedure and measures	
<i>Participants recruited from Kemsley</i>	94
<i>Participants recruited from community brain injury team</i>	94
<i>Measures</i>	95
<i>Awareness</i>	95
<i>Psychological distress</i>	96
<i>Executive functioning</i>	97
Data analysis	99

RESULTS

<i>Participant characteristics</i>	100
<i>Awareness and Psychological Distress</i>	102
<i>Awareness and Depression</i>	106
<i>Awareness and Anxiety</i>	108
<i>Psychological Distress and Executive Functioning</i>	109
<i>Awareness and Executive Functioning</i>	109
<i>Awareness and Executive Function As Predictors Of Psychological Distress</i>	112

DISCUSSION

Summary of findings

<i>Awareness and Psychological Distress</i>	113
<i>Psychological Distress and Executive Function</i>	115
<i>Awareness and Executive Function</i>	115
<i>Awareness and Executive Functioning as predictors of Psychological Distress</i>	116

Implication of findings

<i>Clinical implications</i>	121
------------------------------	-----

Limitations of design/study

Future work

REFERENCES

TABLES

Table 1. A summary of demographic and injury data for the participants	101
Table 2. Summary of descriptive data	102
Table 3. Significant relationships between awareness (using DEX discrepancy scores) and Executive Functioning	110
Table 4. Significant relationships between awareness using PCRS ratings and Executive Functioning	111
Table 5. Summary of clinical approaches for individuals with differing levels of awareness	124

FIGURES

Figure 1. Moore and Stambrook's (1995) conceptual model.	85
Figure 2. Moore and Stambrook's model including how awareness, executive functioning and psychological distress may be reflected.	87
Figure 3. Box plot distributions of DEX Questionnaire self ratings and other ratings regarding the presence of executive problems of participants	103
Figure 4. Scatterplot distribution of HADS total score and awareness	104
Figure 5. Scatterplot distribution of DEX S and HADS total score	106
Figure 6. Scatterplot distribution of HADS-D scores and awareness	107
Figure 7. Scatterplot distribution of HADS-A scores and awareness	108
Figure 8. Model of interactions of psychological distress and executive function with awareness	119

CRITIQUE OF THE RESEARCH PROCESS

Origin of the Study	
<i>Initial interest</i>	147
<i>Further interest</i>	149
Devising the Study	150
Participant Recruitment	152
Data Collection	154
Data Analysis	155
Reflections	155
<i>Time</i>	156
<i>Supervision Process</i>	156
<i>Willingness to conduct future research</i>	157
REFERENCES	158

FIGURES

Figure 1. Frequency of all aggression since admission	148
--	-----

APPENDICES

Appendix 1: Instructions for authors for journal ‘Brain Injury’.	161
Appendix 2: Confirmation of ethical review sought and obtained for the study.	172
Appendix 3: Participant information sheet	177
Appendix 4: Participant consent form	187
Appendix 5: Copies of PCRS questionnaires	188
Appendix 6: Copies of HADS questionnaire	192
Appendix 7: Relationships between psychological distress and executive function	194
Appendix 8: Relationships between awareness (DEX) and executive function	196
Appendix 9: Relationships between awareness (PCRS) and executive function	197

Acknowledgements

Thank you to Dr Nick Alderman and Dr Caroline Knight who as always have provided guidance, advice, and numerous 'words of wisdom'. They have pushed me when needed. I can not imagine how I'd have completed this without their constant encouragement. It was and is appreciated.

Thank you to all of the clients for agreeing to take part and those family members who took part. I am grateful to St Andrew's Hospital and the traumatic brain injury team for permission to carry out this research. Thank you to Dr Brian Moffat, Dr John Follansbee and Dr Raffey Faruqi for allowing me access to the patients within Kemsley. Thanks to staff within Kemsley for their assistance and every one at the TBI team for their support, especially Dr Carole Cowan Turner. I acknowledge the contribution of Dr Nick Alderman and Assistant Psychologists under his supervision in the collection of some of the data used. Thank you to Alison Ullman for her support and thanks also to Kemsley secretaries for printing numerous draft copies of the research.

Finally, thank you to my family. Thanks to Andy for just letting me get on with what I have needed to, we can get on with 'doing things' now. Than you to Connor for not wanting attention all the time and for being a really well behaved son. We can hopefully spend more time together now. Lastly, I want to thank my Mum and Dad for always being there for me. I don't know where I would be today if I had any one else for parents. I don't say it much but I love you all very much, thank you.

OVERVIEW

This thesis consists of three papers. The first, a self contained literature review is prepared for submission to 'Brain Injury'. Contrary to journal requirements, figures have been integrated within the text as well as references cited by name and listed in alphabetical order. It should be noted that references are in the style of the journal requirements. The second paper is the main research report. The third paper is a critique of the research process and as such is presented in the 'first person'. The aim of this study is to examine the relationship between psychological distress, awareness and executive functioning.

A literature review outlines the separate areas of psychological distress, executive function and psychological distress. For an individual to maximise their full rehabilitation potential, they must be motivated to work towards rehabilitation goals. Motivation can be affected by low mood, decreased awareness and deficits in executive functioning. There is evidence to suggest there is an interaction between awareness, psychological distress and executive functioning. There are few studies which examine how the three variables interact. The literature review highlights the need for further examination of this area. It is suggested that investigation into these interactions could provide important information regarding how best rehabilitation could be approached with an individual demonstrating difficulties in all three areas.

The main research report aims to further examine the relationship between the three variables. Relationships were examined and a model is proposed which suggests how psychological distress and executive functioning are able to predict awareness of an individual following an acquired brain injury. A discussion is also presented of the clinical implications of the findings from this study.

Finally, the third paper, the critique of the research includes discussion of the origins of the study along with a critical appraisal of the study, including a critique of areas not discussed in the second paper. The aim of this paper is to offer a critical reflection of the research process whilst allowing the reader into an understanding of the processes which have occurred during the course of the research.

**MOOD, AWARENESS AND EXECUTIVE FUNCTIONING FOLLOWING
TRAUMATIC BRAIN INJURY: A REVIEW**

ABSTRACT

The acquisition of a brain injury can lead to changes in brain function. Alterations can be observed in terms of physical disablement, mood, cognition and behaviour. For an individual to maximise their full rehabilitation potential, they must be motivated to work towards rehabilitation goals. Motivation can be affected by low mood, decreased awareness and deficits in executive functioning. Each of these areas can be affected by brain injury. There is evidence to suggest there is an interaction between awareness and mood and awareness and executive functioning. In addition, deficits in executive functioning would appear to reflect lower rates of reporting of mood disorders. However, there are few studies which examine how awareness, mood and executive functioning interact. It is suggested that investigation into these interactions could provide important information regarding how best rehabilitation could be approached with an individual demonstrating difficulties in all three areas.

INTRODUCTION

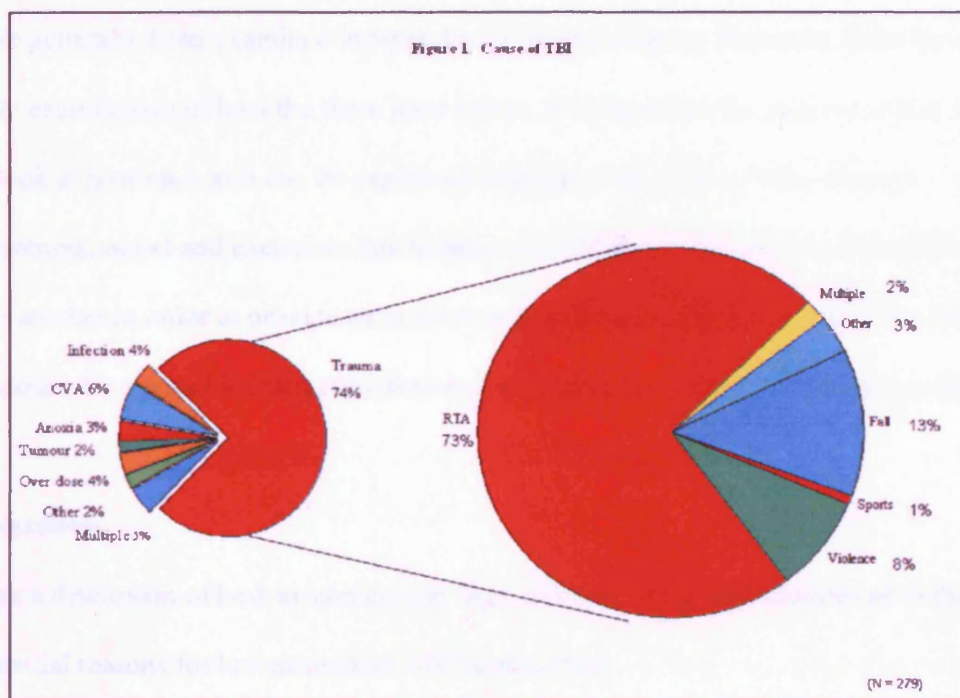
Incidence and causes of Brain Injury

In the USA the National Head Injury Foundation described traumatic brain injury (TBI) as 'an insult to the brain caused by an external force that may produce diminished or altered states of consciousness, which results in impaired cognitive abilities or physical functioning' (National Head Injury Foundation, 1989). This type of injury can either be from a blow to the head (closed head injury) or as a result of an object penetrating through the skull into the brain. The latter tends to cause a different pattern of neurological deficits as the injury site is generally less diffuse (Ponsford, 1995).

It is difficult to obtain exact data about the incidence of TBI both nationally and internationally due to variations in methods of data collection and definition. It has been estimated that across Britain and the United States the incidence of hospitalisation following head injury is between 200 and 300 per 100,000 (Jennet & MacMillan, 1981). It has been suggested that the prevalence of TBI – disabled survivors in the UK is estimated to be 100 – 150 per 100 000 population (British Society of Rehabilitation Medicine, 1998; Bryden, 1989). In addition, it is estimated that this is with an annual incident rate of two TBI survivors with a severe disability per 100 000 (Bryden, 1989; Department of Health, 1996) and four per 100,000 with a moderate disability (Lyle et al., 1990). In a postal survey using General Practitioners (GPs) in Flanders, Belgium, Lannoo et al. (2004) found that the estimated prevalence of adults with TBI related disabilities is 183 per 100 000 population with the largest majority remaining at home

without professional assistance. Due to the lack of homogeneity in measures used to ascertain severity and the variations in definition it is difficult to obtain precise data about the frequency of various severity of injury. It can be seen from Figure 1 that the causes of TBI are multiple.

Figure 1. Causes of TBI admitted to a neurorehabilitation service (Dawson, 2003)



Seventy four per cent of all TBIs admitted to the neurorehabilitation service examined (Dawson, 2003) were due to trauma, with the remainder being due to Cerebral-vascular accident (CVA), tumour, anoxia, overdose and other. Of the number of TBIs classed as being caused by trauma, 73% were due to road traffic accidents (RTA), 13% from falls,

8% from violence and the remainder classed as sports injuries, multiple factors and other (Dawson, 2003).

It is now well established that the acquisition of a brain injury can lead to changes in brain function (Prigatano et al., 1986). Alterations can be observed and experienced in terms of physical disablement, mood, cognition and behaviour (Uomoto & Brockway, 1992; Ezrachi et al., 1991). The areas of mood, awareness and executive functioning have generally been examined independently of one another. However, there has been little examination of how the three inter-relate. It is therefore the purpose of this review to look at how each area can be explained following brain injury. The areas of awareness, mood and executive functioning will initially be discussed independently of one another in order to provide an understanding of each. The review will then examine evidence for a possible interaction between executive functioning, awareness and mood.

Awareness

Here a discussion of how awareness has been defined, along with theories as to the potential reasons for low awareness will be presented.

It is not uncommon for individuals who have experienced a brain injury to show an inability to recognise they have problems as a result (Prigatano et al., 1986). The significance of unrealistic appraisals of the self has been noted as being problematic in the adjustment and adaptation needed following moderate to severe TBI (Ezrachi et al., 1991; Prigatano & Fordyce, 1986). Individuals who are more aware of the deficits observed by the rehabilitation team show better treatment performance and have better

rehabilitation outcomes (Deaton, 1986; Prigatano et al., 1994; Lam et al., 1988), including successful work re-entry (Sherer et al., 1988). Individuals will often recognise that they are unable to carry out physical activities in a way done previously, yet they can not seem able to report that they have any cognitive impairment even when they have forgotten what they were shown 15 minutes previously (Ponsford, 1995).

Lack of awareness is described using various terminology. The term 'lack of awareness' is also often referred to as anosognosia (unawareness, imperception of disease) and 'lack of insight'. The terms can relate to language, memory and motor or perceptual problems. Another term that is sometimes related to lack of awareness is denial, meaning that the individual is aware of the deficit but does not admit to it. This can appear as a lack of awareness and it can often be difficult to differentiate between the two. Anosodiaphora refers to an indifference or lack of concern, generally referring to the emotional impact of the deficit not being acknowledged.

For the purposes of this review the term lack of awareness will be used to cover all of these areas and will be discussed more fully where appropriate e.g. some authors have stated that lack of awareness is due to neurological conditions (McGlynn & Schacter, 1989) whereas denial can be due to psychological factors (Caplan & Schacter, 1987). In addition, Prigatano and Klonoff (1998) have made a distinction between awareness deficits due to neurological causes and environmental and personality causes. They have classed these as 'Impaired Self Awareness' (ISA), caused by a disruption of the integration of thinking and feeling due to lesions in the heteromodal cortex (fronto-

parietal) and 'Denial of disability' (DD). This is due to an individual's effort to use previous coping strategies to manage problems only partly recognised. However, the area of awareness or unawareness is slightly more complex than being due to a specific area or region of the brain as will be demonstrated.

Historically there appears to be two main explanations for poor awareness; the neurological explanations and the psychological explanations. Early neurological explanations have been noted by Bisiach and Geminiani (1991) who report cases dating back to 1893. Babinski (1914, cited in Bisiach & Geminiani, 1991) refers to 'anosognosia'; in this case referring to lack of knowledge of hemiplegia. Early psychological explanations date back to 1900 with Freud's psychoanalytic interpretations relating the role of psychological defense mechanisms in blocking unpleasant thoughts from awareness (Prigatano & Schacter, 1991). Levine and Zigler (Levine & Zigler, 1975) elaborated this a little and identified that the use of denial to protect patients from the full meaning of impaired functioning can be observed across every form of disability and disease. Indeed this has also been examined in the area of mental illness and schizophrenia (Carpenter et al., 1978; Wilson et al., 1986; Mohamed et al., 1999).

Neurologically based theories.

Evidence for neurologically based theories falls into three main areas, focal lesion theories, diffuse damage lesion theories and general disorder theories. These will be discussed briefly in turn as it is not the purpose of this review to cover the area comprehensively.

Focal lesion theories

It has been suggested that individuals who have experienced right hemisphere damage more commonly experience deficits in awareness, compared with left hemisphere damage (McGlynn & Schacter, 1989; Anderson & Tranel, 1989, Ranseen et al., 1990). Focal lesion theories may provide an insight into the possible mechanisms which underlie awareness deficits relating to some problems arising following TBI. However, these theories appear unable to account for deficits in awareness relating to more global areas, such as behaviour and personality change (McGlynn & Schacter, 1989).

Diffuse damage theories

Prigatano (1999) has reported a relationship between deficits in awareness, severity of injury and speed of bilateral finger tapping, from which it was concluded that impaired awareness might represent a disturbance of conscious experience. In a review carried out by Ownsworth, McFarland and Young (2002) it was found that four out of ten studies examined suggested that a general cognitive decline contributes to a deficit in awareness. However, as McGlynn and Schacter (1989) have pointed out, patients with an intact IQ may still exhibit deficits of awareness in other areas of functioning. It

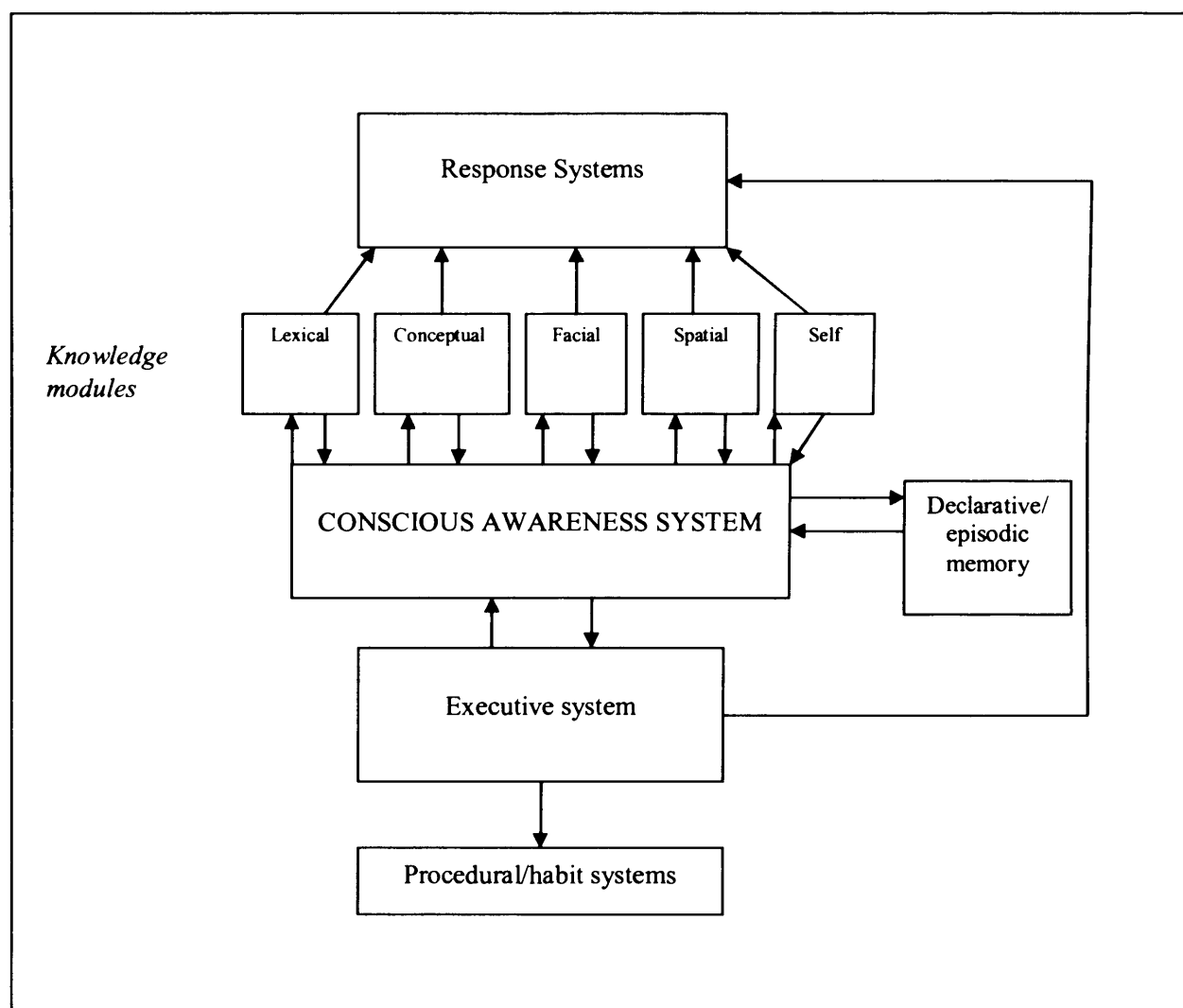
appears likely that other neurological factors such as the nature of the lesion and specific aspects of neuropsychological impairment play a more important role than the severity of the injury or general cognitive decline (Ownsworth et al., 2002).

General Disorder theories

These theories suggest that a significant disruption of higher order cognitive control systems such as monitoring and regulation of behaviour can lead to deficits in awareness. Support for this theory has come from studies that have shown a link between impairments of executive functioning and poor awareness (Ownsworth et al., 2002; Allen & Ruff, 1990; Stakstein et al., 1993; Malec et al., 1997; Trudel et al., 1998; Ownsworth et al., 2000). McGlynn and Schacter (1989) proposed a model to attempt to explain how awareness deficits occur when there is a disconnection between the Central Awareness system (CAS) and a specific domain, (see Figure 2). Schacter (1990) put this forward as the Dissociable Interactions and Conscious Experience (DICE) model. In this model, damage can arise at a number of levels, each of which can result in varying degrees of unawareness. An individual module can be selectively disconnected from the CAS, resulting in domain specific unawareness. In addition, the CAS itself can be damaged resulting in a more generalized unawareness across all areas. Finally damage can occur to the executive system resulting in impaired awareness of deficits in complex functions.

This model is consistent with data from clinical studies of awareness in neurological disorders; however, it has a number of limitations. McGlynn and Schacter (1989) have pointed out that it does not account for all data obtained clinically and it is unable to provide an explanation for the link between right hemisphere damage and unawareness (Clare, 2004). In addition, it does not take account of psychosocial or psychological factors.

Figure 2. Schacter's (1990) DICE model



Agnew and Morris (1998) have criticized the DICE model for failing to address how memory impairment can be involved in changes of metacognition. In an attempt to address these limitations they have presented a re-formulation of the DICE model. This 're-model' suggests that unawareness of memory deficits can occur in three ways. Firstly, mnemonic anosognosia, resulting from a failure to update the contents of semantic memory; secondly, executive anosognosia, resulting from impairment of the executive system; finally, primary anosognosia resulting from a problem in the CAS itself. Again, as with similarity to the DICE model, this extension of it can be criticized for not taking into account psychological or psychosocial factors.

Psychologically based theories

As mentioned previously it has been suggested that denial is a form of psychological defense mechanism. Many researchers believe that the use of denial is influenced by pre-morbid personality characteristics (Prigatano, 1999, Gainotti; 1993; Weinstein, 1991). For example, Caplan and Schacter (1987) report denial being used by psychologically healthy individuals to cope with major stressful life events, including severe illness. Weinstein (1991) noted that patients who developed verbal denial of deficits previously had very high expectations of themselves. However, at this time there is little research evidence examining denial and its relationship to pre-morbid personality.

Weinstein (1991), argued denial can play an important role in the adaptation to traumatic experience, including the onset of neurological conditions. The use of denial in the

emotional protection of individuals who have sustained a TBI from facing the full meaning of deficits in functioning or impending death has been recognised across numerous forms of disability and disease (Levine & Zigler, 1975; Gianotti, 1993; Cramer, 1998). A number of studies have found a correlation between decreased awareness and lower levels of reporting of emotional dysfunction, e.g. depression (Hamish et al., 1993) and PTSD (Williams et al., 2002). Fleming, Strong and Ashton (1998), found that people with an ABI in a high self awareness group demonstrated more emotional distress. However, there is little in the literature that examines the relationship between anxiety and levels of awareness. It is not clear at this point if the reduced rate of reporting of psychological distress in those with reduced insight is due to the denial acting as a protective factor or due to an inability to accurately report emotions.

Psychological explanations for lack of awareness suggest that deficits can be explained in terms of personality and coping style in contrast to the different patterns of neurological injury described above. However, the evidence for psychological factors is less substantive than that for the neurological factors; this may in part be due to study of psychological factors only recently becoming more prominent. The psychological explanations of awareness can be criticised for not taking into account the nature of the brain injury. Although they examine how important psychological factors are, they do not account for how different lesions can affect awareness.

Integrated theories

More recently research has begun to develop integrated explanations of awareness. These take into account multiple factors in their explanation of awareness. Weinstein (1991) proposed that various factors contribute to how people adapt to and represent their disabilities. These include the nature of the brain pathology (as previously discussed, affected by the severity and location of lesion), the meaning of their disability as determined by pre-morbid experiences, personality and values and finally by the environment in which the behaviour is observed. Giacino and Cicerone (1998), have stated that the causes of poor awareness are complex and multiply determined. They argue therefore that it is unlikely that a single theory can adequately explain the underlying mechanism of awareness.

Allen and Ruff (1990) proposed three levels of processing which influence the accuracy of patient's self reporting. The first level is that of 'awareness' which involves the ability to attend to, encode and retrieve information. At this level it is neurophysiological factors which are likely to influence the patient's level of awareness. The second level of processing is that of 'appraisal'. At this level the patient compares their current self with the pre-injury self. The authors argue that both neurological factors and psychological factors can interfere with an accurate appraisal of the self. Finally the third level of processing is 'disclosure'. This is the patient's willingness to actually report self perceptions to another person. Failure to disclose information at this stage is due to a complex interaction of neurological, psychological and social factors.

Stuss and Benson (1986) proposed the Hierarchy of Brain Function Model. This is an integrated theoretical framework in which self awareness is viewed as the highest form of brain activity which mediates and interacts with other brain processes. In this model both psychological and neurophysiological processes are represented as interactive functions underlying self awareness.

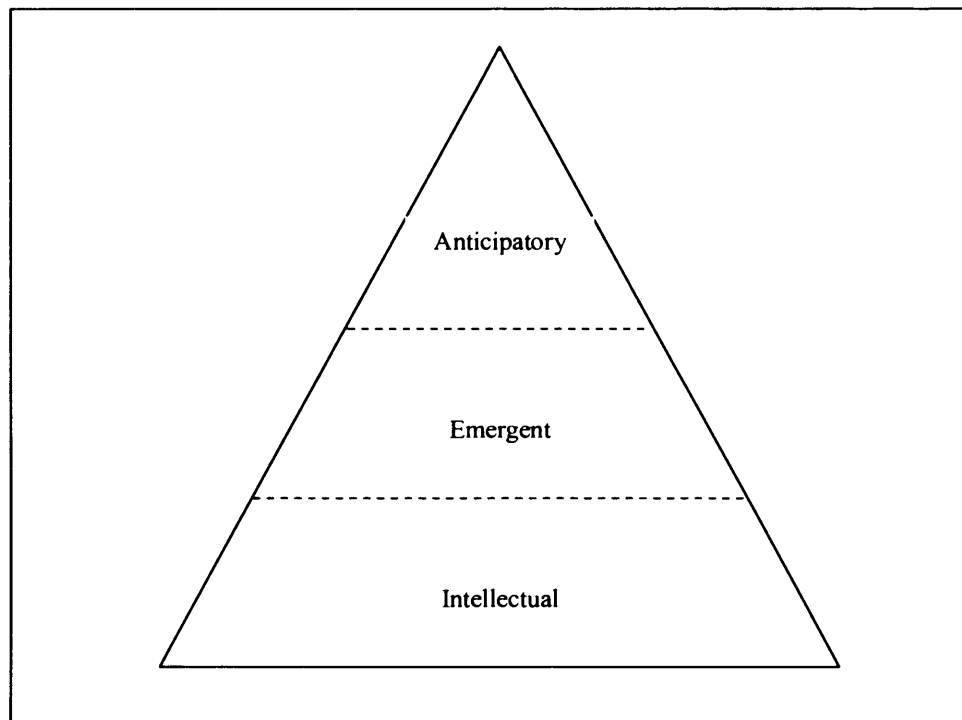
The concept of awareness has been extended further by models which expand the scope of awareness to include metacognitive skills such as self monitoring and anticipation of performance. The Pyramid Model of Awareness proposed by Crosson et al., (1989) shown in Figure 3 consists of three interdependent levels that are hierarchical.

Intellectual awareness is at the bottom of the pyramid, this is the knowledge that a particular function is impaired. The next level is emergent awareness and this is the ability to recognise a problem when it occurs. Dissociation can occur between these levels, for example when the patient knows that they have a problem but is unable to recognise it when it occurs unless another person points it out. The final level is anticipatory awareness. This is the ability to recognise that a problem is likely to occur as a result of a deficit. This model states that intellectual and emergent awareness are pre-requisites for anticipatory evidence.

The integrated models discussed above suggest that awareness is not a unitary concept. However, they can all be criticized for the same problem. Toglia and Kirk (2000) have argued that they do not explain how the different levels of awareness work together and why some levels of awareness can be observed in some situations but not others. In

addition, the pyramid model states that emergent and intellectual awareness must be in place to have anticipatory awareness.

Figure 3. Pyramid Model of Awareness (Crosson et al., 2000)

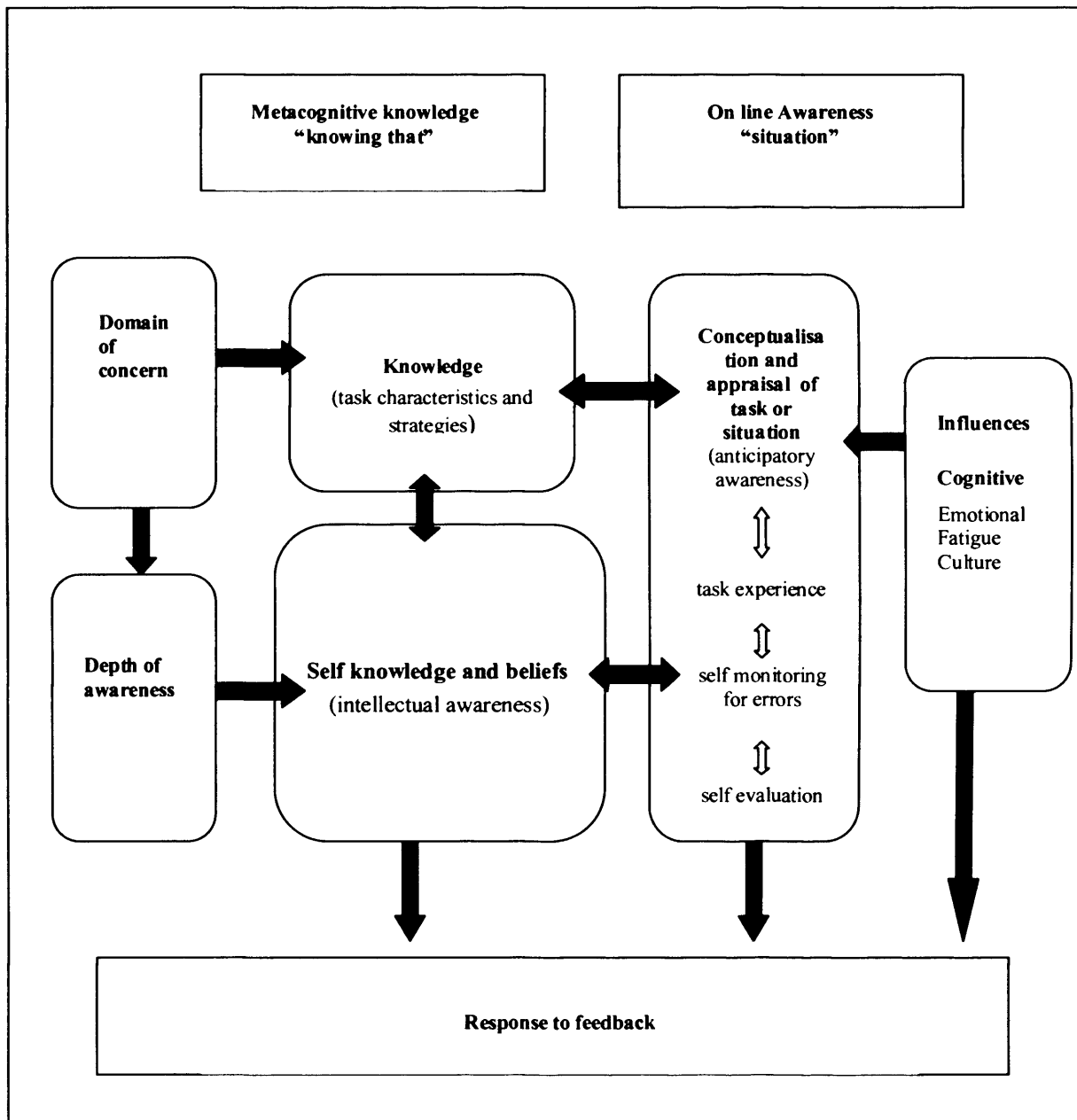


This would not appear to explain how some patients with a brain injury will anticipate the types of problems they may have in certain situations, but then be apparently unable to identify these difficulties whilst actually carrying out the task, until another person points them out. Finally, although these models, including the pyramid model are considered integrative, they do not specify how neurological damage impacts on the knowledge that a particular function is impaired.

In view of these criticisms Toglia and Kirk (2000) have proposed a further model which is more comprehensive and takes into account the individual's belief system and attempts to explain the way in which different aspects of awareness work together. This model is shown in Figure 4.

The Comprehensive Dynamic Interactional Model (Toglia & Kirk, 2000) reflects the complex and multi dimensional nature of awareness. It is an expansion of the Pyramid model and views awareness following a brain injury within a framework based upon metacognition. The relationship between metacognition and awareness is seen as a dynamic process rather than a hierarchical one. In addition, it differentiates between knowledge and beliefs related to self that are pre-existing or stored in long term memory and knowledge and awareness that is activated during a task.

Figure 4. Comprehensive Dynamic Interactional Model (Toglia and Kirk, 2000)



'On-line awareness' is used to describe the ability to monitor performance within the stream of action (in the situation). It also provides an explanation of how perceptions of capability interact with the task performance within and across domains. Variations can occur in depth of awareness as well as in a particular domain.

All of the approaches that attempt to account for discrepancies in awareness through integrating psychological and neurological can have one criticism aimed at them, namely the lack of substantiating research. Ownsworth, McFarland and Young's (2002) findings showed that neurological factors had a greater and more direct influence on deficits of awareness and self regulation than psychological. However, the integrated theories of awareness provide a more full understanding of how multiple factors can affect awareness. Toglia and Kirk's (2000) model provides a particularly comprehensive account of deficits in awareness. It is being recognised that for an individual's rehabilitation potential to improve insight too has to improve. The research within this area of awareness is gradually expanding and more evidence is being gained.

Mood

A discussion of the area of mood, its impact on rehabilitation and difficulties in the examination of it will now be presented. Morton and Wehman (1995) have suggested that mood disturbance can seriously affect long term rehabilitation outcomes. They recommended that for rehabilitation to be effective, 'at risk' individuals must be identified and their emotional problems treated early on. There is much evidence to

indicate that mood disturbances of various forms are common following TBI e.g.

Hibbard, Uysal, Kepler, Bogdany and Silver (1998) examined patterns of mood disorder following TBI using the structured clinical interview for the Diagnostic and Statistical Manual (DSM)-IV (American Psychiatric Association, 2000). They found that major depression and specific anxiety disorders were the most common diagnoses and that co-morbidity was high, with 44% of individuals having two or more diagnoses. Bowen, Neumann, Conner, Tenant and Chamberlain, (1998) found that the rate of clinically significant mood disorders was 38% following a TBI.

Depression

The most widely reported mood disturbance in the literature is depression. Depression can be viewed as a 'persistent state of low self esteem, sadness and hopelessness' (Williams, 2003, p. 117). It is not clear why this appears to have been investigated more than other forms of mood disorder following TBI. One possible reason is the link between depression and increased suicide rates following TBI. Wallace and Bogner (2000) found that 45% of individuals who had sustained a TBI reported symptoms suggestive of 'mild or greater' depression (p.550). Harris and Barraclough (1997) carried out a meta-analysis of suicide following various medical and psychiatric conditions. They calculated the Standard Mortality Ratios (SMRs) for each disorder and found that the risk of suicide following a brain injury was raised over three fold from that expected in the general population. Teasdale and Engberg (2001) in a large-scale population based study, found that approximately 3 – 4% of those who suffered TBI later committed suicide.

Studies of depression and TBI have consistently shown a strong association regardless of instruments or procedures used (Kreutzer et al., 2001). Along with those studies mentioned above, Kreutzer, Seel and Gourley (2001) investigated depression using the DSM-IV (APA, 2000) standardized diagnostic criteria in 722 outpatients with a brain injury. They found that 42% of patients met the criteria for a major depressive disorder. In another study carried out using the Beck Depression Inventory, 55% of 47 people with TBI had clinical symptoms of mild to severe depression (Garske & Thomas, 1992). However, the reliability and implications of these findings are questionable e.g. due to the measurement tools used. Such factors will be discussed later in this review.

Anxiety disorders

As mentioned earlier, it would appear that anxiety disorders are less well represented in the literature than depression. However, Wallace and Bogner (2000) found that 39% of individuals reported symptoms suggestive of experiencing 'mild or greater' anxiety following a TBI (p550). Anxiety disorders which have been investigated to some extent include post traumatic stress disorder (PTSD), panic disorder, obsessive compulsive disorder (OCD) and generalized anxiety disorder (GAD). Anxiety disorders are the most commonly diagnosed mental health problem within the general population (Wells, 1997). It has been suspected that anxiety disorders are more common following a brain injury (Williams, 2003) and may be due to the adjustment process which occurs following TBI. In particular the changes are often perceived as lack of control and insecurities about the future (Prigatano, 1999). Despite this, they may be un-diagnosed

due to difficulties in identifying symptoms in the context of other issues (Scheutzwow & Wiercisiewski, 1999).

Until fairly recently PTSD has not been studied in relation to TBI. Often individuals who have sustained a TBI experience post traumatic amnesia (PTA) meaning that they do not have continuous memories for a period after the TBI. Despite this it is believed that PTSD is relatively common in those who have experienced mild and severe brain injury (see Williams et al, 2002; Bryant, 2001; Bryant et al., 2000). However, the presence of PTA creates difficulties for a diagnosis of PTSD.

Like PTSD, Obsessive Compulsive Disorder (OCD) was considered rare in survivors of TBI although evidence for this problem is increasing. In one study of 25 survivors of brain injury, 3 were found to have severe OCD (McKeown et al., 1984). In addition, Berthier, Kulisevsky, Gironell, and Lopez, (2001) described 10 people with TBI who had an OCD. They also noted that the patterns of OCD were well specified and did not appear contaminated by other symptoms of TBI. It is unclear if the TBI acts as an activating event; acts to exacerbate pre-morbid problems; or simply co-occurs alongside a pre-morbid OCD.

Phobic disorders are rarely reported, although clinically patients are observed to exhibit phobic symptoms (Williams, 2003). Burgess and Alderman (1990) reported the case of a man who displayed phobic anxiety for showering. Williams (2003) suggests that such responses can be understood in terms of PTSD, however, at times they would appear to

mirror types of phobic disorders observed in the general population. As with other types of anxiety disorder, GAD is not given as much emphasis in the literature as depression. It has been reported in cases following TBI (Jorge et al., 1993a). However, it is often associated with depression and therefore has not been examined in isolation.

Contributing factors for mood disorders.

Mood disorders associated with TBI parallel those found in the general population in that there are numerous contributing factors associated with onset, course and duration. These include the type and nature of the event (how the TBI was sustained), the nature of the neurological injury, adjustment and coping styles, pre-injury history and any other stresses being experienced.

When considering neurological factors, two main forms of damage may lead to emotional dysfunction. Firstly, diffuse damage involving a number of systems which are interdependent of one another to produce a specific functional behaviour (composite). Secondly, specific damage to a particular part of the brain and resulting in specific impairments. Figure 1 suggests the majority of causes of TBI for those admitted to a neurorehabilitation service were due to trauma and in particular road traffic accidents (RTA) (Dawson, 2003). Following this, the majority of injuries are likely to be more composite, of which the dysexecutive syndrome is commonly reported (Williams, 2003). Executive systems are crucial for handling cognitive acts that modulate emotional processing. Examples of specific deficits include injury to the amygdala leading to an inability to process others' emotional expression and an inability

to respond appropriately to situations which should be of concern, due to lesions of the ventromedial prefrontal cortex (Williams, 2003).

As was seen in issues of awareness, pre-injury personality can have an impact on outcome determinants. It is commonly accepted that personality characteristics observed in those who have sustained a TBI are often exacerbations of their pre-morbid personality (Brooks et al., 1987). Brooks and colleagues (1987), state: “In most cases after severe head injury, the personality and behavioural changes that occurred tend to either be an exaggeration of previous traits or to occur in patients that might have been expected to develop mental disorder without having had their brains damaged” (p.139).

There is evidence to show that the largest group of individuals who sustain TBI are men aged 18 – 25 years (Dawson, 2003; Tate, 1998), this does not help in identifying which characteristics are more likely to be predictive of an individual experiencing a mood disorder following the TBI. Some work has been carried out looking at Pre-morbid Social Maladjustment (PSM; Tate, 1998; Symonds & Russell, 1943). Although Tate (1998) found some evidence of PSM characteristics, it was not predictive of functioning 6 months post injury. Other links to pre-morbid history and emotional outcome include occupational status pre-injury (Bowen, et al., 1998), pre-injury psychiatric status and drug use (MacMillan et al., 2002) and pre-injury history of alcohol abuse (Dunlop et al, 1991). However, as was noted previously Brooks et al., (1987) wrote, “It is possible that these people would be likely to go on to develop mental health problems if they had not sustained a TBI” (p.139).

Survivors of TBI have experienced a major life event which requires adjustment. Grief models have achieved some popularity in an attempt to understand why some people develop such reactions and others do not (Jackson, 1988). These models provide a framework for understanding loss. The grief reaction can be similar to that seen in any other grief reaction, however, following a TBI it can be complicated. Initially complications can occur due to decreased awareness (as discussed previously). In addition, the individual may have lost the skills necessary to re-build their lives e.g. memory impairments, communication difficulties e.t.c. In addition to grief models, stress-coping theories can build on the understanding of the grief process, (see Kendall & Terry, 1996, for a more full explanation of this).

Difficulty in examining mood disorders following TBI.

A review of the literature suggests there is considerable variability in the reported frequency of mood disorders associated with TBI. For example, rates of depression following TBI have ranged from 26% (Jorge et al., 1993a) to 77% (Dunlop et al., 1991). There are a number of reasons that account for these discrepancies. These include sub groups of differing severity of cognitive deficits, different assessment methods employed and differing times post injury. All of these factors make comparisons between studies difficult as they are not comparing like with like. In addition, the symptoms being measured, particularly in depression, can often be a function of the neurological damage rather than just down to the mood disorder. Kreutzer, Seel and Gourley (2001) reported that fatigue, frustration and poor concentration were the most

commonly cited symptoms of depression following TBI. All of these symptoms can be symptomatic of neurological impairment. In addition Kreutzer et al., (2001) identified the symptoms irritability, lack of interest, moving slowly, fatigue and forgetfulness (common symptoms of depression) as being more common after a brain injury, regardless of mood. In a study conducted by Jorge, Robinson and Arndt (1993b), it was found that at 12 month follow up the only symptoms that distinguished those who were depressed from those who were not, were the psychological symptoms relating to changes in self attitude, e.g. self-deprecation, lack of confidence and feelings of hopelessness. From this it can be seen how difficult it can be to attribute the symptoms that follow TBI to a mood disorder.

Another factor which must be taken into account in the diagnosis of a mood disorder following TBI relates to awareness. Those with dysexecutive disorders may lack sufficient insight to make realistic judgments regarding mood state, whilst those with severe memory disorders may not recall sufficient information of their current experience to make accurate reports of their mood (Williams, 2003). Finally, in the case of denial, if an individual is unable or unwilling to disclose details of their deficits, why is this likely to be different for emotional state? Therefore, the actual reports themselves may be unreliable. If this is the case and as has been discussed already, such observations can prove difficult due to the difficulty distinguishing between depression and symptoms of ABI. It can be impossible in some cases to accurately diagnose depression as self report and clinical observation can all prove unreliable.

Finally and related to the last factor is the lack of validated measures to determine mood disorders in individuals who have sustained a TBI. The diagnosis of depression in the TBI literature has often relied on self report measures designed for a psychiatric population (Kreutzer, 2001). There is a lack of validated measures for those with TBI. The Structured Assessment of Depression in Brain Damaged Individuals was devised by Gordon et al., (1991), however it does not appear to have been widely adopted as there are few reports of it's use within the literature.

When attempting to measure an emotional construct such as depression the advantages and disadvantages of using a particular measure must be seriously considered.

Observation rating has the advantage of the patient not having to report symptoms.

However , as discussed, observable symptoms may be attributable to the organic aspects of brain injury rather than the psychological. Self report measures may also lack validity when self report is unreliable. However, depression and anxiety are emotional constructs and it is difficult to always be able to tell what is abnormal for another person or if they are experiencing emotional distress. Therefore, as a compromise, wherever possible, self report should be used, even if it is supplemented by observer ratings.

Executive Functioning

A discussion of models of executive function and methods of assessment will now be presented. Damage to the frontal lobes of the brain has been documented as having catastrophic consequences for individuals (Burgess & Alderman, 1990). Even though damage to motor, sensory and cognitive functioning may be relatively minimal, major changes may be observed in personality and social competency (Fogel, 1994; Varney & Menefee, 1993). These types of outcomes have been considered the result of 'executive' difficulties and associated with poor community reintegration (Sohlberg et al., 1993), memory impairments (Hart, 1994) and social isolation and loneliness (Kinsella et al., 1989).

Patients presenting with executive difficulties have traditionally been diagnosed as having 'frontal lobe syndrome'. The frontal lobes have been thought of as housing the "special workshop of the thinking process" (Burdach, 1819 cited by Rylander, 1939, p. 329). The 'frontal lobe syndrome' is a term that "is used to refer to an amorphous, varied group of deficits resulting from various aetiologies, different locations, and variable extents of abnormalities" (Stuss & Benson, 1984), (p.3). A variety of behavioural symptoms and cognitive abilities are documented in the literature as associated with this phenomenon, including; planning, organization, inhibition, impulsivity, self monitoring, perseveration, utilization of feedback, problem solving, cognitive flexibility, motivation, initiation, abstract thinking, memory, concentration and attention and ability to deal with novel situations. Many authors have documented such deficits in group and single case studies (Shallice, 1982; Luria, 1981; Penfield, 1935).

However, such symptoms are not exclusively found in individuals who have sustained damage to only the frontal lobes. Baddeley and Wilson (1988) argue that specification of a syndrome in terms of localization is unfortunate and potentially misleading. They go on to argue that localizing the description would be inadequate and limit our understanding of the observed cognitive phenomena. Baddeley (1994) suggested 'dysexecutive syndrome' (DES) as a label to avoid potentially misleading specification of a syndrome in terms of localization, indeed, a functional definition seems more appropriate to the deficits described above.

Despite the large number of deficits described above certain features do appear characteristic in the breakdown of executive functioning. Alderman and Ward (1991) highlighted problems with initiation, inability to monitor performance and difficulty using feedback to regulate effective behaviour. A similar set of difficulties were highlighted in an earlier account by Rylander (1939). These were described as "disturbed attention, increased distractibility, a difficulty grasping the whole of a complicated state of affairs, well able to work along routine lines but cannot learn to master new tasks" (p.203).

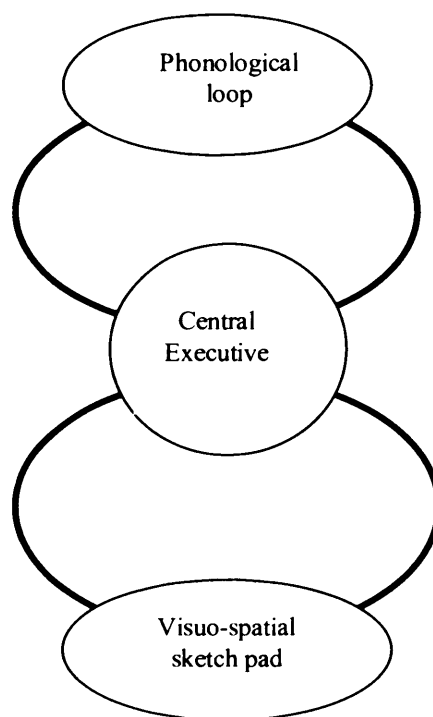
Overall it has been agreed that executive functioning encompasses the skills necessary for purposeful, goal directed activity (Anderson, 1998).

Models of Executive Functioning

Two theoretical explanations for executive deficits have achieved popularity within the past few years, Baddeley and Hitch's working memory model (Baddeley & Hitch, 1974)

and Norman and Shallice's information processing model (1980). Baddeley and Hitch's (1974) working memory model proposes that a 'central executive' component allows allocation of attentional resources to at least two tasks, for example a verbal and visual task. Feedback is utilized in order to regulate behaviour as necessary. Figure 5 is a diagrammatical representation of the model. It represents information passing between the phonological loop, the visuospatial sketch pad and the central executive. If a breakdown occurs, allocation of attentional resources will be impaired by only being able to attend to one environmental or internal cue at a time. Experimental work has suggested that allocation of attentional resources is impaired following head injury (Alderman, 1996; Hartman et al., 1992).

Figure 5. Baddeley and Hitch's Working Memory Model (1974)



An example of how the damage may manifest in symptoms can be seen in social situations. For example, an individual may be talking incessantly. Those around may be yawning, talking to one another providing multiple cues that they are not interested in the topic of conversation. However, the individual is unable to pick up on these indirect cues, therefore causing them to appear as though they have blunted social skills.

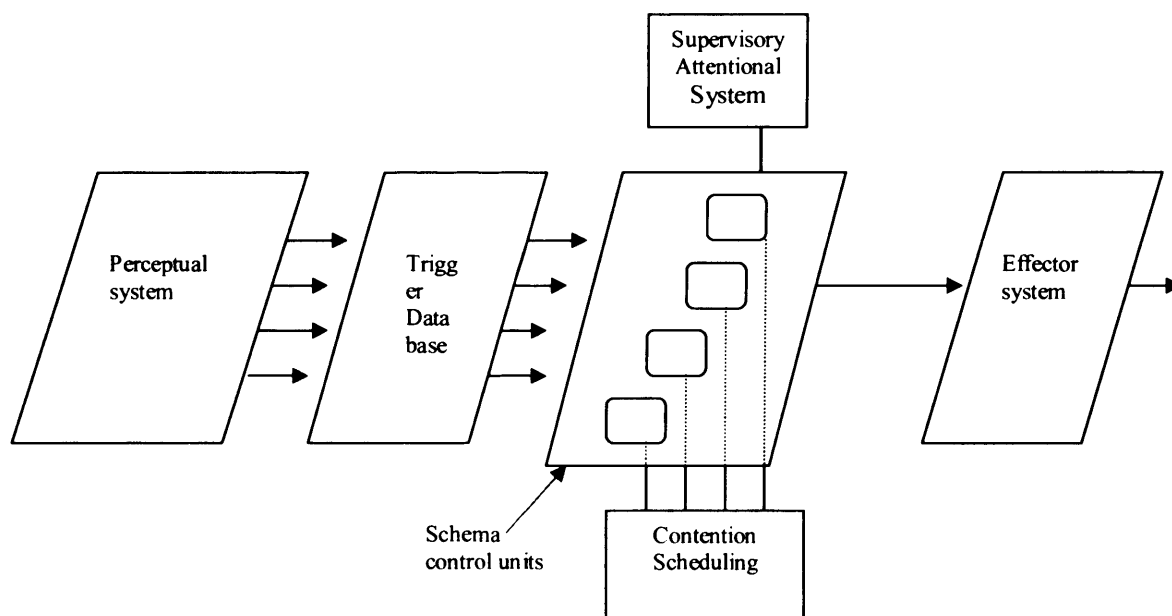
Experimental assessment has been conducted, examining detriments in performance on a primary motor task involving tracking when secondary verbal tasks (digit span) were added (Baddeley et al., 1997). These studies have shown that carrying out two tasks simultaneously did not have a detrimental effect on performance in neurologically healthy individuals but groups who had sustained a brain injury showed significant impairment.

Norman and Shallice's (1980) model of attentional control is a little more elaborate in accounting for both low and high level cognitive disorders which the Baddeley and Hitch (1974) model does not account for. In this model 'contention scheduling' allows well-learned routine tasks to be executed automatically. Units of behaviour are stored as schemata which control and reflect components of all over learned actions, for example, driving home from work, making a slice of toast. When a triggering stimulus activates a schema, contention scheduling controls the behaviour until the goal is achieved (or other schema are activated). In new situations which require more self control e.g. negotiating a roundabout in a foreign country when driving on the opposite side of the road, a second system, the supervisory attentional system comes into operation. The

Supervisory Attention System (SAS) allows behaviour to be guided more slowly and flexibly, this model can be seen in Figure 6. Shallice (1982) believed that it was the SAS which was responsible for executive functioning and that when impaired performance of routine tasks remained intact. However, problems such as impulsivity and perseveration are likely to occur when novel tasks were carried out. Evidence for this model has mainly come from case studies (Burgess & Alderman, 1990).

In conclusion, when either the central executive or SAS are not functioning correctly, behaviour is likely to break down in new or novel situations, and a pattern of deficits as described above is likely to occur.

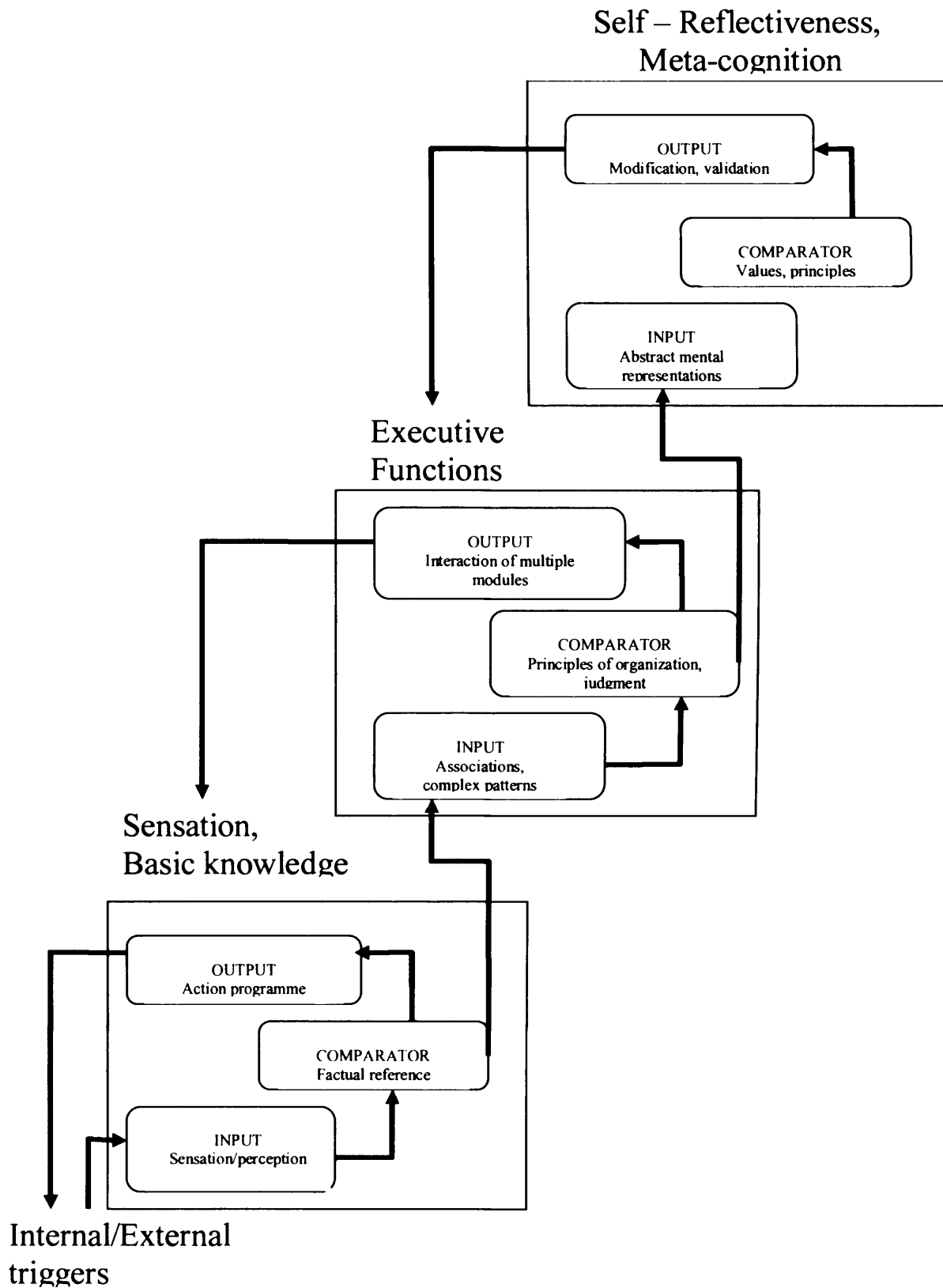
Figure 6. Norman and Shallice's Model of Information Processing (1980)



A similar model to that of Norman and Shallice's was conceptualized by Stuss (1991) (Figure 7). This model has a hierarchy of three interdependent components. The first relates to perceptual, sensory or knowledge based information and over learned automatic, rapid and routine behaviour. The second component is associated with executive control and postulated to mirror the frontal lobes. This allows for anticipation, goal articulation and plan formation for more complex tasks. With time and repetition, the lower sensory component may take over these tasks, and executive function may only be activated again in exceptional circumstances or when fatigued or distressed. The third component of the hierarchy incorporates meta cognition including self awareness and the ability to reflect on thinking and action patterns. It receives input from the previous stages and its output influences executive control. Within each component is a feedback control system which consists of incoming information, a 'comparator' which analyses information in terms of current and stored experience, and output mode which translates the results of this evaluation into any necessary response. Any of these components may be influenced by brain injury.

Of the three models discussed only Stuss' (1991) takes into account awareness and the ability to reflect on thinking and action patterns. Although the other two (in varying degrees) identify how deficits occur in novel tasks, they do not discuss the importance of meta-cognitive skills in the planning and organising of behaviour. Therefore, the Stuss model may be of more help when attempting to see if there are any interactions between areas of executive functioning and awareness.

Figure 7. A Framework for understanding Executive Control, (Stuss, 1991)



Methods of Assessment

Executive functioning is assessed using a range of tests which have been reported to be sensitive to frontal lobe damage. These include: Wisconsin Card Sorting Test (WCST) which can be used as a measure of perseveration (Grant & Berg, 1948); Tower of London/Hanoi/ Toronto which examine the individual's planning skills (Shallice, 1982); Trail Making Test, another assessment focusing on planning ability (Reitan, 1955); The Verbal Fluency Test focuses on the spontaneous production of words that begin with a certain letter within a specific time limit (Miller, 1984) and the Stroop Test measures the ease with which a person can shift his or her perceptual set to conform to changing demands and suppress a habitual response in favour of an unusual one (Stroop, 1935). Problems with these tests relate not only to conceptual problems of definitions for executive functioning and the localization of these abilities within the brain but also to issues of reliability and validity. Other problems with such tests include poor prediction of everyday functioning (lack of ecological validity) and inconsistency of results. A brief summary of the points will follow.

Reliable and valid tests have proven 'elusive' in failing to reflect executive behaviour (Varney & Menefee, 1993). Some of these difficulties may be accounted for by the poor relationship between impairment and the impact on everyday living. This may possibly be due to the early speculation about localization of function (as previously mentioned) and over structuring of tests. Patients with dysexecutive syndrome can sometimes prove difficult to assess accurately because of the individual component skills of executive functioning. What is impaired is the 'ability to initiate their use, monitor their

performance and use this information to adjust their behaviour' (Burgess & Alderman, 1990), (p.183). Shallice and Burgess (1991) make the point that in most neuropsychological tests 'the patient typically has a single explicit problem to tackle at any one time, the trials tend to be short, task initiation is strongly prompted by the examiner and what constitutes successful trial completion is clearly characterised' (pp.727-728).

It would appear that traditional tests are insufficient for the clinician to carry out necessary assessment.

Ecologically valid tests of executive function

A common assumption of the use of neuropsychological tests, including those examining executive function is that performance on them reflects processes presumed to be employed in everyday life. However, as many clinicians are aware, some individuals with frontal lobe damage may perform within the normal range on traditional neuropsychological tests of language, memory, perception and even traditional tests of executive function, yet may be impaired in everyday life situations requiring planning and multi tasking. This was demonstrated by Shallice and Burgess (1991) who provided an explanation that the situations where these individuals had problems are those that require subtle planning and prospective memory and are ill-structured. The tasks that the individual has difficulty with have multiple approaches and the participant has to decide for themselves how to allocate their effort (Alderman et al., 2003). There are only a small number of studies which examine the relationship between reflective function and real life situations directly and even then they are examining very precise

aspects of executive function (e.g. Sivak et al., (1981) examined driving ability and performance on the Porteus Maze and Naglieri and Das (1987) correlated performance on a visual search paradigm, trail making and a 'matching numbers' task with academic achievement in children). However, a complicating issue with regards to the use of tests as indicators of executive dysfunction is evidence which suggests the DES may be fractionable (Burgess, 1997; Damasio, 1996; Robbins, 1996). If this is the case, and each process has its own behavioural and cognitive sequelae then it makes little sense to estimate the ecological utility of an executive task using a single criterion (a single test). Burgess et al., (1998) examined the ecological validity of a number of traditional tests of executive functioning. They found that all of the tests they examined were significantly predictive of at least some of the behavioural and cognitive deficits reported by carers. However, factor analysis of the symptoms suggested a fractionation of the DES with neuropsychological tests loading differentially on 3 underlying cognitive factors (Inhibition, Intentionality and Executive memory), therefore showing that different tests measure different aspects of executive dysfunction.

More recently development of tests of executive function have focused more on ecologically valid measures (those that reflect real life situations), in order for the clinician to more accurately measure the types of difficulties experienced. Such tests include the Behavioural Assessment of Dysexecutive Syndromes (BADS) (Wilson et al., 1996) and the Multiple Errands Test (MET) (Shallice & Burgess, 1991) including modified versions (Burgess et al., 1998; Knight et al., 2002). The MET has high ecological validity and captures the non routine, problem solving, planning, organisation

and initiative required for every day functioning. Both the MET and the Six Elements Test (Shallice & Burgess, 1991) were developed to require adequate functioning of the SAS or Central Executive. In addition the remainder of the items from the BADS were developed to be similar to other real life activities. The total profile score of the BADS and each of the individual subtests are able to successfully differentiate between participants with a brain injury from non brain injured controls.

In summary, older tests thought to be sensitive to frontal lobe damage may lack validity and have limited clinical utility when examining executive function as a unitary concept. Global tests examine many abilities including executive function and therefore may hinder differentiation and isolation of cognitive processes. In order to provide the best possible support to those with a DES priority should be given to examining functional ability rather than maintaining the use of traditional tests which search for evidence of localisation in the frontal lobes (Goldstein & Green, 1995).

Interaction between Executive functioning, mood and awareness

At points there has been an indication of how awareness, mood and executive functioning interact (although not all three together). There has been mention of impairments in executive functioning being related to reduced awareness (Fleming et al., 1998). Discussion of how deficits in executive functioning can effect a decrease in reporting of mood (Williams, 2003) have also been presented, although this is in no way

conclusive. Below is a discussion of the interaction of mood, awareness and executive functioning.

Studies of executive function and awareness

Owensworth et al., (2002) examined the interaction of denial and executive factors. The study consisted of 51 participants and measurements of awareness (Self Awareness of Deficits Interview; SADI; Fleming et al., 1998) was compared with volition using the Health and Safety subtest of the Independent Living Skills battery (Loeb, 1986) and purposive behaviour using the Tinker Toy Test (Lezak, 1995). Findings were that contributions of neurological factors to an outcome of deficits in awareness had a more direct result than psychological factors. In addition, they found that those who minimised their symptoms had lower levels of 'on-line awareness' than those who reported moderate or high symptoms. Impaired volition was associated with lower levels of awareness generally. However, the tests chosen to assess executive functioning, as described above, are not as useful and perhaps as valid as would be necessary when extrapolating such findings. In addition, awareness was only measured using self-report. As a full assessment of ability was not carried out, it is not possible to draw conclusions about realistic, every day functioning.

Owensworth and Fleming (2005) examined the relationship between measures of meta-cognitive skills and executive functioning. Measures of executive function were chosen using Lezak's (1995) schema. They found more 'empirical evidence' to support the aetiological role of neurological factors in awareness deficits, especially executive impairment. Once again though, bearing in mind the discussion above about

ecologically valid tests of executive function, this study could have been improved by choosing tests more representative of varying aspects of a DES and also more ecologically valid tests could have been chosen to represent real life abilities.

Awareness and mood

Godfrey et al., (1993) found that individuals at 2 – 3 years post injury displayed a higher level of intellectual awareness which was associated with greater emotional distress.

Fleming, Strong and Ashton (1998) found similar findings. They examined patients 1 year post injury and found that individuals with increased awareness had corresponding high levels of emotional distress. At this time it is not clear why this correlation has been observed. It may be that reduced insight does indeed serve as a protective factor and this would then indicate that attempts to improve awareness should not occur until the individual has the coping strategies necessary.

Awareness, mood and executive function

Up until recently there have been no studies examining the relationship between awareness, mood and executive functioning. Ownsworth (2004) reported the findings of a study examining just this. Findings include, the early onset of depression influencing response to rehabilitation, self belief and participation in activities. Depression and error self regulation were the best predictors of level of occupational activity, depression was the best predictor of interpersonal skills and level of awareness and depression were the best predictor of independent living skills. Ownsworth (2004) comments that the

treatment of early onset depression and interventions targeting metacognitive skills may reduce long term psychosocial dysfunction. Once again, with similarity to those problems listed above, this study did not make use of an ecologically valid test of executive function, therefore any conclusions drawn should be rather tentative. However, this study does show that there may be some interaction between the three aspects of mood, executive functioning and awareness

SUMMARY

In summary, an examination has been made of some of the types of problems encountered following a brain injury. Awareness was examined including different theories of why people demonstrate reduced awareness following a TBI and models which account for an integrated approach. Mood disturbances were then discussed, along with their possible reasons for following TBI and the difficulty measuring mood in this population. Executive function was then discussed, including models to account for deficits in executive functioning following brain injury. Finally some studies which examined the relationship were mentioned including short comings for these studies. Although not liberal in number these studies point towards a relationship between an increase in awareness and a decrease in mood. As lower mood is reflective of poorer outcome, this could have an effect on potential for rehabilitation. However, as was also seen, a decreased awareness can also prove to be a barrier to rehabilitation, thus having an implication in examining which of these two aspects causes the less hindrance to rehabilitation.

The literature pointed towards an interaction between decreased executive functioning and decreased awareness. If awareness was to improve would this then mean that executive functioning would improve? There was little literature found on the relationship between executive functioning and mood. This could in part be due to the problems discussed previously, in that symptoms caused by deficits in executive functioning often appear similar to mood disorders.

Owensworth's study (2004) examined awareness, mood and executive functioning and found relationships between depression and rehabilitation and occupational potential and awareness and depression in areas of independent living skills. However, due to the tools used conclusions should only be tentative. Following this literature review it can be concluded that there have been few studies to date which examine how mood awareness and executive functioning interact with one another, if in fact they do at all.

Evidence for a link between awareness and mood has been discussed, as to has a link between executive functioning and awareness. Although no strong evidence has been found linking executive functioning and mood, it would appear that those with impaired executive functioning tend to report mood disturbances less often (Williams, 2003).

This could be due to difficulties in initiation and impaired awareness . Perhaps deficits in executive functioning serve as an emotionally protective factor in a similar way it is hypothesized that awareness does. Indeed, Stuss' model (1991) of executive functioning states that self awareness is at the meta cognitive level and can be impaired when the

executive system is disabled in some way. If this is the case, it is suggested that deficits in executive functioning will impact on awareness (causing reduced awareness). This in turn will be related to normal mood. Conversely increases in executive functioning and awareness will be related to a decrease in mood. It is therefore recommended that a study be conducted to examine if any interactions do occur.

REFERENCES

AGNEW, S. K., & MORRIS, R. G. The heterogeneity of anosognosia for memory impairment in Alzheimer's disease: A review of the literature and a proposed model. *Aging and Health*, 2, 7 – 19. 1998

ALDERMAN, N. & WARD, A. Behavioural treatment of the dysexecutive syndrome: Reduction of repetitive speech using response cost and cognitive over learning. *Neuropsychological Rehabilitation*, 1, 65 – 80. 1991

ALDERMAN, N. Central Executive deficit and response operant conditioning methods. *Neuropsychological Rehabilitation*, 6, 161 – 186. 1996

ALDERMAN, N., BURGESS, P. W., KNIGHT, C., & HENMAN, C. Ecological validity of a simplified version of the multiple errands shopping test. *Journal of the International Neuropsychological Society*, 9, 31 – 44. 2003

ALLEN, C. C., & RUFF, R. M. Self rating versus neurophysiological performance of moderate versus severe head injured patients. *Brain Injury*, 4, 7 – 17. 1990

AMERICAN PSYCHIATRIC ASSOCIATION. *Diagnostic and Statistical Manual of Mental Disorders*. Fourth Edition. Washington DC: APA 2000.

ANDERSON, V. Assessing executive functions in children: biological, psychological and developmental considerations. *Neuropsychological Rehabilitation*, 8, 319 –349. 1998

ANDERSON, S. W., & TRANEL, D. Awareness of disease states following cerebral infarction, dementia, and head trauma: standardised assessment. *Clinical Neuropsychologist*. 3. 327 – 339. 1989

BADDELEY, A. D., & HITCH, G. Working Memory. In G. H Bower (Ed) *The Psychology of Learning and Motivation (Volume 8)* (New York: Academic Press.) 1974

BADDELEY, A. D., & WILSON, B. A. 'Frontal amnesia and the dysexecutive syndrome'. *Brain and Cognition*, 7, 212 – 230. 1988

BADDELEY, A Working Memory: The interface between memory and cognition. In D. L. Schacter & E. Tulving (Eds), *Memory systems 1994* (Cambridge, MA: MIT Press) pp 351 – 367. 1994

BADDELEY, A., DELLA SALA, S., GRAY, C., PAPAGNO, C., & SPINNLER, H., Testing Central Executive Functioning with a Pencil – and - Paper Test. In P. Rabbitt (Ed) *Methodology of Frontal and Executive Function* (Hove, UK: Psychology Press). pp 61 – 80. 1997

BERTHIER, M., KULISEVSKY, J., GIRONELL, A., & LOPEZ, O. L. Obsessive-compulsive disorder and traumatic brain injury: Behavioural, cognitive and neuroimaging findings. *Neuropsychiatry, Neuropsychology & Behavioural Neurology*, 14, 23 – 31. 2001

BISIACH, E., & GEMINANI, G. Anosognosia related to hemiplegia and hemianopia. In G. P. Prigitano & D. L. Schacter (Eds.), *Awareness of deficit after brain injury: Clinical and theoretical issues* (New York: Oxford University Press). pp. 17 – 39. 1991

BOWEN, A., NEUMANN, V., CONNER, M., TENNANT, A., & CHAMBERLAIN, M. A.. Mood disorders following traumatic brain injury: identifying the extent of the problem and the people at risk. *Brain Injury*. 12 (3), 177 – 190. 1998

BRITISH SOCIETY OF REHABILITATION MEDICINE. *Rehabilitation after Traumatic Brain Injury*. A Working Party Report. London: British Society of Rehabilitation Medicine 1998

BROOKS, D. N., MCKINLAY, W., SYMINGTON, C., BEATTIE, A & CAMPSIE, L. The effects of severe head injury upon patient and relative within seven years of injury. *Journal of Head Trauma Rehabilitation*, 2, 1 – 13, 1987.

BRYANT, R.A., MAROSSEZESKY, J. E., CROOKS, J., BAGULEY, I., & GURKA, J.. Coping style and post traumatic stress disorder following severe traumatic brain injury. *Brain Injury*. 14, 175 – 180. 2000

BRYANT, R. A. Post traumatic stress disorder and traumatic brain injury: Can they co exist? *Clinical Psychology Review*, 21, 931 – 948. 2001

BRYDEN, J. How many injured? The epidemiology of post head injury disability. In R. Wood and P. Eames. (Eds) *Models of Brain Injury Rehabilitation*. (London: Chapman & Hall). 1989

BURGESS, P. W. & ALDERMAN, N. Rehabilitation of dyscontrol syndromes following frontal lobe damage: A cognitive neuropsychological approach. In R. L I Wood and I. Fussey. *Cognitive Rehabilitation in Perspective*. (Bristol: Taylor and Francis). pp 183-202. 1990.

BURGESS, P. W. Theory and methodology in executive function and research. In P.Rabbitt (Ed), *Methodology of frontal and executive function* pp 81 – 116 (Hove, UK: Psychology Press). 1997

BURGESS, P. W., ALDERMAN, N., EVANS, J., EMSLIE, H., & WILSON, B. A. The ecological validity of tests of executive function. *Journal of the International Neuropsychological Society*, 4, 547 – 558. 1998

CAPLAN, B., & SCHACTER, J. Denial and depression in disabling illness. In B. Caplan (Ed), *Rehabilitation psychology desk reference*. (Rockville, MD: Aspen). 1987

CARPENTER, W. T., BARTKO, J. J., STRAUSS, J. S., & HAWK, A. B. Signs and symptoms as predictors of outcome: A report from the international pilot study of Schizophrenia. *Am J Psychiatry*. 135, 940 – 944. 1978

CLARE, L. The construction of awareness in early stage Alzheimer's disease: A review of concepts and models. *British Journal of Clinical Psychology*. 43, 155 – 175. 2004

CRAMER, P. Coping and defence mechanisms: what's the difference? *Journal of Personality*, 66. 919 – 942. 1998

CROSSON. B. C., BARCO, P. P., VELOZO, C. A., BOLSETA, M. M., WERTS, D., & BROBECK, T. (1989) Awareness and compensation in post acute head injury rehabilitation. *Journal of Head Trauma Rehabilitation*. 4, 46 – 54.

DAMASIO, A. R. The somatic marker hypothesis and the possible functions of the prefrontal cortex. *Philosophical Transactions of the Royal Society of London B*, 351, 1413 – 1420. 1996

DAWSON, K. An investigation into offending behaviour in a severe head injured population. Unpublished thesis, University of Leicester. 2003

DEATON, A. V. Denial in the aftermath of traumatic head injury: its manifestations, measurement and treatment. *Rehabilitation Psychology*. 31, 231 – 240. 1986

DOH SSI (DEPARTMENT OF HEALTH, SOCIAL SERVICES INSPECTORATE), *A Hidden Disability*. Report of the SSI Traumatic Brain Injury Rehabilitation Project. (London: Department of Health). 1996

DUNLOP, T. W., UDVARHELYI, G. B., STEDEM, A. F. A., O'CONNOR, J. M. C., ISAACS, M. L., PUIG, J. G., & MATHER, J. H. Comparison of patients with and without emotional/behavioural deterioration during the first year after traumatic brain injury. *Journal of Neuropsychiatry and Clinical Neurosciences*, 3, 150 – 156. 1991

EZRACHI, O., BEN-YISHAY, Y., KAY, T., DILLER, L., & RATTOK, J. . Predicting employment in traumatic brain injury following neuropsychological rehabilitation. *Journal of Head Trauma Rehabilitation*, 6(3), 71 – 84. 1991

FLEMING, J. M., STRONG, J., & ASHTON, R. Cluster analysis of self awareness levels in adults with traumatic brain injury and relationship to outcome. *Journal of Head Trauma Rehabilitation*, 13 (5), 39 – 51. 1998

FOGEL, B. S. The significance of frontal system disorders for medical practice and health policy. *Journal of Neuropsychiatry*, 6, 343 – 347. 1994

GARSKE, G. G., & THOMAS, K. R. Self-reported self esteem and depression: Indexes of psychosocial adjustment following severe traumatic brain injury. *Rehabilitation Counselling Bulletin*, 36, 44 – 52. 1992

GIANOTTI, G. Emotional and psychosocial problems after brain injury. *Neuropsychological Rehabilitation*, 3, 259 – 277. 1993

GIACINO, J. T., & CICERONE, K.D. Varieties of deficit unawareness after brain injury. *Journal of Head Trauma Rehabilitation*, 13, 1 – 15. 1998

GODFREY, H. P. D., PARTRIDGE, F. M., KNIGHT, R. G., BISHARA, S. Course of insight disorder and emotional dysfunction following closed head injury: A controlled cross-sectional follow up study. *Journal of Clinical and Experimental Neuropsychology*, 15, 503 – 515. 1993.

GOLDSTEIN, F. C. & GREEN, R. C. Assessment of problem solving and executive functions. In R. L. Mapou and J. Spector (Eds) *Clinical Neuropsychological Assessment: A Cognitive Approach*. (New York: Plenum Press). pp 49-81. 1995

GORDON, W. A., HIBBARD, M. R., EGELKO, S., RILEY, E., SIMON, D., DILLER, L., ROSS, E. D., & LIEBERMAN, A. Issues in the diagnosis of post stroke depression. *Rehabilitation Psychology*, 36, 71 – 87. 1991

GRANT, D. A., & BERG, E. A. *The Wisconsin Card Sorting Test: Directions for Administration and Scoring.* (Wisconsin :University of Wisconsin): 1948

HAMISH, P.D., PARTRIDGE, F. M., KNIGHT, R. G. Course of insight disorder and emotional dysfunction following closed head injury: A controlled cross sectional follow up study. *Journal of Clinical and Experimental Neuropsychology.* 15, (4). 503 – 515. 1993

HARRIS, E. C., & BARRACLOUGH, B. Suicide as an outcome for mental disorders: A meta-analysis. *British Journal of Psychiatry*, 170, 205 – 228. 1997

HART, R. P. Forgetting in traumatic brain injured patients with persistent memory impairment. *Neuropsychology*, 8, 325 – 332. 1994

HARTMAN, A., PICKERING, R. M., & WILSON, B. A. Is there a central executive deficit after severe head injury? *Clinical Rehabilitation*, 6, 133 – 140. 1992

HIBBARD, M. R., UYSAL, S., KEPLER, K., BOGDANY, J., & SILVER, J. Axis I psychopathology in individuals with traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 13, 24 – 39. 1998

JACKSON, H. Brain, cognition and grief. *Aphasiology*, 2, 89 – 92. 1988

JENNETT, B., & MACMILLAN, R. Epidemiology of head injury. *British Medical Journal*, 282, 101 – 104. 1981

JORGE, R. E., ROBINSON, R. G., ARNDT, S. V., STARKSTEIN, S. E., FORRESTER, A. W., & GEISLER, F. Depression following traumatic brain injury: A 1 year longitudinal study. *Journal of Affective Disorder*, 27 (4), 233 – 243. 1993a

JORGE, R. E., ROBINSON, R. G., ARNDT, S. V. Are there symptoms that are specific for depressed mood in patients with traumatic brain injury? *Journal of Nervous & Mental Disease* 181 (2), 91 – 99. 1993b

KENDALL, E., & TERRY, D. J. Psychosocial adjustment following closed head injury: A model for understanding individual differences and predicting outcome. *Neuropsychological Rehabilitation*, 6, 101 – 132. 1996

KNIGHT, C. K., ALDERMAN, N., & BURGESS, P. W. Development of a simplified version of the multiple errands test for use in hospital settings. *Neuropsychological Rehabilitation*. 12, (3), 231 – 255. 2002

KINSELLA, G., FORD, B., & MORAN, C. Survivors of social relationship following head injury. *International Journal of Disability*, 11, 9 – 14. 1989

KREUTZER, J. S., SEEL, R. T., & GOURLEY, E. The prevalence and symptom rates of depression after traumatic brain injury: A comprehensive examination. *Brain Injury*. 15 (7), 563 – 576. 2001

LAM, C. S., MCMAHON, B. T., PRIDDY, D. A. Deficit awareness and treatment performance among traumatic head injured adults. *Brain Injury*. 2, 235 – 242. 1988

LANNOO, E., BRUSSELMANS, W., VAN EYNDE, L., VAN LAERE, M., & STEVENS, J. Epidemiology of acquired brain injury (ABI) in adults: prevalence of long term disabilities and the resulting needs for ongoing care in the region of Flanders, Belgium. *Brain Injury*. 18 (2), 203 – 211. 2004

LEVINE, J., & ZIGLER, E. Denial and self image in stroke, lung cancer and heart disease patients. *Journal of Clinical and Consulting Psychology*, 43, 751 – 757. 1975

LEZAK, M. D. *Neuropsychological Assessment*, 3rd Ed (New York: Oxford University Press). 1995

LEZAK, M. D. Newer contributions to the neuropsychological assessment of executive functions. *Journal of Head Trauma Rehabilitation*, 8, 24 - 31. 1993

LOEB, P. A. *The Independent Living Scales Manual* (San Antonio: The Psychological Corporation) 1986

LURIA, A. R. *Higher Cortical Functions in Man*. (New York: Basic Books) 1981

LYLE, D., QUINE, S., BAUMAN, A., & PIERCE, J. Counting heads: Estimating traumatic brain injury in New South Wales. *Community Health Studies*, 14, 118 – 125. 1990

MCGLYNN, S. M., & SCHACTER, D. L.. Unawareness of deficits in neuropsychological syndromes. *Journal of Clinical and Experimental Neuropsychology*, 11. 143 – 205. 1989

MCKEOWN, J., MCGUFFIN, P., & ROBISON, P. Obsessive-compulsive neurosis following head injury. A report of four cases. *British Journal of Psychiatry*, 144, 190 – 192. 1984

MACMILLAN, P.J., MARTELLI, M. F., HART, R. P., & ZASLER, N. D. Pre-injury status and adaptation following traumatic brain injury. *Brain Injury*, 16, 41 – 49. 2002

MALEC, J. F., MACHULDA, M. M., & MOESSNER, A. M. Differing problem perceptions of staff, survivors and significant others after brain injury. *Journal of head trauma rehabilitation*, 12, 1 – 13. 1997

MILLER, E. Verbal fluency as a function of a measure of verbal intelligence and in relation to different types of cerebral pathology. *British Journal of Clinical Psychology*. 23, 53 – 57. 1984

MOHAMED, S., FLEMING, S., PENN, D. L., & SPAULDING, W. Insight in Schizophrenia: Its relationship to measures of Executive functions. *The Journal of Nervous and Mental Disease*. 187 (9), 525 – 531. 1999

MORTON, M. V., & WEHMAN, P. Psychosocial and emotional sequelae of individuals with traumatic brain injury: a literature review and recommendations. *Brain Injury*. 9: 81 – 92. 1995

NAGLIERI, J. A., & DAS, J. P. Construct and criterion related validity of planning, simultaneous and successive cognitive processing tasks. *Journal of Psychoeducational Assessment*, 4, 353 – 363. 1987

NHIF (NATIONAL HEAD INJURY FOUNDATION) TASK FORCE ON SPECIAL EDUCATION. *An Educators Manual: What educators need to know about students with traumatic brain injury*. (Southborough, MA: NHIF). 1989

NORMAN, D. A., & SHALLICE, T. *Attention to Action: Willed and Automatic Control of Behaviour (CHIP Report 99)* (San Diego :University of California) 1980

OWNSWORTH, T. L., MCFARLAND, K., & MCD.YOUNG, R. Development and standardisation of the Self-Regulation Skills Interview (SRSI): a new clinical assessment tool for acquired brain injury. *The Clinical Neuropsychologist*, 14, 76 – 92. 2000

OWNSWORTH, T. L., MCFARLAND, K., & MCD. YOUNG, R. The investigation of factors underlying deficits in self awareness and self regulation. *Brain Injury*. 16 (4), 291 – 309. 2002

OWNSWORTH, T. *Self awareness following brain injury: A contextual understanding to management for clinicians*. 28th May 2004. Oliver Zangwill Centre: Ely 2004

OWNSWORTH, T & FLEMING, J. The relative importance of metacognitive skills, emotional status and executive functioning in psychosocial adjustment following acquired brain injury. *Journal of Head Trauma Rehabilitation*, 20, (4), 315-332. 2005

PENFIELD, W., & EVANS, J. The frontal lobe in man: A clinical study of maximum removals, 58, 115 – 133. 1935

PONSFORD, J. TBI mechanisms and sequelae. In J. Ponsford., S. Sloan & P. Snow. *Traumatic Brain Injury: Rehabilitation for Everyday Adaptive Living*. (pp 1 – 32). (Hove: Lawrence Erlbaum Associates). 1995

PRIGATANO, G. P., FORDYCE, D. J., ZEINER, H. K., ROUECHE, J. R., PEPPING, M & WOOD, R. *neuropsychological Rehabilitation after Brain Injury*. (Baltimore, MD: Johns Hopkins University Press). 1986

PRIGATANO, G. P., & FORDYCE, D. J. Cognitive dysfunction and psychosocial adjustment after brain injury. In G. P. Prigitano (Ed), *Neuropsychological rehabilitation after brain injury*. (Baltimore, MD: Johns Hopkins University Press). pp 1 – 17. 1986

PRIGATANO, G. P., & SCHACTER, D. L. Introduction. In G. P. Prigitano & D. L. Schacter (Eds.), *Awareness of deficit after brain injury: Clinical and theoretical issues..* (New York: Oxford University Press). pp. 3 – 16. 1991

PRIGATANO, G. P., KLONOFF, P. S., O'BRIEN, K. ET AL. Productivity after neuropsychologically oriented milieu rehabilitation. *Journal of Head Trauma Rehabilitation*, 9, 235 – 242. 1994

PRIGATANO, G. P., & KLONOFF, P. S. A clinician's rating scale for evaluating impaired self awareness and denial of disability after brain injury. *The Clinical Neuropsychologist*, 12, 56 – 67. 1998

PRIGATANO, G. P. Diller Lecture: Impaired awareness, finger tapping and rehabilitation outcome after brain injury. *Rehabilitation Psychology*. 43, 145 – 148. 1999

RANSEEN, J. D., BOHASKA, L. A., & SCHMIDT, F. A. An investigation of anosognosia following traumatic head injury. *International Journal of Clinical Neuropsychology*. 12, 29 – 36. 1990

REITAN, R. M. The relation of the trail making test to organic brain damage. *Journal of Consulting Psychology*, 19, 393 – 394. 1955

ROBBINS, T. Dissociating executive functions of the prefrontal cortex. *Philosophical Transactions of the Royal Society of London B*, 351, 1463 – 1473. 1996

RYLANDER, G. Personality changes after operation on the frontal lobes. *Acta Psychiatrica Neurologica*, 30. 201 – 211. 1939

SATZ, P., FORNEY, D. L., ZAUCHA, K., ASARNOW, R. B., LIGHT, R., MCCLEARY, C., LEVIN, H., KELLY, D., BERGSNEIDER, M., HOVDA, D., MARTIN, N., NAMEROW, N., & BECKER, D. Depression, cognition and functional correlates of recovery outcome after traumatic brain injury. *Brain Injury*, 12, 537 – 553. 1998

SCHACTER, D. L. Towards a cognitive neuropsychology of awareness: Implicit knowledge and anosognosia. G. P. Prigitano & D. L. Schacter (Eds.), *Awareness of deficit after brain injury: Clinical and theoretical issues* (New York: Oxford University Press) 1990.

SCHEUTZOW, M. H., & WIERCISIEWSKI, D. R. Panic disorder in a patient with traumatic brain injury: A case report and discussion. *Brain Injury*. 13, 705 – 714. 1999

SHALLICE, T. Specific impairments of planning. *Philosophical Transactions of the Royal Society London (Biology)*, 298, 199 – 209. 1982

SHALLICE, T., & BURGESS, P. W. Deficits in strategy application following frontal lobe damage in man. *Brain*, 114, 727 – 741. 1991

SHERER, M., ODEN, K., BERGLOFF, P ET AL. Assessment and treatment of impaired awareness after brain injury: implications for community integration. *Neurorehabilitation*. 11, 143 – 205. 1988

SIVAK, M., OLSON, P. L., KEWMAN, D. G., WON, H., & HENSON, D. L. Driving and perceptual/cognitive skills: Behavioural consequences of brain damage. *Archives of Physical and Medical Rehabilitation*, 62, 476 – 483. 1981

SOHLBERG, M.M., MATEER, C. A., & STUSS, D. T. Contemporary approaches to the management of executive control dysfunction. *Journal of Head Trauma Rehabilitation*, 8, 45 – 58. 1993

STARKSTEIN, S. E., FEDEROFF, J. P., PRICE, T. R., ET AL. Neuropsychological deficits in patients with anosognosia. *Neuropsychiatry, Neuropsychology and Behavioural Neurology*, 6, 43 – 48. 1993

STROOP, J. R. Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, 18, 643 – 662. 1935

STUSS, D. T., & BENSON, D. F. 'Neuropsychological studies of the frontal lobes', *Psychological Bulletin*, 95, (1) 3 – 28. 1984

STUSS, D., & BENSON, D. F. *the Frontal Lobes*. (New York:Raven Press) 1986.

STUSS, D. Self, awareness and the frontal lobes: a neuropsychological perspective. In J. Strauss and G. R. Goethals (Eds) *The Self: interdisciplinary Approaches* (New York: Springer). pp. 255 – 278. 1991

SYMONDS, C. P., & RUSSELL, W. R. Accidental head injuries. Prognosis in service patients. *Lancet*, 1081 – 1094. 1943

TATE, R. 'It's not only the kind of injury that matters, but the kind of head': The contribution of pre-morbid psychosocial factors to rehabilitation outcomes after severe traumatic brain injury. *Neuropsychological Rehabilitation*, 8, 1 – 18. 1998

TEASDALE, T., & ENGBERG, A. W. Suicide after traumatic brain injury: a population study. *Journal of Neurology, Neurosurgery and Psychiatry*, 71, 436 – 440. 2001

TOGLIA, J. & KIRK, U. Understanding awareness deficits following brain injury.

NeuroRehabilitation, 15: 57-70, 2000

TRUDEL, T. M., TRYON, W. W., & PURDUM, C. M.. Awareness of disability and long term outcome after brain injury. *Rehabilitation Psychology*, 43, 267 – 281. 1998

UOMOTO, J. M., & BROCKWAY, J. A. Anger management for brain injured patients and their family members. *Archives of physical medicine and rehabilitation*, 73 674 – 679.

1992 WALLACE, C. A., BOGNER, J. Awareness o deficits: emotional implications for persons with brain injury and their significant others. *Brain Injury*. 14, (6), 549 – 562. 2000

VARNEY, N. R., & MENEFEE, L. Psychosocial and executive deficits following closed head injury: implications for orbital frontal cortex. *Journal of Head Trauma Rehabilitation*, 8, 32 – 44. 1993

WELLS, A. *Cognitive therapy of anxiety disorders. A practice manual and conceptual guide*. (Chichester :John Wiley & sons). 1997

WEINSTEIN, E. A. Anosognosia and denial of illness. In G. P. Prigitano & D. L. Schater (Eds.), *Awareness of deficit after brain injury: Clinical and theoretical issues*. (New York: Oxford University Press). 1991

WILLIAMS, W. H., EVANS, J. J., WILSON, B. A., NEEDHAM, P. Neurological, cognitive and attributional predictors of post traumatic stress symptoms after traumatic brain injury. *Journal of traumatic stress*. 15 (5), 397 – 400. 2002

WILLIAMS, W. H. Neurorehabilitation and cognitive behaviour therapy for emotional disorders in acquired brain injury. In B. A. Wilson (Ed) *Neuropsychological Rehabilitation: Theory and Practices*. (Lisse: Swets & Zeitlinger) pp 115 – 135. 2003

WILSON, W. H., BAN, T. A., & GUY, W. Flexible system criteria in chronic schizophrenia. *Compr Psychiatry*. 27, 259 – 265. 1986

WILSON, B. A., ALDERMAN, N., BURGESS, P. W., EMSLIE, H., EVANS, J. J. *Behavioural Assessment of the Dysexecutive Syndrome*. (Cambridge: Thames Valley Test Company). 1996

**AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN EXECUTIVE
FUNCTION, PSYCHOLOGICAL DISTRESS AND AWARENESS FOLLOWING
ACQUIRED BRAIN INJURY**

ABSTRACT

Variations in awareness, psychological distress and executive function have been shown to impact on rehabilitation potential. In addition, following an acquired brain injury (ABI) risk of suicide is increased. Recently there has been an emphasis on improving awareness of disability as it has been shown to improve rehabilitation potential.

However, increased awareness has been associated with increased psychological distress. If the focus is on improving awareness following an ABI, increased psychological distress is likely to be observed, increasing the risk of disengagement and also suicide. In this study, the interaction of psychological distress, awareness and executive function was investigated with 64 participants who had sustained an ABI. Measures used included the BADS; DEX; HADS; and PCRS (for 19 out of the 64 participants).

Awareness was positively correlated with psychological distress, depression and anxiety. It was also negatively correlated with behavioural ratings of the dysexecutive syndrome and with two of the subtests from the BADS. No significant correlation was found between psychological distress and executive function. Finally, a model is proposed suggesting how behavioural ratings of executive function and self report of psychological distress can predict awareness.

It was concluded that for some individuals with poor awareness, focusing on improving awareness can be helpful. For those with good awareness, this approach may be detrimental to their emotional well being. In addition, it is concluded that awareness can not be predicted by tests of executive function.

INTRODUCTION

Every year in the UK an estimated one million people seek hospital attention for varying severity of head injury (Powell, 1994). The impact of a brain injury has been well documented (Howes, Edwards & Benton, 2005; Ponsford, 1995; Prigatano et al., 1986). Personality changes associated with poor self regulation skills, low mood and poor awareness of deficits are often linked with poor rehabilitation and employment outcomes (Pollens, Mc Bratnie & Burton 1988).

Outcome studies following survivors of acquired brain injury (ABI) have identified persisting psychosocial problems such as family disharmony, unemployment, decreased leisure activity and decreased social contact (Ownsworth, McFarland & Young, 2000; Brooks, McKinlay, Symington, Beattie & Campsie, 1987). This outcome is associated with numerous variables, many of which have been studied independantly. This study aims to investigate three such variables. If the role of psychological distress, awareness and executive function can be more fully understood, it may lead to future implications for the treatment and rehabilitation of those with an acquired brain injury.

In order to fully understand how psychological distress, awareness and executive functioning may impact on rehabilitation and employment outcomes a brief description of the three variables will be presented.

Awareness

It is not uncommon for individuals who have experienced a brain injury to show an inability to recognise that they have disabilities as a result (Prigatano et al., 1986).

However, there appears to be great variability in levels of awareness amongst those who have survived a brain injury (Gasquoin & Gibbons, 1994; Port, Wilmott & Charlton, 2002). The significance of unrealistic appraisals of the self has been noted as being a challenge in the adjustment and adaptation needed following moderate to severe brain injury (Ezrachi, Ben-Yishay, Kay, Diller & Rattok, 1991; Prigatano and Fordyce, 1986). Individuals who are more aware of the deficits observed by the rehabilitation team show better treatment performance and have better rehabilitation outcomes (Deaton, 1986; Prigatano, Klonoff, O'Brien et al, 1994; Lam, McMahon & Priddy, 1988), including successful work re-entry (Sherer, Oden and Bergloff, 1988).

There are a number of theories that try to account for poor awareness. Historically they fall within two main areas: neurological explanations and psychological explanations. More recently, research has begun to develop integrated explanations of awareness, taking into account multiple factors in their explanation. Weinstein (1991) proposed that various factors contribute to how people adapt to and represent their disabilities. These include the nature of the brain pathology, affected by the severity and location of lesion, the meaning of their disability as determined by pre-morbid experiences, personality and values and finally by the environment in which the behaviour is observed. Giacino and Cicerone (1998) have stated that the causes of unawareness are complex and multifactorial. They argue therefore that it is unlikely that a single theory can

adequately explain the underlying mechanism of awareness. For a full account of theories of awareness see Birkett-Swan, (2006), this thesis.

The literature suggests that people with ABI are less likely to acknowledge emotional changes regardless of severity of injury (Hillier & Metzger, 1997). More recently Gordon, Haddad, Brown, Hibbard and Sliwinski, (2000) found that individuals with moderate to severe brain injuries were able to report symptoms specific to their injury and Ponsford, Olver, Nelms and Curran (1996) found a high degree of agreement between individuals with a brain injury and their relatives' ratings of emotional and cognitive difficulties. Their results differ however from those of other authors (Prigatano et al., 1986; Ezrachi et al., 1991; Giacino and Cicerone, 1998) in their findings of similar ratings of cognitive and emotional difficulties. This relationship will be examined later in this study.

Psychological distress

Morton and Wehman (1995) have suggested that mood disturbance can seriously affect long term rehabilitation outcomes. They recommended that for rehabilitation to be effective, 'at risk' individuals must be identified and their emotional problems treated early on. There is much evidence to indicate that mood disturbances of various forms are common following ABI. Hibbard, Uysal, Keple, Bogdany and Silver (1998) examined patterns of mood disorder following ABI using the structured clinical interview for the Diagnostic and Statistical Manual (DSM)-IV. They found that major depression and specific anxiety disorders were the most common diagnoses and that co-morbidity was

high, for example, 44% of individuals having two or more diagnoses. Bowen, Neumann, Conner, Tennant & Chamberlain, (1998) found that the rate of clinically significant mood disorders was 38% following an ABI.

The most widely reported mood disturbance in the literature is depression. Depression can be viewed as a persistent state of low self esteem, sadness and hopelessness (Williams, 2003). It is not clear why depression appears to have been investigated more than other forms of mood disorder following ABI. One possible reason is the link between depression and increased suicide rates following ABI. Wallace and Bogner (2000) found that 45% of individuals who had sustained an ABI reported symptoms suggestive of 'mild' or 'greater' depression (p.550). Harris and Barraclough (1997) carried out a meta-analysis of suicide following various medical and psychiatric conditions. They calculated the Standard Mortality Ratios (SMRs) for each disorder and found that the risk of suicide following a brain injury was raised over three fold from that expected in the general population. Teasdale and Engberg (2001) in a large-scale population based study, found that approximately 3 – 4% of those who suffered ABI later committed suicide.

It would appear that anxiety disorders are less well represented in the literature than depression. However, Wallace and Bogner (2000) found that 39% of individuals reported symptoms suggestive of experiencing 'mild or greater' anxiety following an ABI (p.550). Anxiety disorders which have been investigated to some extent include post traumatic stress disorder (PTSD), panic disorder, obsessive compulsive disorder

(OCD) and generalized anxiety disorder (GAD) (Williams, 2003). Anxiety disorders are the most commonly diagnosed mental health problem within the general population (Wells, 1997). It is therefore surprising that the literature within the ABI population does not reflect similar high levels. It is likely that the main reason for this is, as suggested above, the focus being on suicide prevention. It has been suspected that anxiety disorders are more common following a brain injury (Williams, 2003) and would seem likely to be due to the adjustment process occurring following ABI, particularly with relationship to the changes that are often perceived as lack of control (as explored by Moore and Stambrook, 1995) and insecurities about the future (Prigatano & Fordyce, 1986). Despite this, anxiety disorders may be un-diagnosed due to difficulties in identifying symptoms in the context of other issues (Scheutzwow and Wiercisiewski, 1999).

Executive Functioning

Damage to the frontal lobes of the brain has been documented as having catastrophic consequences for individuals (Burgess & Alderman, 1990). Even though organic damage to motor, sensory and cognitive functioning may be relatively minimal, major changes may be observed in personality and social competency (Fogel, 1994; Varney and Menefee, 1993). These types of outcomes have been considered the result of 'executive' difficulties and associated with poor community reintegration (Sohlberg, Mateer & Stuss, 1993), memory impairments (Hart, 1994) and social isolation and loneliness (Kinsella, Ford & Moran, 1989).

Patients presenting with executive difficulties have traditionally been diagnosed as having 'frontal lobe syndrome'. The frontal lobes have been thought of as housing the "special workshop of the thinking process" (Burdach, 1819 cited by Rylander, 1939, p. 329). The 'frontal lobe syndrome' is a term that "is used to refer to an amorphous, varied group of deficits resulting from various aetiologies, different locations, and variable extents of abnormalities" (Stuss and Benson, 1984, p.3). A variety of behavioural symptoms and cognitive abilities are documented in the literature as associated with this phenomenon, including: planning, organisation, inhibition, impulsivity, self monitoring, perseveration, utilization of feedback, problem solving, cognitive flexibility, motivation, initiation, abstract thinking, memory, concentration and attention and ability to deal with novel situations, many of which will have an impact on selecting appropriate coping strategies. Many authors have documented such deficits in group and single case studies (Luria, 1981; Penfield and Evans, 1935; Shallice, 1982). However, such symptoms are not exclusively found in individuals who have sustained damage specifically to the frontal lobes. Baddeley and Wilson (1988) argue that specification of a syndrome in terms of localization is unfortunate and potentially misleading. They go on to argue that localizing the description would be inadequate and limit our understanding of the observed cognitive phenomena. These authors suggested the term 'dysexecutive syndrome' (DES) as a label to avoid potentially misleading specification of a syndrome in terms of localization. A functional definition seems a more appropriate way of capturing the range of impairment described above.

Certain features do appear characteristic of executive impairment. Alderman and Ward (1991) highlighted problems with initiation, inability to monitor performance and difficulty using feedback to regulate effective behaviour. A similar set of difficulties were highlighted in an earlier account by Rylander (1939). These were described as “disturbed attention, increased distractibility, a difficulty grasping the whole of a complicated state of affairs, well able to work along routine lines but cannot learn to master new tasks” (p203).

Overall the term ‘executive function’ encompasses the skills necessary for purposeful, goal directed activity (Anderson, 1998). There are a number of models which attempt to explain how and why deficits in executive functioning occur. For a full description of these the reader is directed to Birkett-Swan, (2006), this thesis.

Interactions of psychological distress, awareness and executive functioning

Studies examining the link between psychological distress, awareness and executive functioning point towards a relationship between increased awareness and increased psychological distress (e.g. Fleming, Strong & Ashton, 1998; Godfrey, Partridge, Knight & Bishara, 1993). As lower mood (greater psychological distress) is reflective of poorer outcome (Morton & Wehman, 1995), this could have an effect on potential for rehabilitation, however, a decreased awareness may also prove to be a barrier to rehabilitation (Deaton, 1986; Prigatano et al., 1994).

The literature points towards an interaction between impaired executive functioning and lower levels of awareness (Hart, Whyte, Kim & Vaccaro, 2005; Sawchyn, Mateer, & Braxton Suffield, 2005). There is little literature examining the relationship between executive functioning and psychological distress. This could in part be due to the symptoms caused by deficits in executive functioning often appearing similar to mood disorders such as poor initiation being similar to reduced motivation.

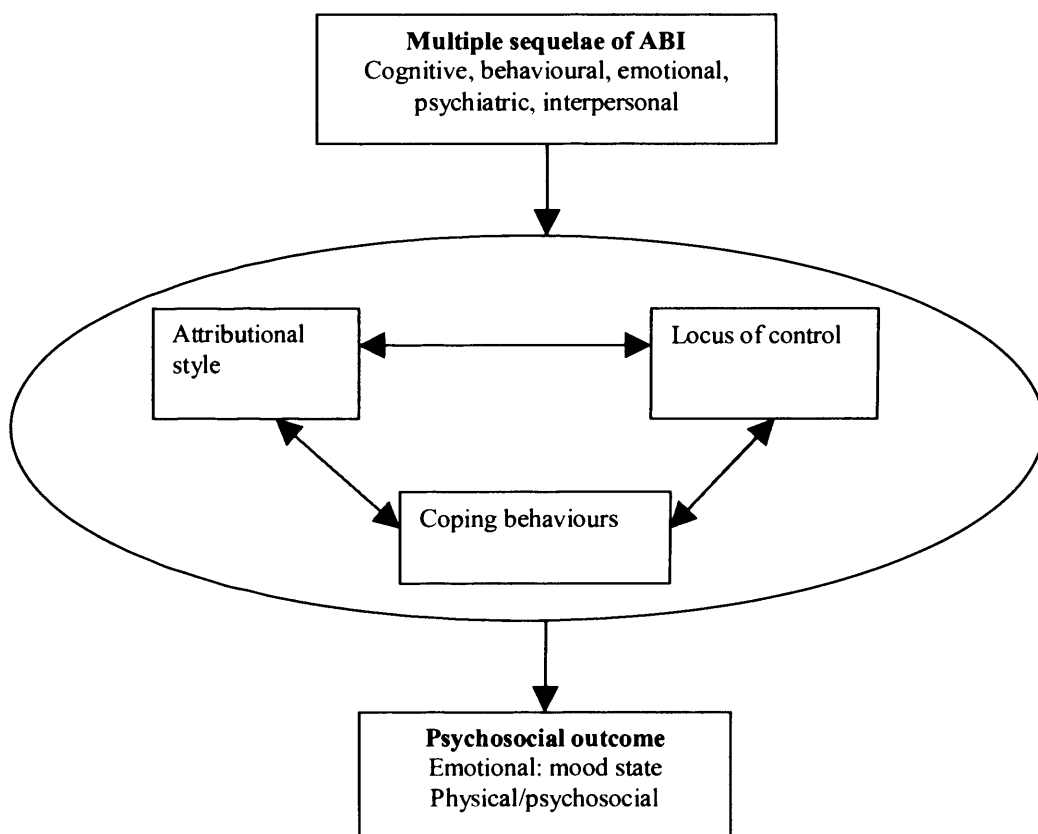
Ownsworth (2004) examined occupational and rehabilitation outcome, investigating awareness, psychological distress and executive functioning. Relationships were found between depression and rehabilitation and occupational potential, and awareness and depression in areas of independent living skills. However, because of the poor ecological validity of the tools used to examine the disabilities conclusions should only be tentative. In addition, Ownsworth and Fleming (2005) found that awareness correlated with hopelessness and executive measures of 'idea generation' and also concluded that the best predictors of psychosocial outcome were symptoms of depression, with specific outcomes additionally related to 'error self regulation' (a skill associated with executive functioning) and awareness. Again, findings from this study should be regarded as tentative as participant numbers were too few to enable a reliable interpretation of the findings. At this time there appears to have been few studies which examine how psychological distress, awareness and executive functioning interact with one another, if in fact they do at all.

One explanation for poor rehabilitation outcomes has been postulated by Moore and Stambrook (1995). These authors proposed a conceptual model in order to attempt to formulate how the experience of those who have sustained a brain injury could establish a pattern of 'learned helplessness'. Figure 1 demonstrates the link between constructs defined as attributional style, locus of control and coping behaviours. A full explanation of the model is beyond the scope of this paper, however it will be summarised below.

Due to the effects of a brain injury (cognitive, behavioural, emotional, physical), survivors are likely to experience many negative outcomes in all aspects of their lives. Because of reduced awareness, it may seem to the individual as though outcome is unrelated to their effort or their attempts to control their environment. This leads in turn to self limiting or defeating beliefs. A self limiting belief system will in time develop into an expectancy of external locus of control (the generalized expectancy of what forces are responsible for reinforcement. An internal locus of control implies that the individual believes their actions can affectively alter the outcome of a situation and an external locus of control implying the reverse; Bandura, 1997) as well as a negative attributional style (the internal explanation regarding events; Abramson, Seligman & Teasdale, 1978) with regard to outcome. These feelings of poor personal control over the environment can contribute to a negative emotional state or increased psychological distress (Alloy et al., 1988). When locus of control becomes more external and attributional style more negative, sense of self efficacy is lowered and psychological distress is further increased.

Self limiting beliefs can negatively influence motivation and increase the likelihood of selecting a less adaptive coping strategy. This probability is enhanced further when aspects of executive function are also considered. Individuals who are unable to monitor, or plan and organise their behaviour, particularly in novel situations, are less likely to select adaptive and appropriate coping strategies. Therefore, the pattern of negative attributional style, external locus of control and selection of inappropriate coping strategies reinforces the negative cycle leading to psychological distress.

Figure 1. Moore and Stambrook's (1995) conceptual model.

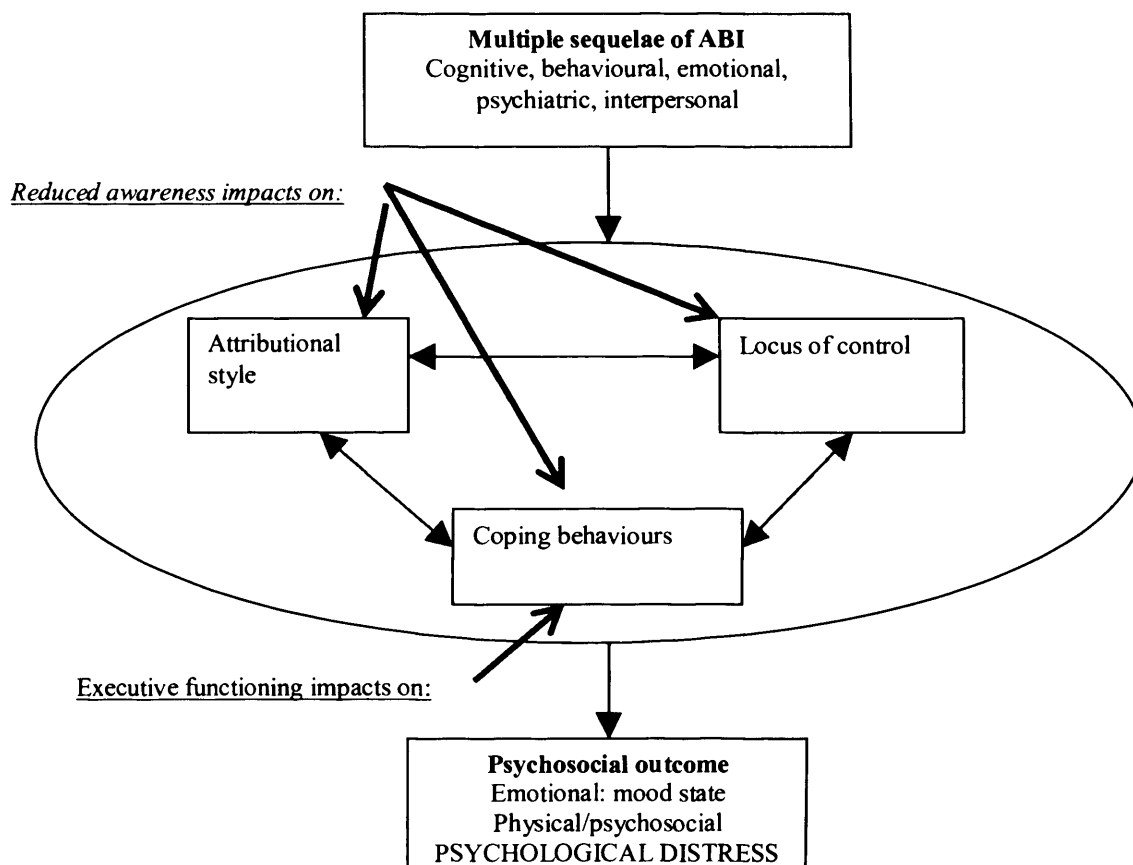


Reduced awareness and impaired executive functioning may impact on the areas of locus of control, attributional style and coping strategies as proposed by Moore and Stambrook (1995) in a manner which compounds emotional or psychological distress. Figure 2 demonstrates how it is proposed that these variables are associated within the Moore and Stambrook Model.

The areas of mood (psychological distress), awareness and executive functioning have generally been examined independantly of one another. However, it can be seen from Moore and Stambrook's (1995) model that there does appear to be an interaction between them.

Although no strong evidence has been found linking executive functioning and psychological distress, it would seem that those with impaired executive functioning tend to report mood disturbances less often (Williams, 2003). Stuss' (1991) model of executive functioning states that self awareness is at the meta cognitive level and can be impaired when the executive system is disabled in some way. If this is the case, it is suggested that deficits in executive functioning may impact on awareness (causing reduced awareness). This in turn will be related to decreased reports of psychological distress. Conversely increases in executive functioning and awareness could be related to an increased psychological distress.

Figure 2. Moore and Stambrook's model including how awareness, executive functioning and psychological distress may be reflected.



If we refer back to Figure 1, Moore and Stambrook (1995) have highlighted how reduced awareness can also be associated with negative attributional style, external locus of control and in turn psychological distress. This differs to the findings from previous research which demonstrated that increased awareness is related to increased psychological distress. Reasons for the discrepancy in findings may have numerous explanations, for example, tools used, participants severity of injury, time since injury or

indeed differences in the terms or concepts being examined. A goal of this study is to further examine the relationship between these three frequently cited variables using standardised, clinically valid and regularly used clinical tools.

Aims

The aim of this study is to examine the relationship between psychological distress, awareness and executive functioning. If this study does highlight interactions between them, it may help clinicians to understand and plan treatment more effectively. If it is shown that increased awareness is closely linked to increased psychological distress, clinicians may be able to make provision for the treatment of mood disorders prior to attempting to improve awareness. Likewise, this study may show that an increase in psychological distress is inevitable in the development of awareness. As a consequence it may prove useful to have a treatment approach in place for all individuals who have experienced a brain injury to be commenced immediately as awareness improves. At present it is not clear if psychological treatment of mood disorder in individuals with low awareness is an appropriate method of treatment, the aim of this study is to further our understanding of how best to implement treatment without causing greater psychological distress and avoiding disengagement by the client.

Hypotheses

The study aimed to address the following hypotheses:

1. *Awareness and psychological distress*

The relationship between psychological distress and awareness will be examined. The literature states that increased awareness is related to increased reporting of psychological distress: **There will be a positive significant correlation between increased awareness and higher reports of general psychological distress.**

2. *Awareness and depression*

The literature highlights a positive relationship between depression and awareness. This will relationship will be examined: **Reports of greater severity of depression will be significantly positively correlated with increased levels of awareness.**

3. *Awareness and anxiety*

Although there is less literature examining the relationship between anxiety and awareness, as there is an expected positive relationship with general psychological distress and awareness, this prediction will be followed here: **Reports of greater severity of anxiety will be significantly correlated with increased levels of awareness.**

4. *Psychological distress and Executive Functioning*

Literature examining the relationship between executive function and psychological distress is sparse. Previous studies have not discussed how executive functioning effects psychological distress, therefore this will be examined within this study: **Psychological distress and executive function will be significantly correlated.**

5. *Awareness and Executive Functioning*

There is some evidence to suggest that individuals who have a dysexecutive syndrome may experience reduced insight into their disabilities, however there are few studies which examine this relationship. The relationship with awareness and executive function will be examined further: **Awareness and executive function will be significantly correlated.**

6. *Awareness and Executive Functioning as predictors of psychological distress*

There is evidence which suggests that psychological distress, awareness and executive function are related. All three variables have an impact on rehabilitation outcomes. From a rehabilitation perspective, gaining a better understanding of interactions between these factors may help guide treatment. An attempt will be made here to build a model that explains the relationship between these three variables. An exploration of how executive function and awareness impact on psychological distress will be undertaken: **Executive function and awareness will predict psychological distress.**

METHOD

Participants

A total of 64 participants were recruited. The size of the sample was estimated according to the choice of statistical test used in the final hypothesis (multiple regression). Harris (1985) advocates that when using multiple regression, the number of participants should exceed the number of predictors (in this case 2) by 50. Howell (1997) recommends that the number of participants should be equal to or greater than 40 plus the number of predictors. Using these recommendations of 52 and 42 respectively it was anticipated that at least 60 participants would be recruited for the purpose of the study. Ethical issues as defined by the British Psychological Society (1996) were adhered to. Ethical review was sought and obtained through the St. Andrew's Hospital Research Committee and the Leicestershire, Northampton and Rutland Local Ethics Committee (see Appendix 2). Issues pertaining to data analysis and storage, consent and debriefing were considered and adhered to as defined by the British Psychological Society. Copies of the information and consent forms used for the brain injured and neurologically healthy groups are shown in Appendix 3 and 4 respectively.

Participants with a diagnosis of acquired brain injury (ABI) were recruited from inpatients at the Kemsley Hospital, St. Andrew's Group of Hospitals, Northampton and through the community brain injury team, Isebrook Hospital, Wellingborough. In order to reduce the effects of confounding variables such as perception, motor and language abilities on the results of the study, the following criteria were used:

- Participants were willing to participate.

- Participants were aged over 18 years.
- They had a current scaled score of greater than 5 on the Wechsler Adult Intelligence Scale (WAIS-3).
- Their first language was English (the psychometrics used are validated with English speaking participants).
- They had no gross perceptual problems and no gross language problems (as judged by the Consultant Neuropsychologist and Speech and Language Therapist in consultation with the Responsible Medical Officer (RMO)).
- Due to the ethical implications involved in using participants who were not considered able to give informed consent, only those who were able to give informed consent were selected.

Those with an executive dysfunction were deliberately not pre-selected in criteria as a more diverse sample including both those with and without executive disabilities was aimed for.

A description of the two services from which participants were recruited is described below.

Kemsley hospital

Kemsley Hospital is a 64 bedded service, offering services for people between the ages of 18 and 64 with an acquired brain injury, with the primary role being to serve people whose difficult to manage behaviour may deny them access to other rehabilitation services. The Service accepts adults with acquired brain injuries, whose physical, cognitive, emotional and /or behavioural problems require rehabilitation within an in-patient setting. Patients who retain capacity and are able to consent to in-patient

treatment as well as those detained under the Mental Health Act(1983) are accepted for admission.

The clients may have physical, communication or swallowing problems requiring specific rehabilitation, medical conditions such as epilepsy or psychiatric conditions (which may require them to be detained under the Mental Health Act). Admissions will be accepted at any time following a brain injury if deemed as appropriate for the service.

Traumatic Brain Injury Team, Northamptonshire

This service will accept referrals for people with an acquired brain injury and traumatic brain injury from across Northamptonshire. All those referrals will receive an assessment by the multi-disciplinary team and advice/rehabilitation given as appropriate. All clients are seen as outpatients. The client group is varied and ranges from those living independently to those requiring in patient care. Referrals are typically received from hospitals immediately following a brain injury. However, referrals are also accepted at any time following a brain injury.

Procedure and measures

Participants who fulfilled the selection criteria were referred to the principal investigator via one of two routes which was dependant upon where they were recruited from. These are described below:

Participants recruited from Kemsley

Ward teams were approached at weekly ward rounds to discuss patients who fitted the selection criteria. Once names of potential participants had been identified, the principal investigator wrote to the RMO in order to gain clarity on the individual's capacity to consent. When the RMO had made a decision about the potential participants' ability to give informed consent, information regarding the study was passed on to the patients via the care co-ordinator (those not able to give informed consent were excluded at this point). Potential participants who indicated an interest in the study then met individually with the principal investigator to discuss what would be involved should they be willing to take part. Those who decided to participate were asked to sign the relevant consent form (see appendix 4) and an appointment was made for data to be collected.

Participants from the community brain injury team

Potential participants within this service were approached via their care co-ordinator who notified them of the study and sought to discover initial interest. Those who showed an interest in participating were sent a copy of the patient information sheet. People were subsequently contacted to ascertain if they were willing to participate. If so a meeting was arranged to further discuss the study, consent was obtained and the measures completed. Capacity to consent was determined by the Consultant Clinical Psychologist and the care co-ordinator prior to the being invited to take part. Only people with capacity to consent were invited to participate.

Measures

The measures were administered during a single session. Sessions lasted for approximately one hour.

Awareness

The **DEX questionnaire**, which forms part of the Behavioural Assessment of the dysexecutive syndrome (BADS) battery (Wilson et al., 1996), was administered as a measure of awareness. This was completed by the participant (DEX-S) as well as by a member of staff or relative who knew the participant well (DEX-O). Awareness was calculated by determining the difference between the DEX-S and the DEX-O (discrepancy score). The use of the DEX as a tool to assess awareness has been reported by a number of authors (Hart et al., 2005; Norris & Tate, 2000; Williams, Evans & Wilson 1999)

The **Patient Competency Rating Scale (PCRS)** (Prigatano et al., 1986) was also used (shown in Appendix 5). The PCRS is a 30 item self report instrument which asks the participant to rate their perceived degree of disability on a variety of tasks and functions. They are asked to rate how easy or difficult it would be to perform tasks, rating their evaluation on a 5 point Likert Scale (1 = “can’t do” through to 5 = “can do with ease”). A higher score on the PCRS indicates a lower frequency of problems in every day life. Like the DEX, the participants’ answers are compared to those of another person who knows them well. The primary purpose of the PCRS is to evaluate general self-

awareness. However, due to the length of the questionnaire, many professional staff (within Kemsley) felt that they did not have the time to complete two very similar measures and therefore data were collected for only 19 participants using this tool.

Analysis using the PCRS is included where appropriate.

Level of awareness using both measures was determined by the degree of agreement between self and others (self score minus the 'other' rater score = discrepancy score) which is common practice within the literature (Hardy, Oyebode & Clare, 2006; Port et al., 2002).

Psychological distress

The **Hospital Anxiety and Depression Scale (HADS: Zigmond & Snaith, 1983)** is a self report measure used to measure psychological distress (Appendix 6). It yields an overall score and also separate scores for anxiety and depression which may be compared to cut off scores. Zigmond and Snaith (1983) recommend that the scores yielded for the two subscales should be interpreted separately with raw scores of between 8-10 identifying 'mild' cases; 11-15 identifying 'moderate' cases; and 16 and above indicating 'severe' cases. Crawford, Henry, Crombie & Taylor, (2001) have demonstrated that the total sum of ratings may be used as a measure of general psychological distress. The HADS has sound psychometric properties (Zigmond & Snaith, 1983). It is particularly useful for measuring psychological distress in individuals with ABI because of the emphasis placed on affective and behavioural symptoms and the exclusion of items relating to physical difficulties. The HADS was also chosen as it is frequently reported within the ABI literature.

Executive Functioning

The **BADS** (Wilson et al., 1996) was selected to assess executive functioning. This was used as it is reported to be ecologically valid and reflect everyday abilities (Burgess et al., 1998). Due to the complex nature of executive functioning there are many difficulties with assessment, particularly how well test performance relates to 'real life' behaviour (Sbordone, 1996). Tests that are predictive of everyday behaviours are described as being ecologically valid. Many tests are designed to assess cognitive impairments, where as in rehabilitation settings, clinicians are interested in determining the potential degree of functional disability arising from the brain damage (van den Broek, 1999). Norris and Tate (2000) found evidence supporting the ecological validity of the BADS, but not traditional tests of frontal lobe functioning. The BADS consists of six subtests from which an age corrected standard score is devised. Adequate inter-rater reliability and test-retest reliability is reported (Wilson et al., 1996) and normative data exists for controls, people with acquired brain injury and people with schizophrenia (Evans, Chua, McKenna & Wilson, 1997).

The **DEX Questionnaire** also measures behavioural symptoms characteristic of executive dysfunction as described by Stuss and Benson (1986). Each of the 20 items is scored on a 5 point Likert scale, ranging from 'never' (0) to 'very often' (4), with a higher score indicating higher frequency of dysexecutive problems in everyday life. A single score is produced for each questionnaire as well as five factor scores (inhibition, intentionality, executive memory, positive affect and negative affect) as reported by Burgess et al., (1998). Lower scores on the DEX represent fewer perceived disabilities.

These authors suggested that the DEX is able to assess behavioural symptoms of the dysexecutive syndrome which are less likely to be captured by traditional tests of executive functioning.

Data Analysis

All data were found to be reasonably normally distributed when examined by visual inspection. As a consequence parametric tests were utilized throughout. Howell (1997) emphasizes the robustness of parametric tests to violations of their assumptions and the loss of power incurred by the use of non parametric tests.

Analysis was carried out using one tailed tests for the first three hypotheses as their direction was predicted. This was done as the literature supported the likelihood of the outcome of the results (Howell, 1997). Two tailed tests were selected for the remaining hypotheses.

Repeated testing can increase the possibility of making a Type One error (rejecting the null hypothesis when it is actually true). The Bonferroni statistic may be calculated to correct significance values for this possibility. However, it has been argued this is a very conservative measure and may increase the chance of a Type Two error (rejecting the experimental hypothesis when it should be accepted; Darlington, 1990). In addition, the statistic is generally not reported in the neuropsychological literature (Knight, 1999). Therefore, for the purposes of comparing this research to other research within the area it was not employed.

Results

Participant characteristics

Within the group most ABI was as a consequence of traumatic brain injury (TBI) (n=53, 81.5%). The remainder were victims of stroke (n=3, 4.6%), anoxia (n=2, 3.1%) and 'other' causes (n=7, 10.7%). Time since insult (injury) ranged from 1 – 312 months with the average time since injury being 63 months (SD = 57). Of the participants 46 (70.8%) participants were male and 19 (29.2%) female. The sample reflected the larger number of males with acquired brain injury (Ponsford, 1995). The participants were aged between 19 and 59 years (mean = 36, SD = 11.). Nineteen (29.2 %) of the participants were recruited from the community brain injury team with the remaining 47 (70.8%) being recruited from four different wards within Kemsley. A summary of participant characteristics is shown in Table 1.

Table 1. A summary of demographic and injury data for the participants

Demographic/injury data	Frequency (mean, SD)
Age in years	19 – 59 (M=36, SD=11)
Gender	
Male	46
female	19
Time since injury (months)	(M=63,SD=57)
0-12	10
13-48	27
49-100	16
100 >	11
Age at injury (years)	2 – 58 (M=27.6, SD=12.8)
Pre injury employment	
Not working	10
Education	11
Part time	8
Full time	33
Self employed	2
Post injury employment	
Not working	57
Education	1
Part time	2
Full time	4
Self employed	0

Table 2 summarises the descriptive data obtained on all of the measures.

Table 2. Summary of descriptive data

Measures used	
HADS total score	16.14 (8.2)
HADS depression	7.9 (5.2)
0-7	33
8-10	12
11-15	13
16>	6
HADS anxiety	8.5 (4.6)
0-7	28
8-10	20
11-15	11
16>	5
DEX -S	28.5 (14.8)
DEX-O	36.1 (12.6)
PCRS – self	112.5 (16.9)
PCRS - other	97.9 (17.9)
BADS age corrected profile	71 (24.8)

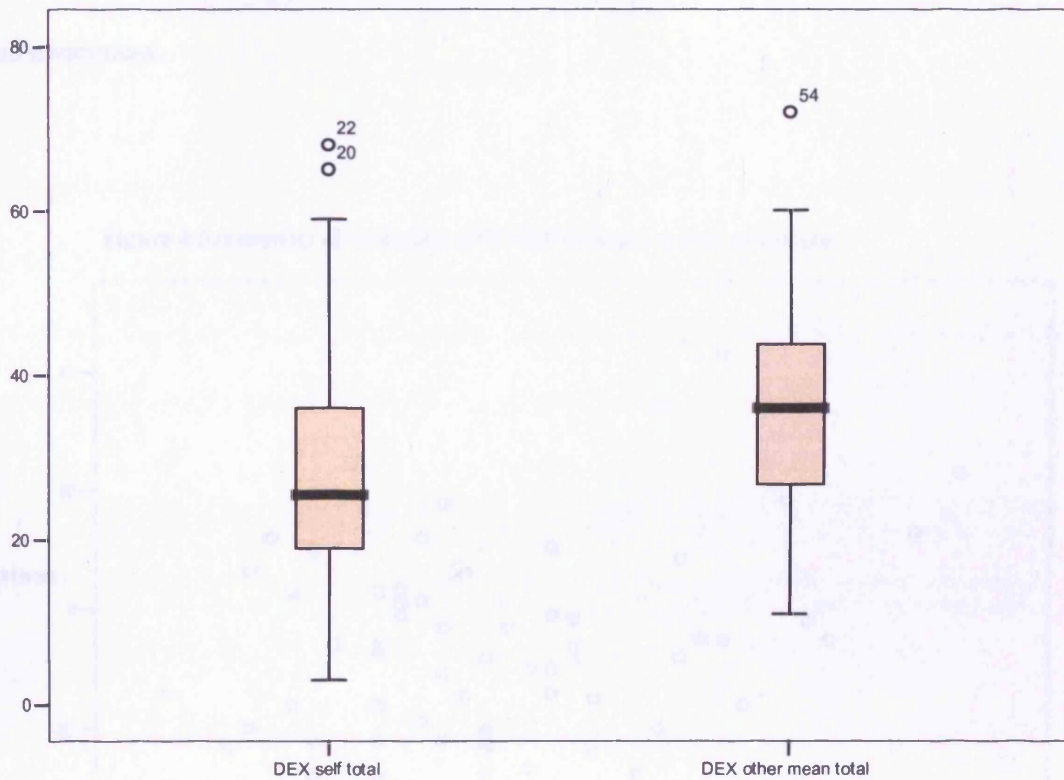
Values represent *n* or mean (SD) as applicable.

Hypothesis 1: Awareness and psychological distress

It was hypothesised that there would be a positive correlation between awareness (as measured by the discrepancy score between the DEX-S and the DEX-O) and psychological distress (HADS total score).

As can be seen from Table 2, the tendency for people with an ABI was to rate themselves as having fewer problems than others rated them as having. However, it should be noted that out of the 64 participants 18 (28%) reported themselves as actually having more problems than the ‘other’ who rated them. The results of self ratings on the DEX are compared to DEX ratings made by others in Figure 3.

Figure 3. Boxplot distributions of DEX Questionnaire self ratings and other ratings regarding the presence of executive problems



*The box represents the inter-quartile range (contains 50% of the values). The bold line across the box represents the median. The whiskers are lines representing the range.

Figure 3 reflects the tendency for participants to rate themselves as having fewer problems (mean = 28.54, SD= 14.84) than others rated them as having (mean = 36.10, SD = 12.36). A paired samples t-test showed that there was a statistically significant difference between DEX-S ratings and DEX-O ratings [$t = -3.660$, $df = 63$, $p < 0.001$].

When data are collected for the purpose of examining the relationship between variables a useful insight may be provided by means of a scatter plot (Howell, 1997). Figure 4 illustrates the relationship between psychological distress (total scores on the HADS) and awareness.

Figure 4. Scatterplot distribution of HADS total score and awareness

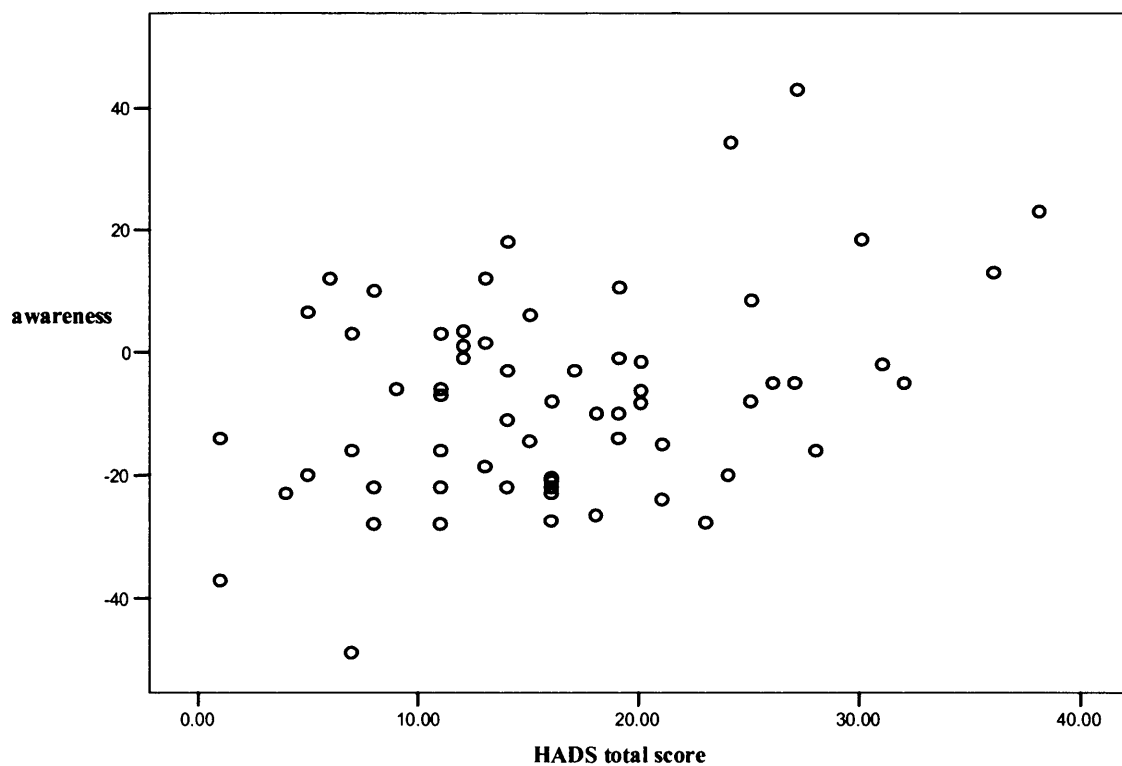


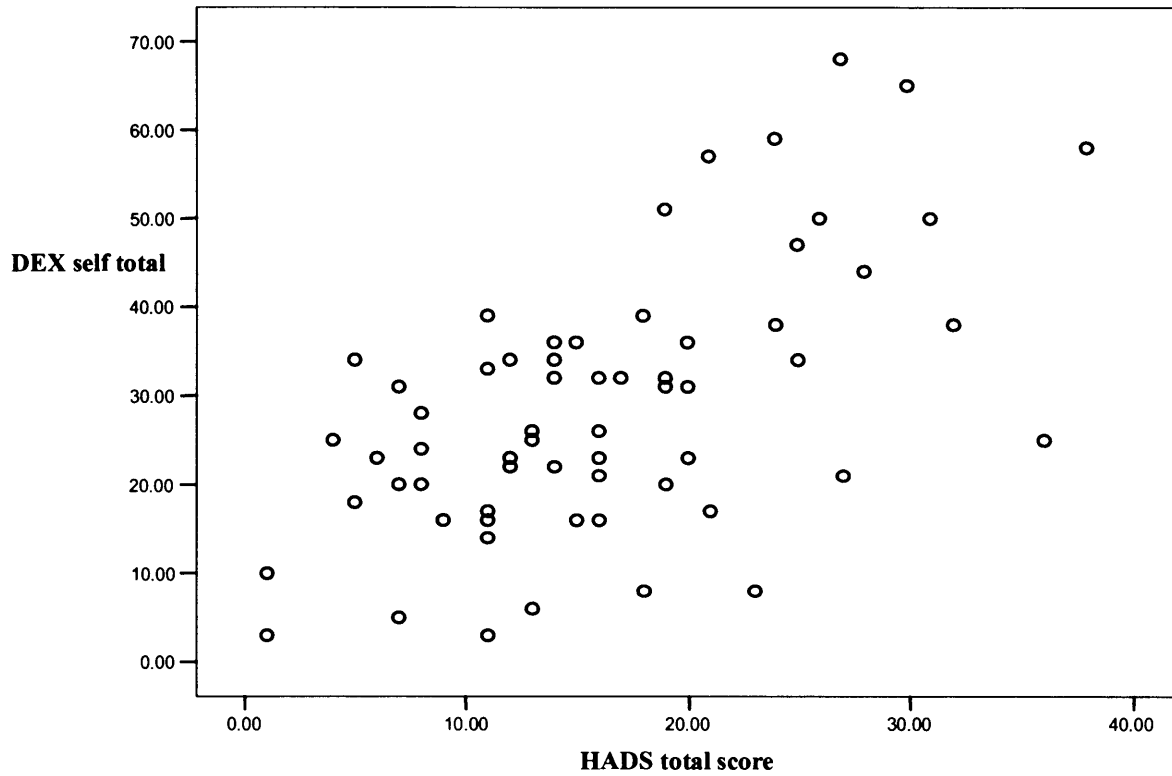
Figure 4 suggests there is some evidence of a positive linear correlation between psychological distress and awareness, the magnitude of which was determined by calculating a Pearson product-moment correlation coefficient. This proved significant [$r=.381$, $p< 0.001$], confirming the impression from Figure 4 of the tendency that greater awareness of disability was associated with greater psychological distress.

The relationship between awareness scores obtained from the PCRS discrepancy score and psychological distress as measured by the HADS was also examined. In contrast to the DEX, no correlation was evident [$r = -0.93$, $p > 0.05$].

Closely related to the issue of awareness is how an individual actually perceives their difficulties, independent of how others perceive them. Consequently, the relationship between individuals' own ratings of their degree of perceived disability (as measured by the DEX-S) and psychological distress was examined (see Figure 5).

Figure 5 suggests a tendency for a positive correlation between these two variables. This was examined by calculating the Pearson product-moment correlation coefficient which proved significant [$r= .590$, $p< 0.001$]. Perception of higher levels of disability was associated with greater psychological distress.

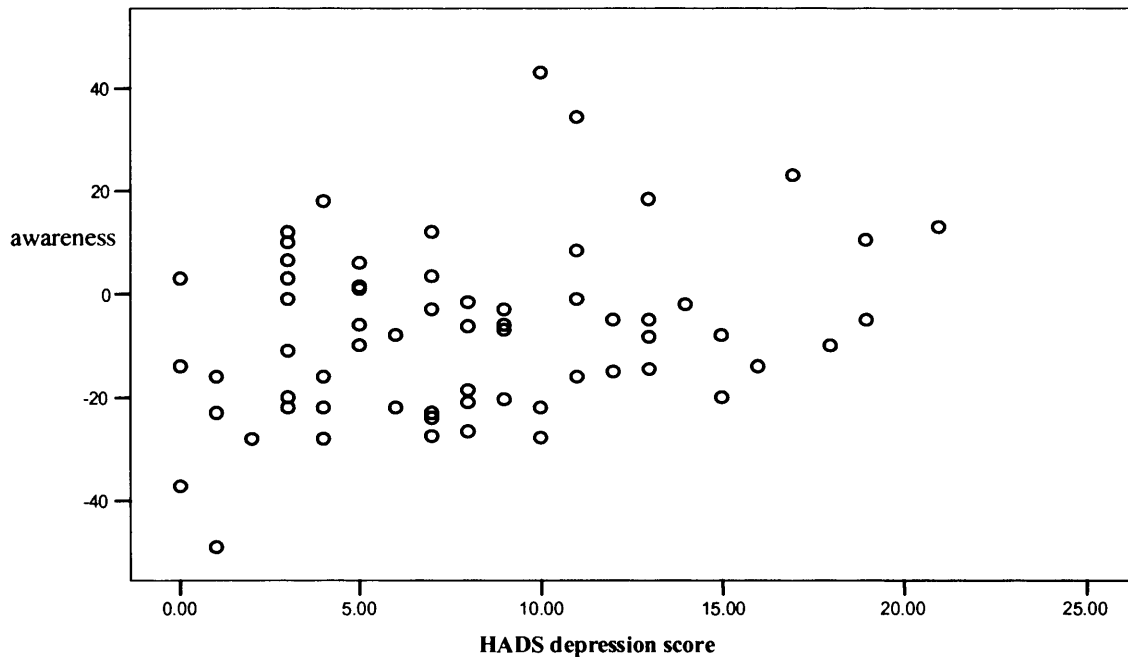
Figure 5. Scatterplot distribution of DEX S and HADS total score



Hypothesis 2: Awareness and Depression

It was predicted that those participants who were more aware of their actual disabilities experience more symptoms of depression. Figure 6 illustrates the relationship between depression and levels of awareness.

Figure 6. Scatterplot distribution of HADS-D scores and awareness



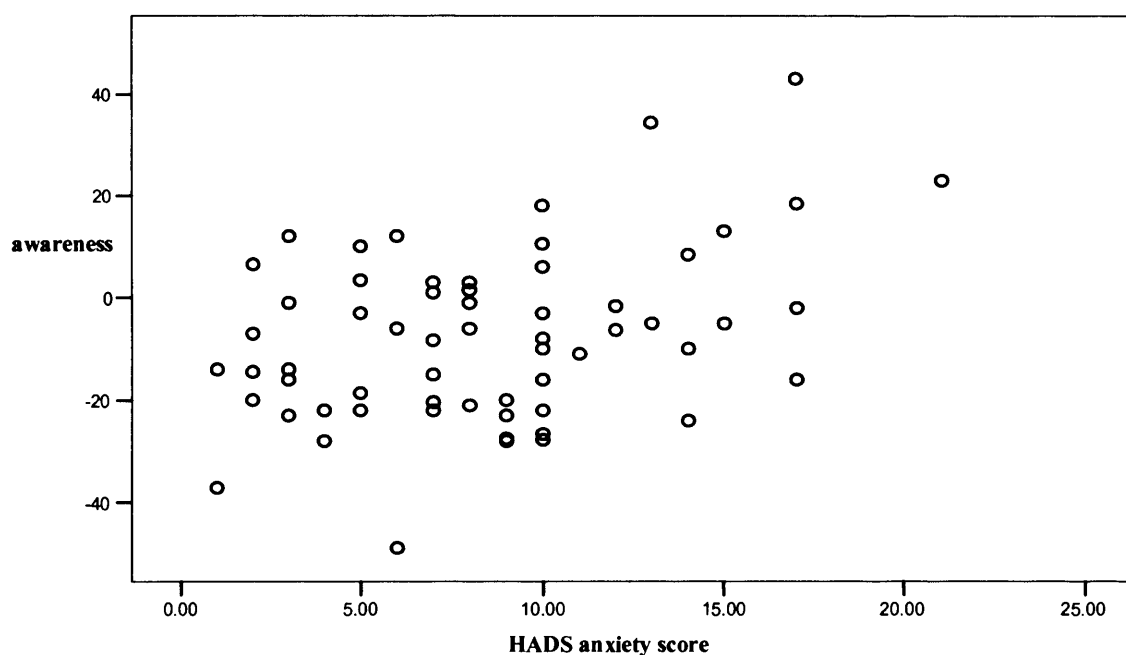
As Figure 6 suggests, there was significant correlation between the two variables [$r=.291$, $p<0.01$], with increased awareness being associated with most frequent symptoms of depression.

The relationship between reports of psychological distress and perception of degree of disability was also examined. There was a significant correlation between the two variables [$r=.498$, $p<0.001$], with degree of belief in level of disability being associated with reports of depression. Data support the tendency for those who believed they had more problems being more likely to report more symptoms of depression.

Hypothesis 3: Awareness and Anxiety

It was predicted that participants with more awareness of their disabilities would also be more likely to report greater levels of anxiety. Figure 7 illustrates the relationship between scores from the anxiety subscale of the HADS and awareness.

Figure 7. Scatterplot distribution of HADS-A scores and awareness



0

There was a moderate correlation between the two variables [$r=.396$, $p<0.01$], with greater awareness of disability being associated with increased anxiety.

The strength of the relationship between beliefs about disability (DEX-S) and reports of psychological distress were investigated. There was a strong correlation between the two variables [$r=.580$, $p<0.001$]: degree of belief in level of disability was associated with increased anxiety.

Those who believed they had more problems were more likely to report symptoms of anxiety.

Hypothesis 4: Psychological distress and Executive Functioning

Performance of the group as a whole fell within the borderline range on the BADS (Mean = 71, SD = 24.83). The relationship between psychological distress and executive function was assessed through a series of correlations between psychological distress (HADS total scores, depression scores and anxiety scores) and executive functioning (BADS total profile score and the DEX-O, including the five factors of intentionality, inhibition, executive memory, positive affect and negative affect). No relationship was evident between ratings of psychological distress and any of the measures of executive functioning. All correlations are shown in Appendix 7.

Hypothesis 5: Awareness and Executive Functioning

The relationship between awareness and executive function was examined through a series of correlations. These were computed for levels of awareness (DEX discrepancy score) and measures of executive functioning (performance on the BADS and ratings on the DEX). There were a number of significant correlations evident (see table 3).

Table 3. Significant relationships between awareness (using DEX discrepancy scores) and Executive Functioning

	Correlation	Significance (two tailed)
DEX –O mean total	-.503	p<0.001
DEX Factors		
Inhibition	-.332	p<0.01
Intentionality	-.494	p<0.001
Executive memory	-.436	p<0.001

N.B. All correlations are shown in Appendix 8.

As stated previously PCRS recordings were available for 19 of the 64 participants. In order to investigate further if awareness is related to other aspects of executive functioning, correlations were undertaken to examine the relationship between awareness as measured by the PCRS and aspects of executive functioning. Significant results are shown in Table 4 (all correlations are shown in Appendix 9). It can be observed that awareness as measured by the PCRS correlates with performance on the BADS rather than ratings on the DEX.

The literature suggests that individuals who are more impaired on measures of executive function are more likely to have decreased awareness of their deficits (Hart et al., 2005). In order to assess this participants were split into two groups according to their performance on the BADS. The first group consisted of those who scored 69 or less ($n = 26$) (the bottom 5% of control participants).

Table 4. Significant relationships between awareness using PCRS ratings and Executive Functioning

	Correlation	Significance (two tailed)
BADS age corrected score	-.557	p<0.05
Key search	-.496	p<0.05
Temporal Judgment	-.679	p<0.001

The second group consisted was those who scored above 69 ($n = 38$). An independent samples t- test was used to determine if there was any difference between the two groups ($t = .717$, $p > 0.05$). This demonstrated that there was no significant difference in awareness between those that scored below the 5% cut off on the BADS and those who scored higher.

Analysis was also conducted using the ratings from the DEX-O. The 5% cut off score (39) was used to split the groups. This was based upon ratings made by others of neurologically healthy controls arising from DEX normative data (Alderman, personal communication, 7th June 2006). A significant difference was found in awareness between those that were rated as having more behavioural symptoms indicative of dysexecutive syndrome (39 and above, $n = 28$) and those who were rated as having fewer problems ($n = 36$) ($t = 3.201$, $p < 0.05$).

Hypothesis 6: Awareness and Executive Function as predictors of psychological distress

This study hypothesized that awareness and executive functioning could serve as predictors of psychological distress. However, no significant correlation has been found between psychological distress and executive function. Therefore executive function will be unable to add to a model to predict psychological distress. It can be concluded that according to this executive function and awareness do not contribute to a model to predict psychological distress.

However, significant relationships were evident between psychological distress and awareness, and between executive functioning and awareness. As the literature does not state how the three variables interact this will be examined further. In light of the current findings, an examination of the data was conducted in order to investigate if psychological distress and executive function are able to form a model in order to predict psychological distress. Forward stepwise multiple regression was used to determine the best predictors of awareness. Of the variable selection methods “the stepwise regression is probably the best” (Howell, 1997, p541). The following variables for each participant were entered into the equation: Psychological distress (HADS total score); and executive function (measured by DEX-O and BADS age corrected profile score).

The first variable to enter the equation was DEX-O ($R = .503$, adjusted $R^2 = .241$, $F = 21$, $p < .001$). The next variable to enter the equation was psychological distress, HADS total score, ($R = .703$, adjusted $R^2 = .478$, $f = 29.83$, $p < .001$). BADS age corrected profile score failed to enter the equation.

DISCUSSION

A brief summary of the results will be presented followed by implications of the findings, limitations of the study, and recommendations for future work.

Summary of findings

Awareness and psychological distress

Due to the relationship and similar results between the findings of the first three hypotheses, the results will be discussed together. These hypotheses were:

1. **There will be a positive significant correlation between increased awareness and higher reports of general psychological distress.**
2. **Reports of greater severity of depression will be significantly positively correlated with increased levels of awareness.**
3. **Reports of greater severity of anxiety will be significantly correlated with increased levels of awareness.**

Participants within this study reported slightly higher levels of anxiety, depression and general psychological distress than are observed in the general population, with mean overall psychological distress for the group falling at the 89th percentile (Crawford et al., 2001). This is similar to the findings of other authors (Hibbard et al., 1998; Bowen et al., 1998).

This study found evidence of a significant relationship between psychological distress and awareness, with greater awareness being associated with more psychological

distress. There was no correlation found between awareness and psychological distress and awareness as measured by the PCRS. It is possible that this was due to the small sample size (n=19). These findings are consistent with previous studies (Godfrey et al., 1993; Fleming et al., 1998). However, they differ to those reported by Ownsworth and Fleming (2005) who found no relationship between awareness and psychological distress. They suggest that they did not find this relationship as it is more likely to occur 1-2 years post injury and most of their participants were at a later stage post injury. However, this assumption can not be supported by this study as the average time since injury was over 5 years.

Participants' beliefs about the levels of their disability significantly correlated with psychological distress. This would suggest that not only is awareness of disability important when considering psychological distress, but also the subjective opinions held about their disability is important.

There was a significant difference between ratings of disability, with others rating the participants as having significantly more problems. This is similar to the findings of previous studies (Knight, Alderman & Burgess, 2002; Wilson et al., 1996). Despite this difference, a number of the participants (28%) rated themselves as actually having more problems than others had. There is little literature that considers the frequency with which individuals believe they have more problems than in fact they do, or the implications of this. The implications of this finding will be subsequently discussed along with clinical implications of the study.

Psychological distress and executive function

4. Psychological distress and executive function will be significantly correlated.

This study failed to find any relationship between psychological distress and executive functioning. Knight et al., (2002) gained similar findings. Although the possible relationship was only tentative on examination of the literature, it may reflect limitations in design (to be discussed further).

Awareness and Executive Function

5. Awareness and executive function will be significantly correlated.

This study has shown that increased levels of awareness are associated with better executive function. This was found using both measures of awareness (PCRS and DEX). Similar findings were described by Hart et al., (2005) who found that people with an ABI scoring lower on tests of executive dysfunction had significantly worse awareness. Awareness (as rated by the DEX discrepancy score), related with three of the five factors from the DEX (inhibition, intentionality and executive memory) and the overall DEX – O rating. There was also a relationship between the PCRS discrepancy score and two of the subtests from the BADS (key search and temporal judgment) and the BADS age corrected scaled score. When the items from the scales are examined more closely it can be seen that the DEX awareness score is more closely related to executive dysfunction in the ‘real world’ (Hart et al., 2005). Alderman, Burgess, Knight and Henman, (2003) found that many patients passed tests of executive frontal lobe function yet failed the Multiple Errands Test (MET). These authors state that such

patterns are associated with observed dysexecutive symptoms in every day life. 'Real world' executive dysfunction can be characterized by the impairments often reported by individuals who have sustained a brain injury, yet these symptoms are not readily characterised on tests of executive function. The PCRS awareness ratings appear more closely related to inhibition as measured by the temporal judgment and key search sub tests of the BADS (Alderman, personal communication, 4th June 2006).

Degree of awareness was examined further to assess if executive functioning had an impact on level of awareness. No difference was found in awareness between those impaired on the BADS and those whose performance was classified as 'normal'. However, when impaired executive function was classified using the 5% cut off score a significant difference was noted in level of awareness. This may be explained by the DEX's ability to highlight the behavioural symptoms of the dysexecutive syndrome, whereas the BADS is more likely to highlight the cognitive factors associated with executive function. These findings support Stuss's (1991) model of executive functioning, in which he states that as awareness is at the 'meta-cognitive' level, it can be impaired when the executive system is disabled in some way

Awareness and Executive Functioning as predictors of psychological distress

6. Executive function and awareness will form a model in order to predict psychological distress.

There was no relationship found between executive functioning and psychological distress. Therefore, further analysis of this relationship was not conducted. The

literature points towards an interaction between psychological distress, awareness and executive functioning. Relationships were found between psychological distress and awareness and between executive functioning and awareness. Stuss (1991) stated that awareness can be negatively affected when the executive system is damaged. There are also numerous reports of increased psychological distress being associated with increased awareness (Godfrey et al., 1993; Prigatano et al., 1994; Morton & Wehman, 1995). Due to the findings from this study and that proposed in the previous literature, the predictive nature of the relationships of psychological distress and executive functioning were examined in relation to awareness. It was found that executive function (as measured by the DEX) and psychological distress were able to predict awareness. The BADS age corrected score failed to enter the equation, demonstrating that the 'real world' behavioural symptoms of the dysexecutive syndrome have a greater impact on degree of awareness and related disability. In addition, this study demonstrates that tests of executive function are not useful in predicting awareness of deficit. This confirms the findings of Trudel, Tryon and Purdum, (1998) who found that little variance in awareness could be explained by neuropsychological tests. However, awareness can be predicted by behavioural ratings of dysexecutive syndrome.

Implication of findings

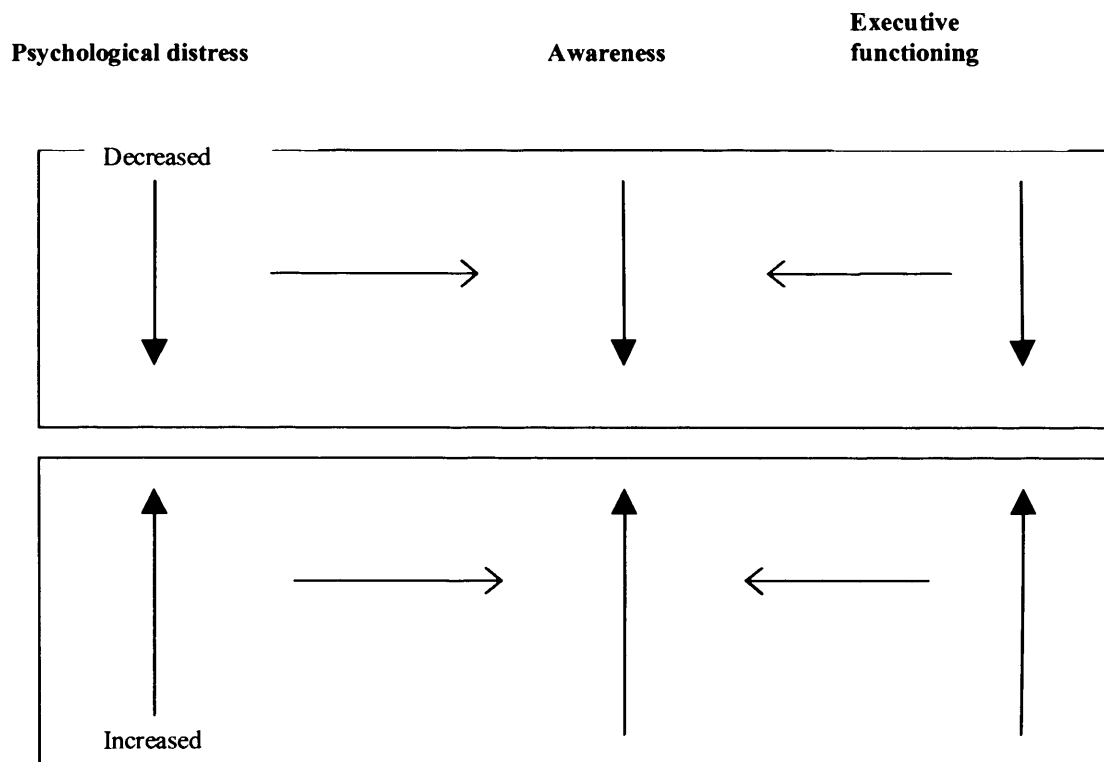
This study has demonstrated that how much awareness a person may have following a brain injury appears to be affected by both psychological (as demonstrated by levels of psychological distress) and organic factors (as demonstrated by level of disability). This would appear to lend credence to the integrative models of awareness, as demonstrated

by the basic model shown in Figure 8. This model is able to demonstrate visually that a decrease in psychological distress (improvement in mood) and lower executive functioning skills will be associated with poorer levels of awareness. The reverse of this will also occur.

However, when we refer back to Moore and Stambrook's (1995) model (Figure 1, p 85), it can be observed that the findings from this study differ. This study suggests that it is those who experience more awareness of their deficits that experience more psychological distress. In addition, psychological distress and executive functioning are indicative of awareness rather than awareness and executive functioning being indicative of psychological distress. It was also found that perceived disability also impacted significantly on psychological distress. Whilst people with an ABI may have difficulty reporting their level of impairment accurately, the evidence suggests that they have a definite internal assumption about themselves which seems to impact significantly on psychological distress (Curran, Ponsford & Crowe, 2000; Howes et al., 2005).

Moore and Stambrook (1995) explain the importance of understanding how powerful an ABI survivor's interpretation of their injury could be in determining their recovery process in terms of coping strategies and motivation (Lazarus & Folkman, 1984). Although, due to the cognitive deficits sustained as a consequence of the ABI, awareness and understanding may be impaired and therefore interpretations may be distorted. This distortion may also be a cause of an over estimate of level of disability as demonstrated by some of the participants within this study.

Figure 8. Model of interactions of psychological distress and executive functioning with awareness.



Perception of the self was referred to in Moore and Stambrook's (1995) model in terms of self concept. Not surprisingly it has been found that profound changes in self concept may occur following severe head injury (Tyreman & Humphrey, 1984). These authors suggest that these people demonstrated more awareness than had previously been recognised. Similar results were found by Wright and Telford (1996) who found that a greater discrepancy between perceptions of past and present self was associated with higher levels of psychological distress. These studies reflect the findings from the present study, in that those who reported themselves as having greater disabilities reported greater psychological distress. However, the findings of Wright and Telford

(1996) and Tyreman and Humphrey (1984) should be examined with caution. Both pre and post ratings of how participants saw themselves were taken following the ABI and therefore the reliability of the ratings may be questionable. Nonetheless, the implications of self concept in the relationship with psychological distress is worthy of further discussion as it apparently relates closely with the constructs being examined here.

Self concept is closely related to self esteem and clinically, self esteem is often discussed as being a causal factor or as a consequence of psychological distress (Guindon, 2002). Negative self concept and self esteem have been associated with depression, anxiety and submissiveness (Halvorson, 1997) and feelings of powerlessness (Coopersmith, 1967). Indeed, Williams (2003) defined depression as a persistent state of low self esteem, sadness and hopelessness. Although Moore and Stambrook (1995) proposed that reduced awareness resulted in a poorer self concept and more negative attributional style, it is also quite likely that those who are more aware will have a poorer self concept and negative attributional style. This hypothesis is supported by the work of Cooper-Evans (2005) who found that decreased self esteem (related to self concept) showed a relationship to increased awareness and increased psychological distress. Evidence from this and previous studies suggests that those who are more aware of their disabilities, whether or not they are realistic appraisals, are more likely to experience psychological distress.

External locus of control has been attributed to low self esteem and greater psychological distress. Pre-morbid characteristics have an impact on awareness following a brain injury (Weinstein, 1991). It is therefore likely that pre-morbid locus of control may impact on levels of awareness post injury. Those with more of an external locus of control pre-morbidly may present with a greater degree of awareness as they need more external re-assurance about their performance. Those with more of an internal locus of control pre-morbidly may present as less aware of their disabilities as they do not actively seek re-assurance about their performance and are less likely to be as vigilant to the cues of others.

Clinical implications

Those who typically experience a better outcome following ABI tend to be those who appreciate and recognise their limitations and actively participate in rehabilitation (Prigatano et al., 1986). However, people with mood disorders are less likely to actively participate in rehabilitation due to reduced motivation (Williams, 2003). This has implications for how the clinician goes about offering treatment to this complex client group. One area of interest which this study has highlighted is the group of individuals who actually report themselves as having more problems than the other people who also rated their degree of disability. There is an increase in clinical work aimed at raising awareness following a brain injury. However, this study implies that caution needs to be taken as this type of work may have a significantly detrimental effect. If those who over estimate their disability are made to focus on their difficulties their psychological distress may well prevent them taking part in their rehabilitation. From a rehabilitation

perspective this highlights two quite different client groups who would benefit from different clinical approaches. Table 5 summarises suggestions for strategies that could be quite useful with these two groups. Raising awareness may continue to be an important aspect of treatment for those who demonstrate low levels of awareness, however, for those who over estimate their disabilities a more behavioural perspective may be of use. Reality testing similar to that suggested for social phobias may be of use. In both Clark and Wells' (1995) and Rapee and Heimberg's (1997) models of social phobia, negative, inaccurate impressions of how one comes across are strongly tied to the cognitive, somatic and behavioural anxiety symptoms. Therefore, if video feedback can provide corrective information, it should, by extension, decrease symptoms such as anxiety and avoidance. Rodenbaugh and Chambless (2002) found that video feedback showed a lasting beneficial effect for participants who demonstrated a high discrepancy between their ratings of their performance and the ratings of observers. McEwan and Devins (1983) found that highly social anxious individuals who reported that they generally experienced intense somatic sensations in social situations overestimated how anxious they appeared to their peers. In order for those with a brain injury to experience their success in activities and to have their successes reinforced the use of video could play an important part in their treatment. It may also act in a similar manner as proposed for those with a social phobia, in that it may reinforce that they have the ability to conduct activities which they had previously felt unable to.

The importance of a thorough psychological assessment is of the utmost importance prior to commencing any form of treatment approach. It seems that therapists are all too

willing to provide treatment aimed at raising awareness of disability as evidence suggests that awareness is necessary for positive rehabilitation outcomes (Ezrachi et al., 1991). This study suggests that not only is this approach potentially not useful with some individuals who have sustained a brain injury, but may also be detrimental to their psychological state. In addition, highlighting deficits to those who are already well aware of their disabilities may have the adverse effect of decreasing their mood to the point that they disengage from treatment.

Table 5. Summary of clinical approaches for individuals with differing levels of awareness

Group	Area of disability	Clinical approach
Low awareness group	Executive functioning	Problem solving skill. Strategies to structure day to day life e.g. diaries, calendars, daily time tables. General methods to circumvent the need for continual monitoring of the external environment.
	Psychological distress	Provided skills and strategies for dealing with low mood when it occurs. An introduction to methods such as CBT e.g. challenging thoughts and alternative thinking. Ensure that the individual is equipped with the necessary skills to deal with psychological distress as far as possible when necessary.
	Awareness	Education about effects of brain injury. Groups for people to discuss their own experiences of injury.
High awareness group	Psychological distress	Focus on strengths. Emphasis on methods such as challenging thoughts and alternative thinking. Working towards short term goals to ensure feelings of achievement.
	Awareness	Focus on reality testing e.g. use of video to visualise disability as observed by others. Regular feedback about achievements. Diary keeping of positive outcomes from rehabilitation

Limitations of design/study

As exploratory research, this study featured a number of methodological shortcomings.

The variables being examined in this study are all quite fragile concepts. Firstly, the measurement of executive functioning poses difficulties. There may be variation in performance over time and for this reason Burgess (1997) likened the measurement of executive functioning to 'shooting a moving target'. This study aimed to assess the impact of executive functioning, however limited measures of executive functioning were used. Although the measures used were chosen for their reported ecological validity, there was also some consideration of the time involved in collecting multiple measures. As such a compromise was considered necessary. If the study was to be repeated it would be preferable to include more time consuming measures for example, the Multiple Errands Test (Alderman et al., 2003) which demonstrates behavioural symptoms of executive functioning highlighted by the DEX (Burgess et al., 1998), alongside some of the more traditional tests of executive functioning.

Secondly, psychological distress can be affected by numerous factors. Such examples are: what was watched on television last night; and receiving a complement prior to being asked about their mood. These examples plus many more will all have an impact on how the individual reports their mood on any given day at any time. In addition, those who have sustained a brain injury are often unaware of the cognitive changes they experience following a brain injury. The question must be asked if they are truly aware of their mood. Why would an individual who is unaware of their behaviour be able to monitor changes in psychological distress? There is evidence to suggest that following a

brain injury many people are unable to identify emotions in other people (Guercio, Podolska-Schroeder & Relfeldt., 2004; Valentine, Powell, Davidoff, Letson & Greenwood, 2006). Could this also imply that they may have greater difficulty identifying and labelling their own emotions? Inconsistencies in self report are often observable in this client group. Those who report psychological distress or low mood will be visibly enjoying activities, yet when asked if they are enjoying themselves will respond negatively. The question of reliability when reporting psychological distress following a brain injury appears to be unresolved. One possible reason for this is the fact that it is a hypothetical construct, and as such should be taken at face value when reported subjectively by the person who is being asked.

The third of the variables examined, awareness, is also a difficult concept to measure. The tools used (DEX and PCRS) have been widely reported in the literature (Prigatano & Klonoff, 1998), however, these contain an implicit flaw. Ratings are taken from significant others and as such the reliability of the others beliefs about disability should be questioned. Clinical experience has shown that differing health professionals have differing beliefs about areas of disability. For example an occupational therapist is more likely to highlight difficulties within areas of personal care not noticed by a different health professional. Likewise, family members may be less likely to readily notice and report on all difficulties as they may be unaware of (or in denial) of the problems whom someone trained to assess the areas of disability may observe. One way this problem may be overcome is by using multiple raters and using a mean average for each item.

However, when the individual with a brain injury has contact with few other people who know them well, this can prove difficult and also somewhat time consuming.

Self report measures generally may be unreliable methods of collection data within this client group (Wilson et al., 1996). As researchers we are all too aware of respondents answering in socially desirable manners when presented with questionnaires or interviews (Fleming et al., 1998; Kozma & Stones, 1987). There is the possibility that not only may participants be attempting to play down their perceived difficulties in a manner which would appear that they are lacking awareness of their problems, they may also be responding in a manner which they believe others expect them to. The questionnaire measures used may have benefited from measures of response bias and social desirability being included within the individual items such as the Marlow-Crowne Social Desirability Scale (Crowne & Marlowe, 1960).

Only a limited number of measures were collected for participants. One reason for this is the time involved. Each participant was seen for forty five minutes to one hour. This time would have needed to be increased significantly to include further neuropsychological information. It was felt that this increased time taken to collect data would have meant that fewer participants would have agreed to take part in the study; fewer participants could have been included over the time period within which these data were collected; and would not have added further to the hypotheses. Had more background data been collected, the effects of other variables could have been examined, although the analysis would have been beyond the scope of this study.

Data were collected using the Patient Competency Rating Scale (PCRS), however, as mentioned previously, only data from 19 participants were gained. The PCRS correlated well with the DEX, although due to the low number gained it was not possible to use these data in all of the analyses. It was also found that the PCRS and the DEX appeared to be correlated with different aspect of executive functioning, this is perhaps because the dysexecutive syndrome fractionates (see Burgess et al., 1998). Had there been more data, it may have proven interesting to examine this difference further.

Future work

As mentioned this study could have been improved by using a greater range of standardised measures. At the present time there is difficulty making comparisons between different research due to the different tools being used. A repeat of the study making use of a greater range of tools would be of interest, this would allow a comparison with other studies whilst also examining the various differences with the tools being used.

According to the National Service Framework for long term conditions (DOH, 2005); health services should make provision for the individual from the start to the end of their illness. Although this study has provided an insight into how treatment perspectives should change dependant upon individual need, there is no strong evidence to assess reliably how the areas of psychological distress, awareness and executive functioning may change over time. Cross sectional studies are generally utilised to assess change

over time. Although cross sectional studies are able to provide some information about general group changes over time, due to the lack of homogeneity within this group they are unable to provide a truly accurate picture. This study could be improved and built upon by furthering with a longitudinal study examining the changes in all three variables over time. This would enable a more suitable provision of care for those with a brain injury for as long as is needed. A longitudinal study may also be able to highlight some of the many factors which may have an effect on the three variables and highlight which treatment approaches may be of the most use in enabling successful rehabilitation outcomes. A longitudinal study could be strengthened further by being carried out across numerous brain injury care providers. A multi agency study would ensure that a full spectrum of disabilities and severities of brain injury were included.

Up to this point, severity and site of brain lesions have not been discussed. The main reason for this is the difficulty in assessment. Often severity of brain injury is classed according to length of post traumatic amnesia (PTA) or by use of the Glasgow Coma Scale (GCS) ratings (Ponsford, 1995). However, reports of these are often variable and become difficult to find in case notes several years post injury. In addition, scan data is often unavailable or has not been carried out. A systematic study examining MRI (magnetic resonance imaging) or PET (positron emission tomography) scan data along with the information collected in this study would be of interest to examine if the effects noted are due to brain lesions, psychological consequences or both, particularly as Weinstein (1991) states that the nature of brain lesion may impact on levels of awareness. Studies of site and severity of lesion would also add to the understanding of

causes of reduced awareness in terms of psychological, organic or integrated theories of awareness.

This study was able to show that levels of awareness can be predicted through behavioural symptoms of disability and through levels of psychological distress. In order to assess the reliability of these findings a study examining this may be of interest. According to the findings, if psychological distress can be reduced and executive functioning improved then awareness will also improve. As the rehabilitation of the dysexecutive syndrome has not been fully explored within the literature, a potential first step in examining the reliability of the findings would be to conduct a study aimed at improving mood in those who have sustained a brain injury and then assess any changes in levels of awareness following treatment.

Finally, some clinical implications and areas for treatment have been discussed. Like all evidence based clinical work, evidence for its usefulness and outcome evidence needs to be collected. A study examining the effects of the treatment approaches suggested would be of use in assessing their treatment efficacy.

REFERENCES

- Abramson, L. Y., Seligman, M. E., & Teasdale, J. D. (1978). Learned helplessness in humans: critique and reformulation. *Journal of Abnormal Psychology, 87*, 49-74.
- Alderman, N., Burgess, P. W., Knight, C., & Henman, C. (2003). Ecological validity of a simplified version of the multiple errands shopping test. *Journal of the International Neuropsychological Society, 9*, 31 – 44.
- Alderman, N., & Ward, A. (1991). Behavioural treatment of the dysexecutive syndrome: reduction of repetitive speech using response cost and cognitive over learning. *Neuropsychological Rehabilitation, 1*, 65-80.
- Alloy, L., Abramson, L., Metalsky, G., et al., (1988). The hopelessness theory of depression: Attributional aspects. *British Journal of Clinical Psychology, 27 (5)*, 5-21.
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders*. Fourth Edition. Washington DC: APA.
- Anderson, V. (1998). Assessing executive functions in children: biological, psychological and developmental considerations. *Neuropsychological Rehabilitation, 8*, 319 –349.

Baddeley, A. D., & Wilson, B. A. (1988). Frontal amnesia and the dysexecutive syndrome'. *Brain and Cognition*, 7, 212 – 230.

Bandura, A. (1997). *Self efficacy: The exercise of control*. New York: W H Freeman & Company.

Bowen, A., Neumann, V., Conner, M., Tennant, A., & Chamberlain, M. A. (1998). Mood disorders following traumatic brain injury: identifying the extent of the problem and the people at risk. *Brain Injury*. 12 (3), 177 – 190.

Brooks, D. N., McKinlay, W., Symington, C., Beattie, A. and Campsie, L. (1987). The effects of severe head injury upon patient and relative within seven years of injury. *Journal of Head Trauma Rehabilitation*, 2, 1-13.

Burgess, P. W. (1997). Theory and methodology in executive function research. In P. Rabbitt (editor), *Methodology of frontal and Executive Function*. Hove: Psychology Press, pp 81-113.

Burgess, P. W., Alderman, N., Evans, J. J., et al. (1998). The ecological validity of executive function. *Journal of the International Neuropsychological Society*, 4, 547 – 558.

Burgess, P. W. & Alderman, N. (1990). Rehabilitation of dyscontrol syndromes following frontal lobe damage: A cognitive neuropsychological approach. In R. L. Wood and I. Fussey. *Cognitive Rehabilitation in Perspective*. (Bristol: Taylor and Francis). pp 183-202.

Clark, D. M. & Wells, A. (1995). A cognitive model of social phobia. In R. G. Heimberg, M. R. Liebowitz, D. A. Hope, & R. F. Schneier, (Eds) *Social Phobia: Diagnosis, assessment and treatment* (pp 69-93). New York: Guilford Press.

Cohen, A. K., & Hollands, S. (1988). *Statistical Power Analysis for the Behavioural Sciences*. (Hillsdale, NJ: Erlbaum).

Cooper-Evans, M, S. (2005). *Self-esteem and self concept as predictors of behaviour during rehabilitation after a severe brain injury: an exploratory study*. Unpublished thesis, submitted in partial fulfillment of the statement of equivalence in Clinical Psychology for the British Psychological Society.

Coopersmith, S. (1967). *The antecedents of self-esteem*. San Francisco: W. H. Freeman.

Crawford, J. R., Henry, J. D., Crombie, C., & Taylor, E. P. (2001). Normative data for the HADS from a large non-clinical sample. *British Journal of Clinical Psychology*. 40, 429 – 434.

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, 24, 349-354.

Curran, C. A., Ponsford, J. L., & Crowe, S. (2000). Coping strategies and emotional outcome following traumatic brain injury: A comparison with orthopaedic patients. *Journal of Head Trauma Rehabilitation*, 15, (6), 1256-1274.

Darlington, R. B. (1990). *Regression and linear models*. McGraw Hill: London.

Deaton, A. V. (1986) Denial in the aftermath of traumatic head injury: its manifestations, measurement and treatment. *Rehabilitation Psychology*. 31, 231 – 240.

Department of Health. (2005). *National Service Framework for Long term Conditions*.

Ezrachi, O., Ben-Yishay, Y., Kay, T., Diller, L., & Rattok, J. (1991). Predicting employment in traumatic brain injury following neuropsychological rehabilitation. *Journal of Head Trauma Rehabilitation*, 6, (3), 71 – 84.

Evans, J. J., Chua, S. E., McKenna, P. J., & Wilson, B. A. (1997). Assessment of the dysexecutive syndrome in schizophrenia. *Psychological medicine*, 27, (3), 635-46.

Fleming, J. M., Strong, J., & Ashton, R. (1998) Cluster analysis of self awareness levels in adults with traumatic brain injury and relationship outcome. *Journal of Head Trauma Rehabilitation*, 13, 39 –51.

Fogel, B. S. (1994). The significance of frontal system disorders for medical practice and health policy. *Journal of Neuropsychiatry*, 6, 343 – 347.

Gasquoine, P. G. & Gibbons, T. A. (1994). Lack of awareness of impairment in institutionalized, severely and chronically disabled survivors of traumatic brain injury: A preliminary investigation. *Journal of Head Trauma Rehabilitation*, 9 (4), 16-24.

Giacino, J. T., & Cicerone, K.D. (1998). Varieties of deficit unawareness after brain injury. *Journal of Head Trauma Rehabilitation*, 13, 1 – 15.

Godfrey, H. P. D., Partridge, F. M., Knight, R. G., Bishara, S. (1993). Course of insight disorder and emotional dysfunction following closed head injury: A controlled cross-sectional follow up study. *Journal of Clinical and Experimental Neuropsychology*, 15, 503 – 515.

Gordon, W. A., Haddad, L., Brown, M., Hibbard, M. R., & Sliwinski, M. (2000). The sensitivity and specificity of self reported symptoms in individuals with traumatic brain injury. *Brain Injury*, 14 (1), 21-33.

Guercio, J. M., Podolska-Schroeder, H., & Relfeldt, R. A. (2004). Using stimulus equivalence technology to teach emotion recognition to adults with acquired brain injury. *Brain Injury, 18*, (6), 593-601.

Guindon, M. H. (2002). Toward accountability in the use of the self esteem construct. *Journal of Counselling and Development, 80* (2), 204-214.

Hardy, R. M., Oyebode, J. R., & Clare, L. (2006). Measuring awareness in people with mild to moderate Alzheimer's disease: Development of the Memory Awareness Rating Scale-adjusted. *Neuropsychological Rehabilitation, 16*, (2), 172-197.

Harris, E. C., & Barraclough, B. (1997). Suicide as an outcome for mental disorders: A meta-analysis. *British Journal of Psychiatry, 170*, 205 – 228.

Harris, R.J. (1985). *A Primer of Multivariate Statistics*, (2nd. ed.), Orlando, FL., Academic Press.

Hart, R. P. (1994). Forgetting in traumatic brain injured patients with persistent memory impairment. *Neuropsychology, 8*, 325 – 332.

Hart, T., Whyte, J., Kim, J., & Vaccaro, M. (2005). Executive function and self – awareness of “real world” behaviour and attention deficits following traumatic brain injury. *Journal of Head Trauma Rehabilitation, 20* (4), 333-347.

Halvorson, M. B. J. (1997). Coping, adjustment and self concept among siblings of the chronically mentally ill. *Dissertation Abstracts International*, 58, 3316.

Headway Organisation (2001). *The Brain Injury Association*. England.

Hibbard, M. R., Uysal, S., Keple, K., Bogdany, J., & Silver, J. (1998). Axis I psychopathology in individuals with traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 13, 24 – 39.

Hillier, S. L. & Metzger, J. (1997). Awareness and perceptions of outcomes after traumatic brain injury. *Brain Injury*, 11, 525-536.

Howell, D.C. (1997). *Statistical Methods for Psychology* (4th Edition). Duxbury: London.

Howes, H. F. R., Edwards, S., & Benton, D. (2005). Female Body image following acquired brain injury. *Brain Injury*, 19 (6), 403-415

Kinsella, G., Ford, B., & Moran, C. (1989). Survivors of social relationship following head injury. *International Journal of Disability*, 11, 9 – 14.

Knight, C. (1999). *The Assessment of Executive Functioning Following Acquired Brain Injury: A Review, Volume 1*. Unpublished Doctoral Thesis, University of Birmingham: Birmingham

Knight, C., Alderman, N., & Burgess, P. (2002). Development of a simplified version of the multiple errands test for use in hospital settings. *Neuropsychological Rehabilitation*, 12, (3), 231-255.

Kozma, A., & Stones, M. J. (1987). Social desirability in measures of subjective well being: A systematic review. *Journal of Gerontology*, 42, (1), 56-59.

Lam, C. S., McMahon, B. T., & Priddy, (1988) D. A. Deficit awareness and treatment performance among traumatic head injured adults. *Brain Injury*. 2, 235 – 242.

Lazarus, D. S., & Folkman, S. (1984). *Stress, appraisal and coping*. New York: Springer.

Luria, A. R. (1981). *Higher Cortical Functions in Man*. (New York: Basic Books)

Moore, A.D. and Stambrook, M. (1995). Cognitive Moderators of outcome following traumatic brain injury: a conceptual model and implications for rehabilitation. *Brain Injury*, 9, 109 – 130.

Morton, M. V., & Wehman, P. (1995). Psychosocial and emotional sequelae of individuals with traumatic brain injury: a literature review and recommendations. *Brain Injury*. 9, 81 – 92.

Norris, G., & Tate, R. L. (2000). The Behavioural Assessment of the Dysexecutive Syndrome (BADs): Ecological, concurrent and construct validity. *Neuropsychological Rehabilitation*, 10, (1), 33-45.

Ownsworth, T., McFarland, K., & Young, R. M. (2000). Self awareness and psychosocial functioning following acquired brain injury: An evaluation of a group support programme. *Neuropsychological Rehabilitation*, 10 (5), 465-484.

Ownsworth, T (2004). *Self awareness following brain injury: A contextual understanding to management for clinicians*. 28th May 2004. Oliver Zangwill Centre: Ely

Ownsworth, T., & Fleming, J. (2005). The relative importance of metacognitive skills, emotional status, and executive function in psychosocial adjustment following acquired brain injury. *Journal of Head Trauma Rehabilitation*, 20, (4), 315-332.

Penfield, W., & Evans, (1935). J. The frontal lobe in man: A clinical study of maximum removals, 58, 115 – 133.

Ponsford, J. (1995). *Traumatic Brain Injury. Rehabilitation for everyday adaptive living*. Lawrence Erlbaum Associates Ltd: UK.

Ponsford, J., Olver, J., Nelms, R., & Curran, C. (1996). Self report of problems and emotional adjustment 2-5 years following traumatic brain injury. In: Ponsford, J., Snow, P., & Anderson, V. (Eds). *International perspectives in traumatic brain injury*. Proceedings of the 5th conference of the International Association for the Study of Brain Injury and the Study of Brain Impairment (pp434-437). Bowen Hills, Australia: Australian Academic Press.

Pollens, R. D., McBratnie, B. P., & Burton, P. L. (1988). Beyond cognition: Executive functions in closed head injury. *Cognitive Rehabilitation*, 6, 26-32.

Port, A., Wilmott, C. & Charlton, J. (2002). Self awareness following traumatic brain injury and implications for rehabilitation. *Brain Injury*, 16, (4), 277-289.

Powell, T. (1994). *Head Injury: A Practical Guide*. Winslow Press:

Prigatano, G. P., Fordyce, D. J., Zeiner, H. K., Roueche, J. R., Pepping, M & Wood, R. (1986). *Neuropsychological Rehabilitation after Brain Injury*. Baltimore, MD: Johns Hopkins University Press

Prigatano, G. P., & Fordyce, D. J. (1986). Cognitive dysfunction and psychosocial adjustment after brain injury. In G. P. Prigatano (Ed), *Neuropsychological rehabilitation after brain injury*. (pp 1 – 17). Baltimore, MD: Johns Hopkins University Press.

Prigatano, G. P., & Klonoff, P. S. (1998). A clinician's rating scale for evaluating impaired self awareness and denial of disability after brain injury. *The Clinical Neuropsychologist*, 12, 56 – 67.

Prigatano, G. P., Klonoff, P. S., O'Brien, K. et al. (1994) Productivity after neuropsychologically oriented milieu rehabilitation. *Journal of Head Trauma Rehabilitation*, 9, 235 – 242.

Rapee, M. R., & Heimberg, R. G. (1997). A cognitive-Behavioural model of anxiety in social phobia. *Behaviour Research Therapy*, 35 (8), 741-756.

Rylander, G. (1939). Personality changes after operation on the frontal lobes. *Acta Psychiatrica Neurologica*, 30. 201 – 211.

Sawchyn, J. M., Mateer, C. A., & Braxton Suffield, J. (2005). Awareness, adjustment, and injury severity in post acute brain injury. *Journal of Head Trauma Rehabilitation*, 2, (4), 301-314.

Sbordone, R. J. (1996). Ecological validity: Some critical issues for the neuropsychologist. In R. Sbordone & C. Long (Eds.), *Ecological validity of neuropsychological testing*. Delray Beach, Florida: St Lucie Press.

Sherer, M., Oden, K., & Bergloff, P. (1988). Assessment and treatment of impaired awareness after brain injury: implications for community integration. *Neurorehabilitation*. 11, 143 – 205.

Shallice, T. (1982). Specific impairments of planning. *Philosophical Transactions of the Royal Society London (Biology)*, 298, 199 – 209.

Scheutzw, M. H., & Wiercisiewski, D. R. (1999). Panic disorder in a patient with traumatic brain injury: A case report and discussion. *Brain Injury*. 13, 705 – 714.

Sohlberg, M.M., Mateer, C. A., & Stuss, D. T. (1993). Contemporary approaches to the management of executive control dysfunction. *Journal of Head Trauma Rehabilitation*, 8, 45 – 58.

Stuss, D.T. (1991).Self, awareness and the frontal lobes: a neuropsychological perspective. In J. Strauss and G. R. Goethals (Eds) *The Self: interdisciplinary Approaches* (New York: Springer). pp. 255 – 278.

Stuss, D. T., & Benson, D. F. (1986) *The Frontal Lobes*. Raven Press: New York.

Teasdale, T., & Engberg, A. W. (2001). Suicide after traumatic brain injury: a population study. *Journal of Neurology, Neurosurgery and Psychiatry*, 71, 436 – 440.

Trudel, T. M., Tryon, W. W., Purdum, C. M. (1998). Awareness of disability and long term outcome after brain injury. *Rehabilitation Psychology*, 43, (4), 267-281.

Tyremen, A., & Humphrey, M. (1984). Changes in self concept following severe head injury. *International Journal of Rehabilitation Research*, 7, (1), 11-23.

Valentine, T., Powell, J., Davidoff, J., Letson, S., & Greenwood, R. (2006). Prevalence and correlates of face recognition after acquired brain injury. *Neuropsychological Rehabilitation*, 16, (3), 272-297.

Van den Broek, M. D. (1999). Cognitive rehabilitation and traumatic brain injury. *Reviews in Clinical Gerontology*, 9, 255-264.

Varney, N. R., & Menefee, L. (1993). Psychosocial and executive deficits following closed head injury: implications for orbital frontal cortex. *Journal of Head Trauma Rehabilitation*, 8, 32 – 44.

Wallace, C. A., Bogner, J. (2000). Awareness o deficits: emotional implications for persons with brain injury and their significant others. *Brain Injury*. 14, (6), 549 – 562.

Wechsler, D. (1999). The Wechsler Adult Intelligence Scale Third Edition (UK).
Oxford: Harcourt Assessment.

Wells, A. (1997). *Cognitive therapy of anxiety disorders. A practice manual and conceptual guide.* (Chichester :John Wiley & sons).

Weinstein, E. A. (1991). Anosognosia and denial of illness. In G. P. Prigitano & D. L. Schacter (Eds.), *Awareness of deficit after brain injury: Clinical and theoretical issues.* (New York: Oxford University Press).

Williams, W. H., Evans, J. J., & Wilson, B. A. (1999). Outcome measures for survivors of acquired brain injury in day and outpatient neurorehabilitation programmes. *Neuropsychological Rehabilitation*, 9, (3/4), 421-436.

Williams, W. H. (2003) Neurorehabilitation and cognitive behaviour therapy for emotional disorders in acquired brain injury. In B. A. Wilson (Ed) *Neuropsychological Rehabilitation: Theory and Practices.* (Lisse: Swets & Zeitlinger) pp 115 – 135.

Wilson, B.A., Alderman, N., Burgess, P. W., Emslie, H., and Evans, J.J. (1996). *Behavioural Assessment of the Dysexecutive syndrome.* London: Harcourt Assessment.

Wilson, B. A., Cockburn, J., & Baddeley, A. (2003). The Rivermead Behavioural Memory Test Second Edition. London: Harcourt Assessment.

Wright, J. C., & Telford, R. (1996). Psychological consequences following minor head injury: a prospective study. *British Journal of Clinical Psychology*, 35, 399-412.

Zigmond, A. and P. Snaith (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*, 67, 361-370.

CRITIQUE OF THE RESEARCH PROCESS

Origin of the study

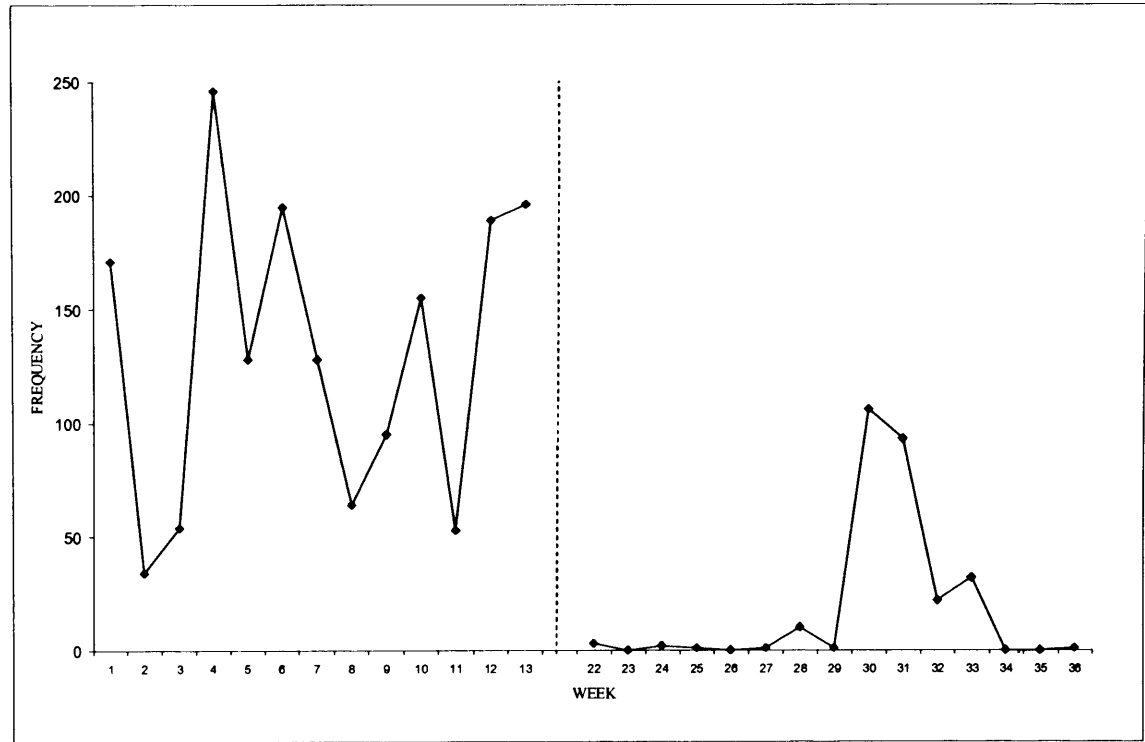
Initial interest

The initial interest in this area of research came about through a piece of clinical work being prepared for a visitors day presentation at Kemsley Hospital, St Andrew's group of hospitals, a national brain injury rehabilitation service. This was subsequently followed up by publication (Swan & Alderman, 2004). An important aspect of the presentation and later publication, was a discussion of reducing challenging behaviour within the service. The piece of work being prepared included a case study of a client who exhibited extremely challenging behaviour. It is beyond the scope of this critique to describe in detail the case, for this the reader is directed to Swan and Alderman (2004). The most challenging behaviour from a rehabilitation perspective was physical and verbal aggression. This was recorded using the Overt Aggression Scale – Modified for Neurorehabilitation (Alderman et al., 1997). Figure 1* shows the frequency of all aggression recorded over a 36 week period (from admission). It can be seen from Figure 1 that aggression had reduced significantly, however at approximately week 30, an increase in the frequency of aggression was observed. In order to prepare this case for presentation, it was necessary to understand the reason for this increase. A review of the case notes was conducted along with consultation of team members. It was finally concluded that this increase in aggression coincided with the client's increased awareness of his injury and his social circumstances. Previously no awareness had been demonstrated. The client was unable to walk and on admission had been unable to carry out any personal hygiene tasks independently. Although functionally he had made

* Consent has been obtained to use this data, however all personal information has been withheld in order to ensure anonymity.

gains, up to this point the client had demonstrated no awareness that he was living in hospital and required assistance for most activities of daily living. At approximately week 30 he became aware that he was no longer married; was living in hospital; and was unable to live independently. It was finally concluded, that it was likely that the resulting challenging behaviour occurred as he had gained more awareness into his disabilities and that his psychological distress was being reflected in his verbally abusive behaviour.

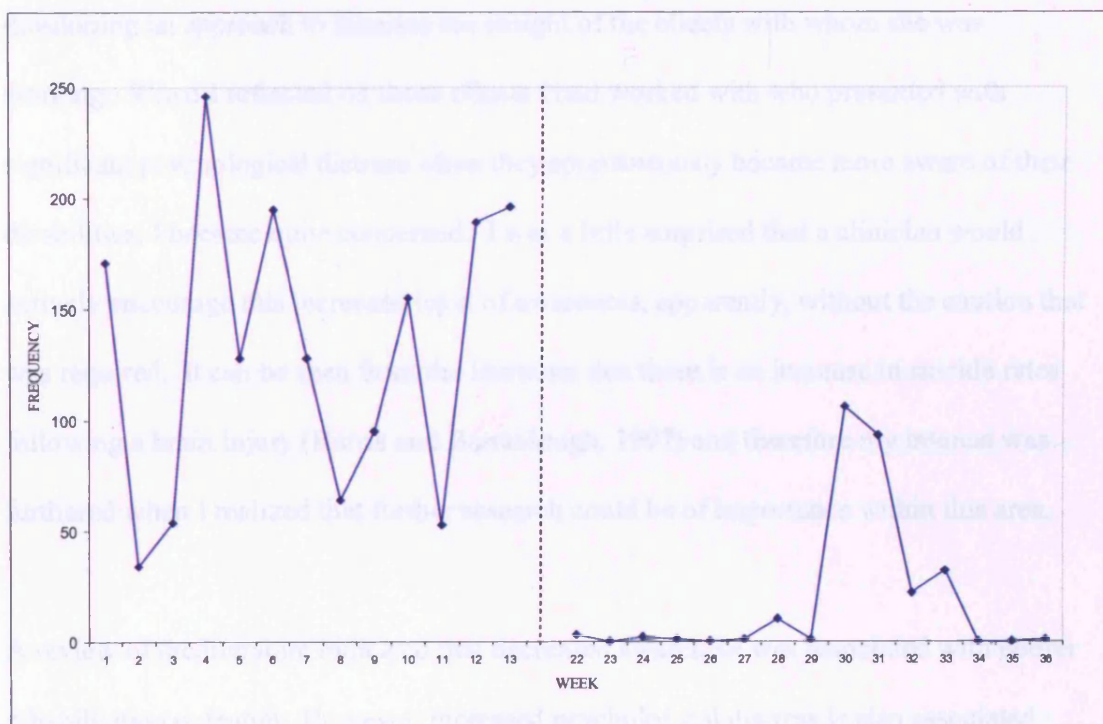
Figure 1. Frequency of all aggression since admission



It was this realization of the effect that increased awareness could have on a person following an acquired brain injury that initially interested me in the area. In addition, it

gains, up to this point the client had demonstrated no awareness that he was living in hospital and required assistance for most activities of daily living. At approximately week 30 he became aware that he was no longer married; was living in hospital; and was unable to live independently. It was finally concluded, that it was likely that the resulting challenging behaviour occurred as he had gained more awareness into his disabilities and that his psychological distress was being reflected in his verbally abusive behaviour.

Figure 1. Frequency of all aggression since admission



It was this realization of the effect that increased awareness could have on a person following an acquired brain injury that initially interested me in the area. In addition, it

became evident following this experience that numerous patients with whom I was working experienced similar increases in awareness and although they were not always aggressive, their behaviour could be challenging in other ways, for example, withdrawing from any rehabilitation and becoming emotionally withdrawn.

Further interest

My interest in this area was furthered following a conference focusing on rehabilitation of those with acquired brain injuries. Following a paper, one of the delegates stood up to comment on what had been said. During her comments she stated that she was developing an approach to increase the insight of the clients with whom she was working. When I reflected on those clients I had worked with who presented with significant psychological distress when they spontaneously became more aware of their disabilities, I became quite concerned. I was a little surprised that a clinician would actively encourage this increased level of awareness, apparently, without the caution that was required. It can be seen from the literature that there is an increase in suicide rates following a brain injury (Harris and Barraclough, 1997) and therefore my interest was furthered when I realized that further research could be of importance within this area.

A review of the literature indicated that decreased awareness was associated with poorer rehabilitation potential. However, increased psychological distress is also associated with poorer rehabilitation potential. Clinical experience, along with the supporting literature demonstrated that as increased awareness was associated with increased

psychological distress rehabilitation potential did not appear to be good. This paradox interested me, as did finding the best possible resolution.

Finally, during my first year as a Trainee Clinical Psychologist, I attended a conference discussing rehabilitation and employment outcomes following acquired brain injury (Ownsworth, 2004). At this conference, an examination was presented of emotional status, awareness and executive function. Following this conference, my interest in this area was re-awakened. However, the tools that were used to examine such constructs as executive function did not reflect the current literature on ecological validity and measurement of executive function. As executive function is a multi faceted construct (Burgess et al., 1998), I felt that although the findings from the conference paper were interesting, tools were needed that reflected greater ecological validity. There is a need for real world disabilities to be reflected in the outcome of clinical research. In addition, no real exploration had been conducted to examine how, or if, the three variables interacted with one another. I believed that further investigation into the interaction of the three variables, using regularly used and ecologically valid tools would be helpful in clinical practice.

Devising the study

There are a number of elements of design which have been reflected upon through out the research and the initial research protocol. Some areas have been critiqued within the study, where possible these will not be repeated here unless a fuller explanation is felt necessary.

Firstly as there is some discussion of the measures used within the research report, I will be briefly clarify the reasoning for those chosen. Three of the measures chosen are regularly used and often reported within the literature. The main reason for the choice of these measures was their proven validity within the area. Other studies described had used lesser known measures, with little evidence of their validity and as such, this was one of the criticisms made of previous research. It was felt necessary to use tools that would be replicable by other psychologists and as such, measures which are commonly reported within the literature were chosen.

A point which I feel is worthy of mention is the ethical review process. I found the process very helpful in ensuring that I had fully thought through the design of the study and the potential ethical implication. Actually having to consider the study as a whole from start to finish prior to commencing ensured that many potential difficulties were over come before they arose. However, I did find the process very frustrating. This was from an administrative aspect though, for example, having to explain to administrative assistants that although I was meeting with the participants I was not carrying out qualitative research and should not have to fill in the COREC form aimed at 'qualitative research only'. I was pleasantly surprised at the Ethical review. The panel were very pleasant and were very positive, not what I had anticipated from others' descriptions. If all ethics groups were that welcoming I would happily attend again!

Participant recruitment

The recruitment of participants proved to be more time consuming than was previously expected. On reflection it is likely that the preconceptions about the time required for recruitment arose from lack of experience with this type of research. Previously any research conducted had occurred along side clinical practice, without an emphasis on time limiting requirements. Although I under estimated the time required for recruitment I was still able to recruit the required number of participants. However, the under estimate of time did have some impact on the study. For example, it was hoped that an equal number of participants could be recruited from the in patient service as from the out patient service. Due to the smaller number of participants recruited from the community, it was not possible to make comparisons between the two groups. I realized perhaps a little too late that I did not have as much time as I would have liked to recruit more participants from the community brain injury team. The first reason for this was my initial reliance on other team members to highlight potential participants. After approximately two months of waiting for the team members to identify clients for me, I eventually had to become more proactive. I found that I needed to speak to individual team members on a regular basis to ensure that they were mentioning my study to their clients (as stated in the research protocol). However, by the time I had adopted this more pro active stance, I did not have enough time to recruit as many participants as I originally wanted from the community. An interesting addition to the study would have been an examination of awareness between those living independently and those living within a hospital environment. From clinical experience I believe there would be a difference, however, I have been unable to explore this further in this study.

Another aspect concerning participant recruitment which was a little unexpected was the difficulty accessing patients on some of the wards within Kemsley. As I had previously worked within the Hospital and was familiar with the environment I did not anticipate having difficulty with accessing the participants. However, on one of the wards I was a little dismayed to find that on arrival on the ward (following making appointments to meet with some of the clients), the clients had been taken out, were in other sessions or other meetings had been arranged. This experience demonstrated to me the difficulty in carrying out research and the need to rely on other peoples' support, even when they are not directly involved in the research. As mentioned in the discussion, another difficulty proved to be retrieving rating forms from staff. A number of participants had to be excluded from the study as rating forms completed by staff were not returned.

These points described above all illustrate the potential difficulties researchers can have when requiring the assistance and co-operation of others. However, when I have reflected upon the minor difficulties I have experienced I do feel that on the whole the recruitment of participants ran relatively smoothly. Any difficulties in recruitment could in part be explained by my inexperience in participant recruitment and an underestimation of the time required.

A final point regarding participant recruitment which I considered for quite some time prior to commencing the research was the exclusion of those who were deemed unable to consent. My greatest concern was that the data would not be representative of the

population if those who were unable to consent were unable to take part. It is likely that those unable to consent would have less awareness of their disabilities. Therefore, excluding this group may have had an impact on the results. This group was excluded however due to the anticipated difficulty with ethical review. As a psychologist I feel uneasy about excluding a group of people in research which could potentially benefit their treatment and rehabilitation outcome. I am concerned that as the ethical review process becomes ever tighter, and at times rightly so, that groups of people will be excluded from research. Through this process I am led to question how we are able to work in an evidence based framework, when those most vulnerable and in need of treatment are excluded from the evidence base.

Data collection

On the whole the actual collection of data ran smoothly. The greatest barrier to achieving the required results was the poor return of the PCRS forms, requiring exclusion from most of the analysis. This has been discussed elsewhere so shall not be discussed further, other than to say it was unexpected and again this was perhaps due to inexperience and over confidence in the willingness of others to assist in the research process.

As stated above, access to some participants within Kemsley was hindered. This did to some extent affect data collection. Some potential participants who had agreed to take part in the study had to be excluded due to the difficulty in actually meeting to complete the measures.

Data analysis

The data analysis has provided a steep learning experience. Prior to commencing the research and submitting to Ethics a statistician was consulted. However, I did not find him particularly helpful, as not only was I unable to understand some of his comments, I felt that he was unable to understand some of the concepts I was examining, for example awareness and psychological distress. Therefore, much of my analysis was conducted via statistical manuals and the assistance of my field supervisor. I had undertaken correlational analysis previously. However, this was some time ago and only included single correlations. At times I experienced difficulty in grasping the results as a whole, this had obvious implications for my understanding of the discussion. In addition, I had not undertaken multiple regression analysis before and to understand the rationale and process of the multiple regression required reading of numerous statistical books and a number of discussions with my field supervisor. If I am to undertake such statistical analysis again, I would attempt to seek out the advice of a statistician with an understanding of psychological principles.

Reflections

Finally, my general reflections on the research process as a whole. When considering the research process I experience a number of feelings: relief that it is almost over; frustration at not being able to collect all of the information I am interested in; interest in wanting to assess the suitability of the interventions suggested. I could ramble on

endlessly discussing my reflections on the research process as a whole, however, I will briefly mention three areas that I have spent much time thinking about.

Time

As mentioned above, my under estimation of the time required to carry out aspects of the research was a hindrance. I do not feel that lack of time caused any significant problems that could not be overcome, however, I feel the research could have been much improved if the time required had been anticipated. I have therefore spent some time considering the length of time necessary to complete such a study and the advantage and disadvantages of conducting a time limited piece of research versus ongoing research. From carrying out this piece of time limited research I have learnt the need for more of a focus on the important aspects of a study. As mentioned previously, there are a number of areas that I would like to have explored, yet due to time limitations I was unable to. I believe this ability to focus can be a great advantage and I will take the skills I have developed with me into clinical practice.

Supervision Process

I feel that I should make comment on my experiences of the supervisory process. At times I have felt quite alone throughout the research process. I remain unsure as to what is expected of me as a 'supervisee' and what is expected of my supervisor. Following discussion with other trainees I am aware that the supervisory process differs greatly. I continue to be unsure as to my responsibilities as a trainee clinical psychologist and as the principal investigator in this piece of research. At times the research process has felt

very solitary and the supervisory process has not been as supportive as was expected.

Although I believe this piece of research could be improved, I do feel that I have managed to conduct it adequately. Knowing that I have carried out this research with minimal supervision until the last few weeks has given me the confidence to believe I would be able to conduct independent research in the future.

Willingness to conduct future research

Often I have heard newly qualified psychologists state that they never want to conduct a piece of research again. Because of these comments over recent months I have often considered how my views on research have changed. My experiences of this research process have not all been positive and perhaps my most difficult periods have been when I have felt very isolated and as though nobody else has any interest in my research. My appraisals of the situation at these times were perhaps not completely unrealistic, yet they were not so traumatic as to impact significantly enough to taint my view of the research process. I am a firm believer in the need for continued advancement and evidence based practice. My experiences carrying out this piece of research have equipped me with skills I was previously lacking and have 'opened my eyes' a little to the reality of some aspects of research. My beliefs in the need for continued research, along with my experiences with this research mean that I will continue with my research interests and continue improving my skills as a researcher.

REFERENCES

Alderman, N., Knight, C., & Morgan, C. (1997). Use of a modified version of the overt aggression scale in the measurement and assessment of aggressive behaviours following brain injury. *Brain Injury*, 11, 503 – 523.

Burgess, P. W., Alderman, N., Evans, J. J., et al. (1998). The ecological validity of executive function. *Journal of the International Neuropsychological Society*, 4, 547 – 558.

Harris, E. C., & Barraclough, B. (1997). Suicide as an outcome for mental disorders: A meta-analysis. *British Journal of Psychiatry*, 170, 205 – 228.

Owensworth, T (2004). *Self awareness following brain injury: A contextual understanding to management for clinicians*. 28th May 2004. Oliver Zangwill Centre: Ely

Swan, L., & Alderman, N. (2004). Measuring the relationship between overt aggression and expectations: a methodology for determining clinical outcomes. *Brain Injury*, 18, (2), 143-160.

Wood, R. L. (1990). *Neurobehavioural sequelae of traumatic brain injury*. London: Taylor Francis.

Wood, R. L. (2001). Understanding neurobehavioural disability. In R.L. Wood and T. M. McMillan (Eds.). *Neurobehavioural disability and social handicap following traumatic brain injury*. Pp3 – 28. Hove: Psychology Press.

APPENDICES

Appendix 1: Instructions for authors for journals ‘Brain Injury’

SPECIAL NOTE

**ITEM SCANNED AS SUPPLIED
PAGINATION IS AS SEEN**

[Contact Us](#) [Members of the Group](#)

Product Search

All Products

Journals Listings

[Alphabetical Listing](#)[Journals by Subject](#)[New Journals](#)

Author Resources

[Author Rights](#)[Copyright Transfer FAQs](#)[Instructions for Authors](#)

General Resources

[Advertising](#)[Commercial Opportunities](#)[Customer Services](#)[Email Contents Alerting](#)[eUpdates](#)[Online Information](#)[Online Sample Copies](#)[Permissions](#)[Press Releases](#)[Price List](#)[Publish with Us](#)[Reprints](#)[Subscription Information](#)[Special Issues](#)[Special Offers](#)[Webfirst](#)

Related Websites

[Arenas](#)[Preview](#)[LibSite](#)[Books](#)[eBooks](#)[T&F Events](#)

Instructions for Authors:

[Click here to check your article status](#)

*****Note to Authors:** please make sure your contact address information is clearly visible on the **outside** of all packages you are sending to Editors.***

General Guidelines

This journal covers all aspects of brain injury from basic science, neurological techniques and outcomes to vocational aspects, with studies of rehabilitation and outcome of both patients and their families. It addresses both adult and paediatric issues and it embraces issues such as family and peer relationships, effects of alcohol and drugs, communication problems and management techniques and creating new programmes. **Brain Injury** uses case studies to illustrate different approaches to a subject, and provides a forum for the appraisal of theories which may influence future research. **Brain Injury** is the official research journal of the *International Brain Injury Association*.

This journal is now available on line.

Contacting the Editors:

Jeff Kreutzer, Department of Physical Medicine & Rehabilitation, Virginia Commonwealth University, Medical College of Virginia Campus Richmond, VA 23298-0542, USA

Nathan Zasler, Concussion Care Centre of Virginia, 10120 West Broad Street, Suite G & H Glen Allen, VA 23060, USA

Associate Editors:

William W McKinlay, ScotCare Brain Injury Rehabilitation Unit, UK

Contacting Taylor & Francis

Production Editorial Department (Brain Injury), Taylor & Francis Ltd, 4 Park Square, Milton Park, Abingdon, Oxfordshire, OX14 4RN, UK

Email: web.queries@tandf.co.uk

Submitting a paper to Brain Injury

All manuscripts should be submitted to the **Journal Editorial Office** - Jennifer H. Marwitz, Department of Physical Medicine & Rehabilitation, Virginia Commonwealth University, Medical College of Virginia Campus Richmond, VA 23298-0542, USA. Please do not submit manuscripts directly to the Publisher." Then the next line of text should begin on a new paragraph.

Brain Injury considers all manuscripts at the Editor's discretion; and the Editor's decision is final.

Brain Injury considers all manuscripts on condition they are the property (copyright) of the submitting author(s) and that copyright will be transferred to the journal **Brain Injury** and Taylor & Francis Ltd, if the paper is accepted.

Brain Injury considers all manuscripts on the strict condition that they have been submitted

only to **Brain Injury**, that they have not been published already, nor are they under consideration for publication, nor in press elsewhere. Authors who fail to adhere to this condition will be charged all costs which **Brain Injury** incurs, and their papers will not be published.

- Please write clearly and concisely, stating your objectives clearly and defining your terms. Your arguments should be substantiated with well reasoned supporting evidence.
- In writing your paper, you are encouraged to review articles in the area you are addressing which have been previously published in the journal, and where you feel appropriate, to reference them. This will enhance context, coherence, and continuity for our readers.
- For all manuscripts, gender-, race-, and creed-inclusive language is mandatory.
- *Ethics of Experimentation*: Contributors are required to follow the procedures in force in their countries which govern the ethics of work done with human subjects. The Code of Ethics of the World Medical Association (Declaration of Helsinki) represents a minimal requirement.
- Abstracts are required for all papers submitted, they should not exceed 150 words and should precede the text of a paper; see 'Abstracts'.
- Manuscripts should be printed on one single side of A4 or 8 x 11 inch white good quality paper, double-spaced throughout, including the reference section.
- An original and three copies of the manuscript must be submitted.
- Accepted manuscripts in their final, revised versions, should also be submitted as electronic word processing files on disk; see 'Electronic Processing'.
- Authors should include telephone and fax numbers as well as e-mail addresses on the cover page of manuscripts.
- In writing your paper, you are encouraged to review articles in the area you are addressing which have been previously published in the journal, and where you feel appropriate, to reference them. This will enhance context, coherence, and continuity for our readers.

Electronic Processing

We strongly encourage you to send us the final, revised version of your article in both hard (paper) and electronic (disk) forms. This Guide sets out the procedures which will assure we can process your article efficiently. It is divided into three sections:

1. **a guide for authors using standard word-processing software packages**
2. **a guide for authors using LaTeX mathematical software packages**
3. **a guide for authors using graphics software packages**

There are some general rules which apply to all three options.

- these guides do not apply to authors who are submitting an article for consideration and peer review; they apply only to authors whose articles have been reviewed, revised, and accepted for publication
- print out your hard (paper) copy from the disk you are sending; it is essential that the hard-copy printout is identical to the material on the disk; where versions differ, the hard copy will take precedence. We advise that you maintain back-ups of your files
- save and send your files on a standard 3.5 inch high density disk (Mac or PC); please do not attempt to send the article via file transfer protocol or email
- when saving your article onto a disk, please make sure that the files do not

exceed a manageable size. Please ensure that figures are saved on a separate disk

- ensure that the files are **not** saved as read only
- virus-check your disk before sending it to the Editor
- label your disk
- package disks in such a way as to avoid damage in the post
- disks are not returnable after publication

If you are not sure about the usability of your disk, contact Neshla Avey, Production Editor, Taylor & Francis Ltd, 4 Park Square, Milton Park, Abingdon, Oxfordshire, OX14 4RN, UK. web.queries@tandf.co.uk

1. A guide for authors using standard word-processing software packages

For the main text of your article, most standard PC or Mac word-processing software packages are acceptable, although we prefer Microsoft Word in a PC format.

Word-processed files should be prepared according to the journal style.

Avoid the use of embedded footnotes. For numbered tables, use the table function provided with the word-processing package.

All text should be saved in one file with the complete text (including the title page, abstract, all sections of the body of the paper, references), followed by numbered tables and the figure captions.

You should send the following to the Editor:

- a 3.5-inch disk containing the final, accepted version of the paper
- include an ASCII/text only version on the disk as well as the word processed version if possible
- two hard copy printouts

Disks should be clearly labelled with the following information:

1. Journal title
2. Name of author
3. File names contained on disk
4. Hardware used (PC or Mac)
5. Software used (name and version)

Sample disk label: text

Journal title
A.N. Author
article.doc
IBM PC
MS Word for Windows 7.0

2. A guide for authors using LaTeX mathematical software packages

Authors who wish to prepare their articles using the LaTeX document preparation system are advised to use article.sty (for LaTeX 2.09) or article.cls (for LaTeX2e).

The use of macros should be kept to an absolute minimum but if any are used they should be gathered together in the file, just before the \begin{document} command

You should send the following to the Editor:

- a 3.5-inch disk containing the final, accepted version of the paper
- the files you send must be text-only (often called an ASCII file), with no system-dependent control codes
- two hard copy printouts

Disks should be clearly labelled with the following information:

1. Journal title
2. Name of author
3. File names contained on disk
4. Hardware used (PC or Mac)
5. Software used (name and version)

Sample disk label: LaTeX

Journal title
A.N. Author
article.tex article.sty
IBM PC
PCLaTeX v2.09

3. A guide for authors using graphics software packages

We welcome figures on disk, but care and attention to these guidelines is essential, as importing graphics packages can often be problematic.

1. Figures must be saved on a separate disk from the text.
2. Avoid the use of colour and tints for aesthetic reasons. Figures should be produced as near to the finished size as possible.
3. High quality reproducible hard copy for all line figures (printed out from your electronic files at a minimum of 600 dpi) must be supplied in case the disks are unusable; photographs and transparencies can be accepted as hard copy only. **Photocopies will not be accepted.**
4. All figures must be numbered in the order in which they occur (e.g. figure 1, figure 2 etc.). In multi-part figures, each part should be labelled (e.g. figure 1 (a), figure 1 (b) etc.)
5. The figure captions must be saved as a separate file with the text and numbered correspondingly.
6. The filename for the graphic should be descriptive of the graphic e.g. Figure1, Figure2a.
7. Files should be saved as TIFF (tagged image file format), PostScript or EPS (encapsulated PostScript), containing all the necessary font information and

the source file of the application (e.g., CorelDraw/Mac, CorelDraw/PC).

Disks should be clearly labelled with the following information:

1. Journal title
2. Name of author
3. Figures contained on disk
4. Hardware used (PC or Mac)
5. Software used (name and version)

Sample disk label: figures

Journal title
A.N. Author
Figures 1-10
Macintosh
Adobe Illustrator 5.5

Abstracts

Structured abstracts are required for all papers, and should be submitted as detailed below, following the title and author's name and address, preceding the main text.

For papers reporting original research, state the **primary objective** and any hypothesis tested; describe the **research design** and your reasons for adopting that methodology; state the **methods and procedures** employed, including where appropriate tools, hardware, software, the selection and number of study areas/subjects, and the central **experimental interventions**; state the **main outcomes and results**, including relevant data; and state the **conclusions** that might be drawn from these data and results, including their implications for further research or application/practice.

For review essays, state the **primary objective** of the review; the reasoning behind your literature selection; and the way you critically analyse the literature; state the **main outcomes and results** of your review; and state the **conclusions** that might be drawn, including their implications for further research or application/practice.

The abstract should not exceed 150 words.

Copyright permission

Contributors are required to secure permission for the reproduction of any figure, table, or extensive (more than fifty word) extract from the text, from a source which is copyrighted - or owned - by a party other than Taylor & Francis or the contributor.

This applies both to direct reproduction or 'derivative reproduction' - when the contributor has created a new figure or table which derives substantially from a copyrighted source.

The following form of words can be used in seeking permission:

Dear [COPYRIGHT HOLDER]

I/we are preparing for publication an article entitled

[STATE TITLE]

to be published by Taylor & Francis Ltd in ***Brain Injury***.

I/we should be grateful if you would grant us permission to include the following materials:

[STATE FIGURE NUMBER AND ORIGINAL SOURCE]

We are requesting non-exclusive rights in this edition and in all forms. It is understood, of course, that full acknowledgement will be given to the source.

Please note that Taylor & Francis are signatories of and respect the spirit of the STM Agreement regarding the free sharing and dissemination of scholarly information.

Your prompt consideration of this request would be greatly appreciated.

Yours faithfully

Code of experimental ethics and practice

Contributors are required to follow the procedures in force in their countries which govern the ethics of work done with human or animal subjects. The Code of Ethics of the World Medical Association (Declaration of Helsinki) represents a minimal requirement.

When experimental animals are used, state the species, strain, number used, and other pertinent descriptive characteristics.

For human subjects or patients, describe their characteristics.

For human participants in a research survey, secure the consent for data and other material - verbatim quotations from interviews, etc. - to be used.

When describing surgical procedures on animals, identify the pre anaesthetic and anaesthetic agents used and state the amount of concentration and the route and frequency of administration for each. The use of paralytic agents, such as curare or succinylcholine, is not an acceptable substitute for anaesthetics. For other invasive procedures on animals, report the analgesic or tranquilizing drugs used; if none were used, provide justification for such exclusion.

When reporting studies on unanaesthetized animals or on humans, indicate that the procedures followed were in accordance with institutional guidelines.

Specific permission for facial photographs of patients is required. A letter of consent must accompany the photographs of patients in which a possibility of identification exists. It is not sufficient to cover the eyes to mask identity.

Mathematics

Special care should be taken with mathematical scripts, especially subscripts and superscripts and differentiation between the letter 'ell' and the figure one, and the letter 'oh' and the figure zero. If your keyboard does not have the characters you need, it is preferable to use longhand, in which case it is important to differentiate between capital and small letters, K, k and x and other similar groups of letters. Special symbols should be highlighted in the text and explained in the margin. In some cases it is helpful to supply annotated lists of symbols for the guidance of the sub-editor and the typesetter, and/or a 'Nomenclature' section preceding the 'Introduction'.

For simple fractions in the text, the solidus / should be used instead of a horizontal line, care being taken to insert parentheses where necessary to avoid ambiguity, for example, $1/(n-1)$. Exceptions are the proper fractions available as single type on a keyboard.

Full formulae or equations should be displayed, that is, written on a separate line. Horizontal lines are preferable to solidi, for example:

$$61 + 5h + q$$

$$3n + 3yz^2$$

$$\text{But: } a/b + c/d + a/d$$

$$P = (a^2 + b^2)(c^2 + d^2)$$

The solidus is not generally used for units: ms⁻¹ not m/s, but note electrons/s, counts/channel, etc.

Displayed equations referred to in the text should be numbered serially (1, 2, etc.) on the right hand side of the page. Short expressions not referred to by any number will usually be incorporated in the text.

Symbols should not be underlined to indicate fonts except for tensors, vectors and matrices, which are indicated with a wavy line in the manuscript (not with a straight arrow or arrow above) and rendered in heavy type in print: upright sans serif **r** (tensor), sloping serif *r* (vector) upright serif **r** (matrix).

Typographical requirements must be clearly indicated at their first occurrence, e.g. Greek, Roman, script, sans serif, bold, italic. Authors will be charged for corrections at proof stage resulting from a failure to do so.

Braces, brackets and parentheses are used in the order {{()}}, except where mathematical convention dictates otherwise (i.e. square brackets for commutators and anticommutators)

Notes on style

All authors are asked to take account of the diverse audience of **Brain Injury**. Clearly explain or avoid the use of terms that might be meaningful only to a local or national audience. However, note also that **Brain Injury** does not aspire to be international in the ways that McDonald's restaurants or Hilton Hotels are 'international'; we much prefer papers that, where appropriate, reflect the particularities of each higher education system.

Some specific points of style for the text of articles, research reports, case studies, reports, essay reviews, and reviews follow:

1. **Brain Injury** prefers US to 'American', USA to 'United States', and UK to 'United Kingdom'.
2. **Brain Injury** uses conservative British, not US, spelling, i.e. colour not color; behaviour (behavioural) not behavior; [school] programme not program; [he] practises not practices; centre not center; organization not organisation; analyse not analyze, etc.
3. Single 'quotes' are used for quotations rather than double "quotes", unless the 'quote' is "within" another quote'.
4. Punctuation should follow the British style, e.g. 'quotes precede punctuation'.
5. Punctuation of common abbreviations should follow the following conventions: e.g. i.e. cf. Note that such abbreviations are not followed by a comma or a (double) point/period.
6. Dashes (M-dash) should be clearly indicated in manuscripts by way of either a clear dash (-) or a double hyphen (- -).
7. **Brain Injury** is sparing in its use of the upper case in headings and references, e.g. only the first word in paper titles and all subheads is in upper case; titles of papers from journals in the references and other places are not in upper case.
8. Apostrophes should be used sparingly. Thus, decades should be referred to as follows: 'The 1980s [not the 1980's] saw ...'. Possessives associated with acronyms (e.g. APU), should be written as follows: 'The APU's findings that ...', but, NB, the plural is APUs.

9. All acronyms for national agencies, examinations, etc., should be spelled out the first time they are introduced in text or references. Thereafter the acronym can be used if appropriate, e.g. 'The work of the Assessment of Performance Unit (APU) in the early 1980s ...'. Subsequently, 'The APU studies of achievement ...', in a reference ... (Department of Education and Science [DES] 1989a).
10. Brief biographical details of significant national figures should be outlined in the text unless it is quite clear that the person concerned would be known internationally. Some suggested editorial emendations to a typical text are indicated in the following with square brackets: 'From the time of H. E. Armstrong [in the 19th century] to the curriculum development work associated with the Nuffield Foundation [in the 1960s], there has been a shift from heurism to constructivism in the design of [British] science courses'.
11. The preferred local (national) usage for ethnic and other minorities should be used in all papers. For the USA, African-American, Hispanic, and Native American are used, e.g. 'The African American presidential candidate, Jesse Jackson...' For the UK, African-Caribbean (not 'West Indian'), etc.
12. Material to be emphasized (italicized in the printed version) should be underlined in the typescript rather than italicized. Please use such emphasis sparingly.
13. n (not N), % (not per cent) should be used in typescripts.
14. Numbers in text should take the following forms: 300, 3000, 30 000. Spell out numbers under 10 unless used with a unit of measure, e.g. nine pupils but 9 mm (do not introduce periods with measure). For decimals, use the form 0.05 (not .05).

Notes on tables and figures

Artwork submitted for publication will not be returned and will be destroyed after publication, unless you request otherwise. Whilst every care is taken of artwork, neither the Editor nor Taylor & Francis shall bear any responsibility or liability for non-return, loss, or damage of artwork, nor for any associated costs or compensation. You are strongly advised to insure appropriately.

The same data should not be reproduced in both tables and figures. The usual statistical conventions should be used: a value written 10.0 ± 0.25 indicates the estimate for a statistic (e.g. a mean) followed by its standard error. A mean with an estimate of the standard deviation will be written $10.0 \text{ SD } 2.65$. Contributors reporting ages of subjects should specify carefully the age groupings: a group of children of ages e.g. 4.0 to 4.99 years may be designated 4 +; a group aged 3.50 to 4.49 years $4 \pm$ and a group all precisely 4.0 years, 4.0.

1. Tables and figures should be referred to in text as follows: figure 1, table 1, i.e. lower case. 'As seen in table [or figure] 1 ...' (not Tab., fig. or Fig).
2. The place at which a table or figure is to be inserted in the printed text should be indicated clearly on a manuscript:

Insert table 2 about here

3. Each table and/or figure must have a title that explains its purpose without reference to the text.
4. All figures and tables must be on separate sheets and not embedded in the text.

Thus tables and figures must be referred to in the text and numbered in order of appearance. Each table should have a descriptive title and each column an appropriate heading. For all figures, original copies of figures should be supplied. All figures should allow for reduction to column width (7.5cm) or page width (16 cm). Photographs may be sent as glossy prints or negatives. The legends to any illustrations must be typed separately following the text and should be grouped together.

Citations in text

References should be cited using the numerical system (e.g. [3], [5-9]). They should be listed separately at the end of the paper in the order in which they appear in the text. 'Ibid.' (and the like) are not used when repeating citations.

Acknowledgements

Any acknowledgements authors wish to make should be included in a separate headed section at the end of the manuscript.

Book reviews

1. The following header material should appear in all reviews in the following order (note also the punctuation):

Student Engagement and Achievement in the American Secondary School.

Edited by Fred M. Newmann (Teachers College Press, New York, 1992), 240 pp., \$38.00 (hbk), ISBN 8077-3183-8, \$17.95 (pbk), ISBN 8077-3182-X.

2. Page references within reviews should be given as follows: (p. 337) or (pp. 36-37).

References

References should follow the CBE Citation & Sequence format. Only works actually cited in the text should be included in the references. Indicate in the text with arabic numbers inside square brackets. Spelling in the reference list should follow the original. References should then be listed in numerical order at the end of the article. Examples are provided as follows:

Journal article:

[1] Steiner U, Klein J, Eiser E, Budkowski A, Fethers LJ. Complete wetting from polymer mixtures. *Science* 1992;258:1122-9.

Book chapter:

[2] Kuret JA, Murad F. Adenohypophyseal hormones and related substances. In: Gilman AG, Rall TW, Nies AS, Taylor P, editors. *The pharmacological basis of therapeutics*. 8th ed. New York: Pergamon; 1990. p 1334-60.

Conference proceedings:

[3] Irvin AD, Cunningham MP, Young AS, editors. *Advances in the control of Theileriosis*. International Conference held at the International Laboratory for Research on Animal Diseases; 1981 Feb 9-13; Nairobi. Boston: Martinus Nijhoff Publishers; 1981. 427 p.

Dissertations or Thesis:

[4] Mangie ED. A comparative study of the perceptions of illness in New Kingdom Egypt and Mesopotamia of the early first millennium [dissertation]. Akron (OH): University of Akron; 1991. 160 p. Available from: University Microfilms, Ann Arbor MI; AAG9203425.

Journal article on internet:

[5] Loker WM. "Campesinos" and the crisis of modernization in Latin America. *Jour of Pol Ecol* [serial online] 1996; 3(1). Available:
http://www.library.arizona.edu/ej/jpe/volume_3/ascii-lokeriso.txt via the INTERNET.
Accessed 1996 Aug 11.

Webpage:

[6] *British Medical Journal* [Internet]. Stanford, CA: Stanford Univ; 2004 July 10 - [cited 2004 Aug 12]; Available from: <http://bmj.bmjournals.com/>

Internet databases:

[7] *Prevention News Update Database* [Internet]. Rockville (MD): Centers for Disease Control and Prevention (US), National Prevention Information Network. 1988 Jun - [cited

2001 Apr 12]. Available from: <http://www.cdcnpin.org/db/public/dnmain.htm>

Further examples and information can be found in the CBE style manual *Scientific Style and Format*, sixth edition.

10. Offprints and Reprints

Offprints and reprints of articles published in ***Brain Injury*** can be obtained through Rightslink ®. Please visit www.copyright.com to obtain a quotation or to place an order. Copies of the Journal can be purchased at the author's preferential rate of £15.00/\$25.00 per copy.

Color figures

a. Any figure submitted as a color original will appear in color in the journal's online edition free of charge and can be downloaded.

b. Paper copy color reproduction will only be considered on condition that authors contribute to the associated costs. Charges are: £500/US\$900 for the first colour page and £250/US\$450 for each color page after per article. (Color costs will be waived for invited Review Articles)

 Previous Page

[↑ top](#)

Copyright © 2006 Taylor & Francis Group, an informa business [Privacy Policy](#) [Terms and Conditions](#)

Appendix 2: Confirmation of ethical review sought and obtained for the study



12 October 2005

Louise Birkett-Swan
Trainee Clinical Psychologist
Leicester University
104 Regent Road
Leicester
LE1 7RH

Dear Louise

Re: Impairments in executive function and deficits in awareness: implications for mood disorders after Traumatic Brain Injury

Thank you for sending this interesting research proposal and a copy of your university's scientific review. The proposal has been reviewed within St Andrew's Group of Hospitals and I am delighted to inform you that you may undertake the study within the Kemsley Hospital, subject to some clarification.

It was noted from your scientific review that there are a number of typographical errors (annotated copy enclosed). These should be corrected. Please also number the pages of the proposal to aid navigation.

The reviewers noted that the proposal would benefit from a paragraph explaining why this research is important. In particular, how will the research assist clinicians in:

- 1 Identifying those who should be targeted for therapeutic intervention
- 2 Identifying which factors should be targeted for therapeutic intervention, and how.

We were unclear as to the role of the MET, RBMT-II and the WAIS-III within the research. Specifically, can you please clarify whether these measures are being collected as part of the research project and, if so, whether they will be collected for all research participants. If not, will an incomplete sample allow you to achieve your aims? You state that the MET will be completed in the presence of the principal investigator which suggests that this constitutes part of the research project and as such should be included in the Participant Information Sheet.

Commencement of the research will, of course, be dependent on successful ethical review from an appropriate REC. I would request that you provide me with an updated final version of the proposal at your earliest convenience. Additionally please also address the above points, along with any changes to the protocol in a covering letter. Once you have commenced the research, I will request updates at appropriate intervals.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Geoff Dickens', with a long horizontal stroke extending to the right.

Geoff Dickens
Research Coordinator

Enc



Leicestershire, Northamptonshire & Rutland Research Ethics Committee 1

1 Standard Court
Park Row
Nottingham
NG1 6GN

Telephone: 01159123344

Facsimile: 01159123300

08 February 2006

Mrs Louise J Birkett-Swan
Trainee Clinical Psychologist
Leicester University
104 Regent road
Leicester, LE17RH

Dear Mrs Birkett-Swan,

Full title of study: **Impairments In Executive Function And Deficits In Awareness: Implications For Mood Disorders after Traumatic Brain Injury**

REC reference number: **06/Q2501/4**

Thank you for your letter of 31 January 2006, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

Ethical review of research sites

The favourable opinion applies to the research sites listed on the attached form.

Conditions of approval

The favourable opinion is given provided that you comply with the conditions set out in the attached document. You are advised to study the conditions carefully.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Application	1.0	08 December 2005
Investigator CV - Louise Birkett-Swan		
Investigator CV - Dr N Alderman		
Investigator CV - Francis M Hopley		
Investigator CV - Dr C Cowan-Turner		
Protocol	1	08 December 2005
Letter from Sponsor St Andrew's Hospital Research		12 October 2005

Committee		
Peer Review Leicester University		14 September 2005
Participant Information Sheet At Kemsley	2	31 January 2006
Participant Information Sheet TBI Team	2	31 January 2006
Participant Consent Form	2	31 January 2006
Response to Request for Further Information		31 January 2006
Biographical Information	1	08 December 2005
Memorandum regarding capacity to consent for RMO	1	08 December 2005

Research governance approval

The study should not commence at any NHS site until the local Principal Investigator has obtained final research governance approval from the R&D Department for the relevant NHS care organisation.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

06/Q2501/4	Please quote this number on all correspondence
------------	--

With the Committee's best wishes for the success of this project

Yours sincerely



Dr Carl Edwards/Ms L Ellis
Chair/Co-ordinator

Email: linda.ellis@rushcliffe-pct.nhs.uk

Enclosures: *Standard approval conditions*
 Site approval form

Copy to:

Dr Mike Hopley
School of Psychology
University of Leicester
104 Regent road
Leicester, LE1 7RH

R&D Department for NHS care organisation at lead site:
Dr Monica Sanna
Northampton Healthcare (Mental Health)
Ground Floor, Abbey Block
Isebrook Hospital
Irthlingborough Road
Wellingborough
Northants, NN8 1LP

Leicestershire, Northamptonshire & Rutland Research Ethics Committee 1

LIST OF SITES WITH A FAVOURABLE ETHICAL OPINION

For all studies requiring site-specific assessment, this form is issued by the main REC to the Chief Investigator and sponsor with the favourable opinion letter and following subsequent notifications from site assessors. For issue 2 onwards, all sites with a favourable opinion are listed, adding the new sites approved.

REC reference number:	06/Q2501/4	Issue number:	1	Date of issue:	08 February 2006
------------------------------	------------	----------------------	---	-----------------------	------------------

Chief Investigator:	Mrs L J Birkett-Swan
----------------------------	----------------------

Full title of study:	Impairments In Executive Function And Deficits In Awareness: Implications For Mood Disorders after Traumatic Brain Injury
-----------------------------	---

This study was given a favourable ethical opinion by Leicestershire, Northamptonshire & Rutland Research Ethics Committee 1 on 07 February 2006. The favourable opinion is extended to each of the sites listed below. The research may commence at each NHS site when management approval from the relevant NHS care organisation has been confirmed.

<i>Principal Investigator</i>	<i>Post</i>	<i>Research site</i>	<i>Site assessor</i>	<i>Date of favourable opinion for this site</i>	<i>Notes ⁽¹⁾</i>
Mrs L J Birkett-Swan	Trainee Clinical Psychologist	St Andrew's Hospital Isebrook Hospital	Leicestershire, Northamptonshire & Rutland Research Ethics Committee 1	08/02/2006	

Approved by the Chair on behalf of the REC:

..... (Signature of Chair/Administrator)
(delete as applicable)

..... (Name)

(1) The notes column may be used by the main REC to record the early closure or withdrawal of a site (where notified by the Chief Investigator or sponsor), the suspension or termination of the favourable opinion for an individual site, or any other relevant development. The date should be recorded.

Appendix 3: Patient information sheets

INFORMATION FOR PARTICIPANTS – TBI TEAM

Title

Impairments In Executive Functioning And Deficits In Awareness: Implications For Mood Disorders After Acquired Brain Injury.

Researcher

Louise Birkett-Swan

Trainee Clinical Psychologist

Introduction

Thank you for your interest. I am asking you if you could help me with a study. It is a study about how people who have survived a brain injury see themselves and how this affects how they feel.

What is the purpose of the study?

This study hopes to find out more about how people who have had a brain injury see themselves. This is because the way people see themselves can have a big effect on the way they go about their day-to-day life. Some studies have found that people who feel that they have a lot of problems because of their brain injury are more likely to feel low or depressed. This study is designed to try and see what some of the things are that make people feel low after having a brain injury.

Why have I been chosen?

You have been invited to take part in this study because you will be able to tell me how a person who has had a brain injury feels about him/herself.

Do I have to take part?

No. It is entirely your choice whether or not you want to take part. Even if you do decide to take part, you can pull out at any time. Pulling out or deciding not to participate will not affect your rehabilitation or standard of care in any way. I will ask you to sign a consent form to say that you want to take part. I will also ask your clinical team whether they think it is a good idea for you to take part.

What will happen to me if I take part?

You will be asked to sign a form saying that you want to take part. Then I will arrange to meet with you. I will ask you to fill in 3 questionnaires and complete a short test. Two of the questionnaires will ask you to answer some questions about how you see yourself now. I will also ask you to fill in a questionnaire which will ask you to describe how anxious or depressed you have been feeling. The test will look at things like how you plan and carry out activities.

It will probably take 45 minutes to one hour to ask you all the questions and carry out the test, but if you get tired, I will come back and finish the questions at another time. All you will be expected to do is to answer the questions as honestly as possible.

Signing the form will also give me permission to look at your medical. The only information I will be getting from your medical records will be specifically about your brain injury i.e. when it happened and how it happened. I will also ask you a few questions about yourself i.e. you name, age and date of birth.

Will my taking part in this study be kept confidential?

Yes. Utmost care will be taken in order to ensure your anonymity. The information will be kept in a locked cabinet in my office. Your personal information will not be discussed with anyone outside the hospital/unit. Any information that is entered onto a computer will be entered in such a way that your name will not be able to be linked with the information. The computer will also be password protected meaning that only I will be able to access it. Your

name and personal details will not be mentioned anywhere in the study in order to protect your identity.

What are the possible disadvantages and risks I should know about before I take part?

Other studies looking at how people rate themselves have not identified any harmful side-effects. However, if you find that you feel upset in any way after answering the questions then I will stop and ask you whether or not you would like to take a break, or stop altogether. You will decide whether or not you want to continue with the questionnaires and test. I will also make sure you receive the necessary ongoing support from someone in your team by telling your Consultant Clinical Neuropsychologist what upset you so that you can work it through with someone who knows you well. Understanding what upset s you would be important in your recovery process. Hopefully you will find the questions interesting rather than upsetting.

What are the possible benefits of taking part?

Your answers will help clinicians to understand more some of the reasons people feel low after a brain injury and this could benefit many people in the long run.

What happens if something goes wrong?

If you are harmed by taking part in this study, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for legal action but you may have to pay for it. Regardless of this, if you wish to complain about any aspect of the way you have been treated or approached during the study you may. You will have to follow the complaints procedure for your hospital/unit and it will be handled according to the formal and correct procedures.

What will happen to the results of the study?

The results will be written up as a thesis which will be submitted to the British Psychological Society as part of their requirements to enable me to gain a Doctorate in Clinical Psychology. They may also be published in a medical journal. You can get a summary of the results if you would like them once the study is completed.

Who is organising and funding the research?

I will be organising the research with the assistance of the Clinical Neuropsychologist. Nobody will receive any money if you choose to be part of the study. The University of Leicester are funding any costs associated with the research.

Who has reviewed the study?

This study has been reviewed and approved by the St Andrews Research Committee and the Leicestershire Medical Research Ethics Committee.

Conclusion

If you wish to participate, I will contact you and you will be able to say if you would like to participate in the study. I will arrange to meet with you to discuss the study further and to answer any questions you might have. At the end of our meeting I will ask you to sign a form saying whether or not you want to take part in this study.

Thank you once again for considering whether or not you would like to take part in this study. I would be very pleased if you could help.

Contact Details

Louise Birkett-Swan

TBI team

Abbey Block

Isebrook Hospital

Irthlingborough Road
Wellingborough

Tel.: 01536 494144

e-mail: LJS31@le.ac.uk

INFORMATION FOR PARTICIPANTS AT KEMSLEY

Title

Impairments In Executive Functioning And Deficits In Awareness: Implications For Mood Disorders After Acquired Brain Injury.

Researcher

Louise Birkett-Swan

Trainee Clinical Psychologist

Introduction

Thank you for your interest. I am asking you if you could help me with a study. It is a study about how people who have survived a brain injury see themselves and how this affects how they feel.

What is the purpose of the study?

This study hopes to find out more about how people who have had a brain injury see themselves. This is because the way people see themselves can have a big effect on the way they go about their day-to-day life. Some studies have found that people who feel that they have a lot of problems because of their brain injury are more likely to feel low or depressed. This study is designed to try and see what some of the things are that make people feel low after having a brain injury.

Why have I been chosen?

You have been invited to take part in this study because you will be able to tell me how a person who has had a brain injury feels about him/herself.

Do I have to take part?

No. It is entirely your choice whether or not you want to take part. Even if you do decide to take part, you can pull out at any time. Pulling out or deciding not to participate will not affect your rehabilitation or standard of care in any way. I will ask you to sign a consent form to say that you want to take part. I will also ask your doctor and clinical team whether they think it is a good idea for you to take part.

What will happen to me if I take part?

You will be asked to sign a form saying that you want to take part. Then I will arrange to meet with you in one of the therapy rooms on your ward. I will ask you to fill in 3 questionnaires and complete a short test. Two of the questionnaires will ask you to answer some questions about how you see yourself now. I will also ask you to fill in a questionnaire which will ask you to describe how anxious or depressed you have been feeling. The test will look at things like how you plan and carry out activities.

It will probably take 45 minutes to one hour to ask you all the questions and carry out the test, but if you get tired, I will come back and finish the questions at another time. All you will be expected to do is to answer the questions as honestly as possible.

Signing the form will also give me permission to look at your medical. The only information I will be getting from your medical records will be specifically about your brain injury i.e. when it happened and how it happened. I will also ask you a few questions about yourself i.e. you name, age and date of birth.

Will my taking part in this study be kept confidential?

Yes. Utmost care will be taken in order to ensure your anonymity. The information will be kept in a locked cabinet in my office. Your personal information will not be discussed with anyone outside the hospital/unit. Any information that is entered onto a computer will be entered in such a way that

your name will not be able to be linked with the information. The computer will also be password protected meaning that only I will be able to access it. Your name and personal details will not be mentioned anywhere in the study in order to protect your identity.

What are the possible disadvantages and risks I should know about before I take part?

Other studies looking at how people rate themselves have not identified any harmful side-effects. However, if you find that you feel upset in any way after answering the questions then I will stop and ask you whether or not you would like to take a break, or stop altogether. You will decide whether or not you want to continue with the questionnaires and test. I will also make sure you receive the necessary ongoing support from someone in your team by telling your Consultant Clinical Neuropsychologist what upset you so that you can work it through with someone who knows you well. Understanding what upset you would be important in your recovery process. Hopefully you will find the questions interesting rather than upsetting.

What are the possible benefits of taking part?

Your answers will help clinicians to understand more some of the reasons people feel low after a brain injury and this could benefit many people in the long run.

What happens if something goes wrong?

If you are harmed by taking part in this study, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for legal action but you may have to pay for it. Regardless of this, if you wish to complain about any aspect of the way you have been treated or approached during the study you may. You will have to follow the complaints procedure for your hospital/unit and it will be handled according to the formal and correct procedures.

What will happen to the results of the study?

The results will be written up as a thesis which will be submitted to the British Psychological Society as part of their requirements to enable me to gain a Doctorate in Clinical Psychology. They may also be published in a medical journal. You can get a summary of the results if you would like them once the study is completed.

Who is organising and funding the research?

I will be organising the research with the assistance of the Clinical Neuropsychologist. Nobody will receive any money if you choose to be part of the study. The University of Leicester are funding any costs associated with the research.

Who has reviewed the study?

This study has been reviewed and approved by the St Andrews Research Committee and the Leicestershire Medical Research Ethics Committee.

Conclusion

If you wish to participate, please could you ask your Named Nurse to make an appointment for you to meet with me. I will come and meet with you to discuss the study further and to answer any questions you might have. At the end of our meeting I will ask you to sign a form saying whether or not you want to take part in this study.

Thank you once again for considering whether or not you would like to take part in this study. I would be very pleased if you could help.

Contact Details Louise Birkett-Swan

Trainee Clinical Psychologist

Leicester University

104 Regent Road

Leicester

LE1 7RH

Tel.: 01604 616688 e-mail: LJS31@le.ac.uk

Appendix 4: Participant consent form

CONSENT TO RESEARCH FORM

Patient Identification Number for this trial:

Title

Awareness and Executive functioning as predictors of mood following acquired brain injury: An exploratory study.

Researcher

Louise Birkett Swan, Trainee Clinical Psychologist

Signing this form does not commit you to complete the study. You remain free to leave the study without having any reason for doing so.

I have read the information sheet. (Version 2 dated 31.01.06)	☐
I have had the opportunity to ask questions and discuss this study.	☐
I have had all my questions answered to my satisfaction.	☐
I have received enough information about the study.	☐
I understand that I am free to withdraw consent - at any time?	☐
- without having to give a reason?	☐
- without my medical care or legal rights being affected?	☐
I understand that Louise Birkett-Swan may be looking at my medical records to obtain details of my date of birth and my brain injury.	☐
I would like to receive a summary of the results of this study	☐
I give my consent to take part in this study?	☐

Signature _____ Date _____

Name (Please PRINT) _____

Researcher's Signature _____ Date _____

Researcher's Name _____

Confidentiality and data protection

Data will be kept in a locked cabinet in the principal investigator's office. Data kept on a password protected computer and will be coded so that it cannot be linked to your name. This project complies with the requirements of the Data Protection Act.

Appendix 5: Copies of PCRS questionnaires

Patient Competency Rating (Patient's Form)

Source: Prigatano, G. P. and Others (1986). *Neuropsychological Rehabilitation After Brain Injury*. Baltimore: Johns Hopkins University Press.

Identifying Information

Patient's Name: _____

Date: _____

Instructions

The following is a questionnaire that asks you to judge your ability to do a variety of very practical skills. Some of the questions may not apply directly to things you often do, but you are asked to complete each question as if it were something you "had to do." On each question, you should judge how easy or difficult a particular activity is for you and mark the appropriate space.

Competency Rating

1	2	3	4	5
Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease

- _____ 1. How much of a problem do I have in preparing my own meals?
- _____ 2. How much of a problem do I have in dressing myself?
- _____ 3. How much of a problem do I have in taking care of my personal hygiene?
- _____ 4. How much of a problem do I have in washing the dishes?
- _____ 5. How much of a problem do I have in doing the laundry?
- _____ 6. How much of a problem do I have in taking care of my finances?
- _____ 7. How much of a problem do I have in keeping appointments on time?

1	2	3	4	5
Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease

- _____ 8. How much of a problem do I have in starting conversation in a group?
- _____ 9. How much of a problem do I have in staying involved in work activities even when bored or tired?
- _____ 10. How much of a problem do I have in remembering what I had for dinner last night?
- _____ 11. How much of a problem do I have in remembering names of people I see often?
- _____ 12. How much of a problem do I have in remembering my daily schedule?
- _____ 13. How much of a problem do I have in remembering important things I must do?
- _____ 14. How much of a problem would I have driving a car if I had to?
- _____ 15. How much of a problem do I have in getting help when I'm confused?
- _____ 16. How much of a problem do I have in adjusting to unexpected changes?
- _____ 17. How much of a problem do I have in handling arguments with people I know well?
- _____ 18. How much of a problem do I have in accepting criticism from other people?
- _____ 19. How much of a problem do I have in controlling crying?
- _____ 20. How much of a problem do I have in acting appropriately when I'm around friends?
- _____ 21. How much of a problem do I have in showing affection to people?
- _____ 22. How much of a problem do I have in participating in group activities?

1	2	3	4	5
Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease

- _____ 23. How much of a problem do I have in recognizing when something I say or do has upset someone else?
- _____ 24. How much of a problem do I have in scheduling daily activities?
- _____ 25. How much of a problem do I have in understanding new instructions?
- _____ 26. How much of a problem do I have in consistently meeting my daily responsibilities?
- _____ 27. How much of a problem do I have in controlling my temper when something upsets me?
- _____ 28. How much of a problem do I have in keeping from being depressed?
- _____ 29. How much of a problem do I have in keeping my emotions from affecting my ability to go about the day's activities?
- _____ 30. How much of a problem do I have in controlling my laughter?

Appendix 6: Copies of HADS questionnaire

Hospital Anxiety and Depression Scale

Instructions: Doctors are aware that emotions play an important part in most illnesses. If your doctor knows about these feelings he or she will be able to help you more. This questionnaire is designed to help your doctor know how you feel. Read each item and place a firm tick in the box opposite the reply which comes closest to how you have been feeling in the past week. Don't take too long over your replies: your immediate reaction to each item will probably be more accurate than a long thought out response.

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

Appendix 7: Relationships between psychological distress and executive function

	HADS anxiety score	HADS depression score	HADS total score
DEX other mean total	.167 (ns)	.185 (ns)	.200 (ns)
DEX factor inhibition	.107 (ns)	.151 (ns)	.161 (ns)
DEX factor intentionality	.087 (ns)	.114 (ns)	.093 (ns)
DEX factor Exec memory	.075 (ns)	-.055 (ns)	-.008 (ns)
DEX factor pos affect	.244 (ns)	.067 (ns)	.189 (ns)
DEX factor neg affect	.120 (ns)	.078 (ns)	.119 (ns)
BADS age corrected score	.095 (ns)	.130 (ns)	.127 (ns)
rule shift	-.113 (ns)	-.002 (ns)	-.025 (ns)
action program	.161 (ns)	.113 (ns)	.170 (ns)
key search	.172 (ns)	.057 (ns)	.151 (ns)
temporal	.069	.097	.065

judgment	(ns)	(ns)	(ns)
zoo map	.031	.050	-.019
	(ns)	(ns)	(ns)
six elements	-.122	.002	-.065
	(ns)	(ns)	(ns)

Appendix 8: Relationships between awareness (DEX) and executive function

	Awareness	Significance
DEX other mean total	-.503(**)	P<0.01
DEX self total	.694(**)	P<0.01
DEX factor inhibition	-.332(**)	P<0.01
DEX factor intentionality	-.494(**)	P<0.01
DEX factor Exec memory	-.436(**)	P<0.01
DEX factor pos affect	-.238	ns
DEX factor neg affect	-.082	ns
BADS age corrected score	.175	ns
rule shift	.071	ns
action program	.137	ns
key search	.229	ns
temporal judgment	-.031	ns
zoo map	.039	ns
six elements	-.008	ns

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix 10: Relationships between awareness (PCRS) and executive function

	Awareness	Significance
DEX other mean total	.249	ns
DEX self total	-.277	ns
DEX factor inhibition	.169	ns
DEX factor intentionality	.248	ns
DEX factor Exec memory	.373	ns
DEX factor pos affect	.072	ns
DEX factor neg affect	-.010	ns
BADS age corrected score	-.557(*)	P<0.05
rule shift	.087	ns
action program	-.143	ns
key search	-.496(*)	P<0.05
temporal judgment	-.679(**)	P<0.01
zoo map	-.425	ns
six elements	-.376	ns

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).