INDICATORS AND PREDICTORS OF RETURN TO WORK OR EDUCATION FOLLOWING TRAUMATIC BRAIN INJURY

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ABSTRACT

The leading cause of brain damage in previously healthy young adults, many of whom are of working age, is traumatic brain injury (TBI). Research to date generally agrees that TBI can lead to unemployment. However, knowledge about the determinants of return to work following TBI in the New Zealand context is minimal. This is remarkable given that failure to return to work following TBI is associated with tremendous costs. These include economic implications such as contribution to the economy through work Vs the necessity of financial support through government and community funding (i.e. invalids benefits or long-term care facilities). Furthermore, work affects an individual's self-concept; it represents a major social role, offering self-esteem, social contact and social support. Therefore, a need exists to understand various predictors and indicators and their influence on a client's ability to return to work or education following TBI.

The present study was divided into two parts. Part one, was a retrospective analysis of a pre-existing database. In this part, the predictors: pre-injury employment status, job classification at TBI, age at TBI, years of post primary education at TBI, ethnicity, substance abuse after TBI and motor impairments, significantly influenced return to work/education and non return to work/education following TBI. The predictors: age at time of assessment, gender, substance abuse prior to TBI, injury severity, epilepsy, visual difficulties, hearing difficulties and speech difficulties, however, did not. In addition, the indicators: verbal IQ, verbal memory, attention, information processing speed and executive functioning, significantly influenced return to work/education and non return to work/education following TBI, however, the indicators: performance IQ, full scale IQ and visual memory did not.

Part two of the present study was a planned analysis. In this part, the predictors: pre-injury job classification, pre-injury job stability, tertiary qualifications and alcohol use after TBI, significantly influenced a persons job classification following TBI and/or the number of hours they were able to work per week following TBI. However, the predictors: pre-injury employment status,

age, years of post primary education, ethnicity, gender, substance use before TBI, criminal offending, injury severity, early post trauma sequelae, did not. In addition, the indicators; attention, services of a General Practitioner, the length of time a General Practitioners service was received, cognitive ability and activities of daily living as reported by a relative or close other, significantly influenced a persons job classification following TBI and/or the number of hours they were able to work per week following TBI. However, the remaining cognitive sequelae, rehabilitation information, emotional, behavioural sequelae, participant and relative/close other reports, did not.

Qualitative information was also provided by the participant and a relative or close other and the results presented.

In conclusion, the findings of both parts of the present study are discussed in relation to the findings of previous research, together with recommendations for future research.

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CHAPTER 1
INTRODUCTION

Due to a substantial reduction in the mortality rate from traumatic brain injuries, an increasing number of persons, many of working age, most with the majority of their working lives ahead of them, have begun to survive traumatic brain injury (TBI) and fail to return to work or education (RTW/E). Failure to RTW/E can significantly impact on the lives of those surviving TBI, in terms of: loss of financial independence, personal autonomy, self-esteem and social contact. Return to productive employment, however, represents a significant challenge after TBI. Successful RTW/E can restore a sense of direction, self worth and provide the foundation for long term personal, family and social readjustment (Tyerman, 1996).

Vocational rehabilitation came into focus in the 1970's as a field that faced the challenge of returning injured persons to productive employment. As technology and medical procedures have continued to expand the numbers of those persons who survive TBI, the rehabilitation industry has faced the need to expand to meet the growing demands placed upon it by survivors of TBI. Vast arrays of short and long-term deficits now challenge the rehabilitation team. Accompanying the process of recovery is often the desire to return to a productive role within the community, and therefore, the need to determine the potential of successful RTW/E and guide the process with care becomes necessary.

Although a relatively large body of research has focused on the predictors and indicators of return to work following TBI, less is known about them in the New Zealand context. The present study aims to add to the research in the area of predictors and indicators of RTW/E in the New Zealand context.

Chapter 2 introduces the concept of TBI and the associated incidence, etiologies, methods of classification and sequelae. Where possible, figures are reported for the New Zealand population, however, due to limited information, figures from overseas are also included.

Chapter 3 outlines the rates of RTW/E as reported by overseas studies as well as by a limited number of studies carried out in New Zealand and Australia. In addition the importance of work is discussed along with accompanying consequences of non-RTW/E.

Chapter 4 discusses the findings of an examination of the current literature in the area of RTW/E following TBI. The various predictors and indicators are systematically reviewed and findings from the respective studies reported and then summarised.

Chapter 5 describes the aims and rationale for the present study, and chapter 6 outlines the methodology for part one and two of the present study. Chapter 7 summarises the results and chapter 8 discusses the relevant findings, their implications and suggestions for further research.

CHAPTER 2
TRAUMATIC BRAIN INJURY

Definitions

Traumatic brain injury is referred to by a variety of terms; e.g. head injury, brain injury, brain damage and head trauma. Generally speaking, they all reference the same population. For purposes of clarity and consistency, the term traumatic brain injury (TBI) will be used to reference the population that is the focus of the present dissertation.

TBI ranges from an apparently symptom free blow to the head to irreversible brain damage. The majority of people have at some stage in there lives knocked their heads without any lasting ill effects; however, at the other end of the continuum lie those TBI's that cause such pervasive trauma to the brain that the patient lies in a vegetative state. In between these two extremes, TBI is associated with a range of emotional, behavioural and cognitive deficits.

> **"Traumatic brain injury is an assault to the brain, not of a degenerative or congenital nature, but caused by an external physical force. That force or blow may produce a diminished or altered state of consciousness, which can result in dysfunction of cognitive abilities and/or physical functioning. These impairments may be either temporary or permanent and cause partial or total functional disability or psychosocial maladjustment" (Spivack & Balicki, 1990, p. 13).**

Incidence

Incidence refers to the number of new occurrences of a given disease or impairment over a given period. In relation to TBI, however, incidence is complicated by a number of inconsistencies. These include: disparities in the definition of TBI across studies, hospital records not including mild TBI's, defining brain injury as a single medical condition precluding the differentiation of mild, moderate or severe and different sources of reports; i.e., physician versus self report (Willer, Abosh & Dalmer, 1990).

Despite these problems, considerable information has accumulated on the incidence of TBI. The National Institute of Neurological Disorders and Stroke (NINDS) cited in Williamson, Scott & Adams (1996) places the occurrence of TBI's in America at 2 million injuries each year. Of these between 75,000 and 100,000 will result in death, whereas another 70,000 to 90,000 will remain permanently disabled. Other studies report estimates of TBI between 195 per 100,000 to 220 per 100,000 population occurring every year (Goldstein & Levin, 1990; Kraus & Sorenson, 1994; Naugle, 1990). Jennet & McMillian (1981) estimate the general incidence of TBI in Western countries to be between 250 – 300 per 100,000 population every year.

In New Zealand there is a paucity of statistics on the extent and outcome of TBI as no formal epidemiological studies have been completed. The Accident Rehabilitation Compensation Insurance Corporation (ACC) gives a total figure of 6,858 new TBI's (excluding facial injuries) and 9,802 ongoing claims for TBI (excluding facial injuries) in the year ending March 1996. Carr (1993) reports that in New Zealand, 9,000 people each year are admitted to hospital with TBI's, this represents approximately 170 per week. Generalising from overseas studies, Carr (1993) further suggests an "expected" TBI incidence in New Zealand of 250 – 370 per 100,000 population, approximate to that of other westernised countries.

TBI is predominantly a condition of the young, accounting for greater rates of death and disability in people under the age of 35 than all other causes combined (NINDS, 1889, cited in Williamson, et al. 1996). Peak rates of incidence occur between the ages of 15 and 24 years of age. Excepting the over-75 age group in which women outnumber men, males sustain TBI's twice as frequently, or more, as females (Naugle, 1990).

Etiology

Falls tend to be the most common cause of TBI's in the very young and very old, accounting for more than half the injuries incurred by infants and young children and by persons in the 64 and older age group (Goldstein & Levin, 1992). In adulthood, TBI is typically an injury suffered in a motor vehicle

accident (see Figure 1) with 48% of TBI resulting from transport accidents (Spivack & Balicki, 1990). As shown in Figure 1, falls account for the second most common cause of TBI in young adults; approximately 20.6% (Spivack & Balicki, 1990). Interestingly however, assaults, whether by blows to the head or a penetrating weapon, as well as sports and recreational activities and accidents in the work place, together account for, from about 25% to 40% (see Figure 1) of reported injuries (Lezak, 1995). Furthermore, recent data has suggested that alcohol is involved in two thirds of all TBI's, with 50% of TBI victims having a blood alcohol level exceeding the legal limit (Dikmen, Donovan, Logberg, Machamer & Temkin, 1993). In addition, lower socioeconomic status, unemployment and lower educational levels are also associated with higher incidence of TBI (Naugle, 1990).

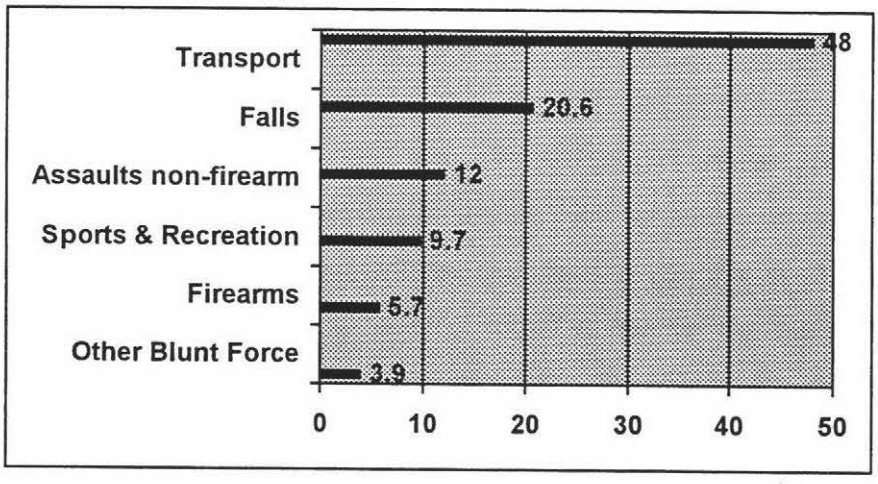

Figure 1. Percentage distribution of persons with brain injury by major categories of external forces. (Spivack & Balicki, 1990)

Classification of Severity of Traumatic Brain Injury

Historically, TBI has been classified in two ways; by the type of injury and by the severity of injury. Type of TBI is commonly divided into three general categories, (a) open TBI's from penetrating objects, (b) closed TBI's from forces applied to a stationary skull, also known as an acceleration injury and (c) closed TBI's from a rapidly decelerating skull, also known as a deceleration injury (Diller & Ben-Yishay, 1987).

Severity of TBI is customarily assessed with one of two measures, the Glasgow Coma Scale (GCS) or the duration of Posttraumatic Amnesia (PTA). The GSC, developed by Teasdale and Jennet (1974), is a generally accepted scale developed due to the need to triage patients for both treatment purposes and outcome prediction (Lezak, 1995). Measurement of severity by means of the GCS depends upon both depth and duration of altered consciousness. A patient receives a score based on ocular, verbal, and motor responses, which can range from a low of 3 to a high of 15. A score of 8 or less constitutes a severe TBI, scores of 9 to 11 or 12 are considered moderate, and scores of 12 to 15 are considered mild (Teasdale & Jennet, 1974).

While the GCS has a useful role in the classification of severity, like any other predictor of human behaviour, it is not appropriate for many cases. Coma duration alone is a poor predictor of outcome for many patients with brief periods of coma (Gronwall, 1989). Further, GCS is generally recorded in medical settings in New Zealand and is therefore not recorded for the many people who do present to hospital following TBI. As an alternative to the GCS many investigators now use PTA as an indication of severity. PTA duration begins at the time of injury and ends when the patient is registering continuous experience again. As shown in Table 1, severity is classified into six categories according to length of PTA ranging from very mild through too extremely severe.

Table 1
Estimates of Severity of Injury Based on PTA Duration

Duration	Severity
<5 minutes	Very Mild
5 – 60 minutes	Mild
1 – 24 hours	Moderate
1 – 7 days	Severe
1 – 4 weeks	Very Severe
More than 4 weeks	Extremely severe

(Lezak, 1995, Neuropsychological Assessment, p. 173).

Sequelae after Traumatic Brain Injury

Mild TBI. Characterised by a GCS of 12 – 15 or a PTA of 60 minutes or less, mild TBI is common, with approximately 290,000 to 350,000 new cases occurring in the United States each year (Katz & Deluca, 1992). Patients with mild TBI may display numerous but subtle, impairments after injury (see Table 2). However a triad of neuropsychological dysfunctions have been commonly agreed upon in the literature, to often appear within the first few days after injury, these are attention deficits, impaired verbal retrieval and emotional distress (Lezak, 1995). Although most patients recover from mild TBI, there exists a subgroup of individuals who are clearly affected past the generally accepted three-month recovery period. Approximately one third of mild TBI's are thought by some authors to fall into this last group (Miller & Gil, 1994). In a study of 424 patients with mild TBI three months after their injury, The National Institute of Handicapped Research (1982), cited in Moore & Bartlow (1990) reported that 79% of the patients still complained of persistent headaches, memory problems, poor balance and visual disorders.

Table 2
Symptoms after Mild Traumatic Brain Injury

Mild TBI Sequelae	
Physical	**Cognitive**
Headache	Memory difficulties
Neck pain	Loss of concentration and attention
Ringing in the ears	Impaired information processing
Dizziness	Impaired cognitive endurance
Fatigue/drowsiness	Impaired judgement
Behavioural/affective	**Integrative**
Depression	Daily living
Less emotional control	Social functioning
Anxiety	Occupational dysfunction
Irritability	
Sleep disturbances	
Sexual disturbances	
Hypochondriacal concern	
Hypersensitivity to noise	
Photophobia	

(Katz & Deluca, 1992, p. 1492)

The deficits that arise from mild TBI are subtle but debilitating. It is possible to sustain significant brain damage with demonstrable neurological abnormalities when there has been only very brief loss of consciousness. Unfortunately mild TBI is easily overlooked due to its very nature of being difficult to detect and health professionals may overlook deficits not immediately apparent, especially if there are other systems injuries that require immediate attention. As a result, after mild TBI, many people attempt to RTW or education (RTW/E) soon after their injury, some even immediately, and consequently can encounter significant difficulties (Kay & Lezak, 1990). Further as a consequence of having little in the way of understanding about the problems they are facing and finding that they are unable to maintain their pre-injury performance level, people feel incompetent, guilty, frustrated, and often fear they are going crazy. Lezak (1995) has reported that at three months, many mildly head injured patients are still unable to RTW.

Moderate TBI. Characterised by a GCS of 12 – 15 or PTA of 1 – 24 hours, the nature and duration of symptoms varies widely within this group. (see Tables , 3 4 and 5). However, it is widely agreed that the sequelae experienced after moderate and severe TBI include the same impairments associated with mild TBI only to a greater degree of intensity. These lead to significant limitations in the capacity for social perceptiveness, self control, learning ability, capacity for judgment and exhibiting appropriate emotions (Moore & Bartlow, 1990). Those with moderate TBI generally manage their day to day activities, yet they tend to be different from intact persons and from their pre-morbid selves. Headaches, memory problems and difficulties with everyday living are among the most common complaints from moderately head injured individuals (Rimel, Giordani, Barth & Jane, 1982). Further, temporal and frontal lobe impairments show up subtly through such problems as affective flattening and diminished initiative. Planning ability and automatic self-monitoring are frequently compromised to some extent also. While in some cases these difficulties are not enough to render individuals unemployable, it does keep them from being able to advance in their positions, e.g. to managerial level (Lezak, 1995). Unemployment, however, does occur within this population. Rimel, et al. (1982) revealed that

two thirds of the moderately head injured participants, who were working prior to their TBI, failed to RTW.

Severe TBI. Characterised by a GCS of 8 or less or a PTA of 1 day to more than 4 weeks, severe TBI produces alterations at various levels of brain function. These changes have relatively predictable clinical manifestations (see Tables 3, 4 and 5). Conceptually impairments resulting from severe TBI can be categorised into three major areas of behaviour dysfunction: psycho-social/emotional, cognitive, and physical impairments (Prigatano, 1987). While TBI is associated with many serious consequences for the person sustaining TBI, most often it is the inability to return to employment that is the greatest concern for both the individual, their family and society. Past studies have indicated that the greater the severity of a TBI the greater the chance for unemployment (see Chapter 4 for a full discussion of this topic).

Table 3
Psychosocial/Emotional Symptoms after Moderate and Severe Traumatic Brain Injury

Moderate and Severe TBI Sequelae	
Behavioural/affective	**Psychosocial/integrative**
Anxiety	Phobias
Depression	Impulsiveness
Irritability	Socially inappropriate comments/actions
Mistrust of others	Emotional lability
Hopelessness	Agitation
Helplessness	Paranoia
Anger	Unawareness of deficits
Social withdrawal	Misperception of the intention of actions of others
	Apparent lack of motivation
	Hypoarousal

(Prigatano, 1987, p. 4)

Although health professionals separate TBI into mild, moderate and severe, and divide the resulting deficits into conceptual categories, the consequences of and the constraints under which TBI's occur are complex and different for each

injury. Further, the outcomes for those who sustain a TBI are just as varied and expectations for each individual differ. For many people "when can I get back to work/school?" is probably the most frequent question asked of those working with the survivors of TBI. RTW/E remains the leading indicator of recovery after a TBI, and it is often what survivors strive for, above all else (Cook, 1990).

Table 4
Cognitive Symptoms after Moderate and Severe Traumatic Brain Injury

Moderate and Severe TBI Sequelae
Attention and concentration problems
•Difficulty sustaining attention in the face of distraction
•Difficulty sustaining attention or concentrating while carrying out tasks that require active processing of information, such as arithmetic or reading
•Cognitive fatigue
•Impaired selective attention and scanning
•Difficulty shifting attention among tasks without losing information or mental set
Learning and memory problems
•Poor rote learning
•Difficulty in learning and remembering new information
•Difficulty organising or processing information that is "important to remember"
•Deficits in either some or all of the input, consolidation and retrieval stages
Judgement and perception problems
•Misinterpretation of action or intentions of others
•Confusion on being presented with multiple bits of information
Problems with communication (Aphasic and Non-aphasic)
•Anomia
•Inefficient word retrieval
•Tangentially of though and speech
•Talkativeness/ Uninhibited choice of words
•Use of peculiar words and phrases
Speed of information processing problems
•Extreme slowness of reaction time
•Slowness in psychomotor activities
•Taking longer to cognitively process information
•Easily overloaded with information, especially complex information
Initiation and planning of goal directed activity problems
•Impulsive and preservative responses
•Slowness in initiation time

Continued below

- •Confusion as to where to start in solving a problem and consequently often using unrealistic problem solving strategies
- •Difficulty ordering or sequencing information
- •Difficulty knowing when, where and how to ask for help
- •Trouble learning from mistakes as well as from successes
- •Impairment of abstract ability

(Prigatano, 1987, p. 5)

Table 5
Physical Symptoms after Moderate and Severe Traumatic Brain Injury

Moderate and Severe TBI Sequelae
Sensory-motor
Loss of smell and/or loss of taste
Loss of or decreased hearing
Loss of or decreased tactile sensation
Visual disturbances
Difficulties with balance
Motor control and co-ordination (ataxia)
Poor control over hand and arm movements
Awkward gait
Seizure disorder
Decreased tolerance for drugs and alcohol
Headache/ post concussion syndrome

(Adapted from Kay & Lezak, 1990)

Vocational rehabilitation

Vocational rehabilitation came into focus in the 1970's as a separate entity focused on returning those with TBI to productive employment. This focus resulted from the increasing emphasis Westernised societies placed, and continue to place, on the importance of contributing to the community through work. Employment is considered important because it is seen to help structure lifestyle, provide stability and purpose and create an autonomous lifestyle

(Lezak, 1986). In keeping with this, the overall goal of vocational rehabilitation is often to achieve an outcome at the highest level possible to maximise the person's independence and productivity and to sustain that outcome over time (Carr, 1993).

Agencies Involved in Returning TBI Individuals to Work in New Zealand.

RTW/E is fraught with difficulties and possible hazards. This is clearly the case overseas as well as in New Zealand. Research undertaken by Carr (1993) indicated that while there were a large number of service providers in New Zealand, comprehensive services after TBI were unavailable, and that 90% of TBI individuals surveyed could cite major gaps in current service provisions.

In New Zealand vocational rehabilitation is provided for from three main sources: government agencies such as, Hospitals, ACC and Income and Work New Zealand, voluntary welfare organisations and the private sector which includes private residential care (e.g. Ryder Cheshire Foundation).

The first of these agencies, ACC, is primarily responsible for the vocational rehabilitation of those people who sustain TBI. Income and Work New Zealand provides funding under the Disabled Persons Community Welfare (DPCW) Act 1975, (Carr, 1993) for various services for people with disabilities, including job placement and vocational services such as Workbridge, an employment agency for people with disabilities. The Heath Funding Authorities (HFAs) concentrate funding on the provision of emergency, acute, post acute and long-term institusionalised care. Return to education is also of immense importance and Special Education Services (SES), funded via the Ministry of Education provides specialist services to young children with special needs and their families (Carr, 1993). Voluntary organisations also provide services to those who sustain TBI. These are provided by the community, through organisations such as Options for Training and Employment, Headway, and IHC. These services generally rely on public donations and grants from other organisations such as the Lotteries Commission, to run their services. More recently, these services have been able to tender for contracts from the HFA to provide their services.

Optimally, the aim of all these diffuse agencies is to return the individual with a TBI to their previous occupation or education of a similar level. This is often not possible and it is necessary to observe RTW/E not as a single entity, but as a series of options on a continuum that typically ranges from full time RTW/E at one end, through to unemployment or non-RTW/E at the other. In the middle lie the most common outcomes: return to previous or similar work or education part time, return to a job or course that carries with it lesser demands or increased compatibility with a persons remaining strengths, supported employment or education, volunteer work or placement in a sheltered workshop.

Overtime, those who sustain TBI may progress through several of these options. For example, someone with a moderate injury may begin by returning to their old job part time, gradually increasing that time until they are able to cope effectively with all their responsibilities. This, however, is the ideal. In some cases RTW/E may be premature or on an overly optimistic point on the employment/education continuum and while expectations recede at this point a refocusing on remaining strengths becomes important.

It is here that the skills and knowledge of a clinical Neuropsychologist may be of invaluable service to those attempting or wishing to attempt to RTW/E. In helping to plan the appropriate entry or re-entry point in conjunction with other rehabilitation professionals, ineffectual and frustrating attempts to RTW/E may be forestalled. The ability to plan for a realistic future is often a major concern for the individual and their family. By being aware of those factors that may contribute to successful RTW/E, or those that may pose significant barriers, a Neuropsychologist may offer clients some guidance.

CHAPTER 3

RETURN TO WORK FOLLOWING TRAUMATIC BRAIN INJURY

Introduction

Approximately 9,000 people are admitted to hospital each year in New Zealand with TBI (Carr, 1993) and due to improving surgical techniques, medical care and management, TBI individuals who only a few decades ago may have died from their injuries are now surviving. These individuals show little or no decrease in life expectancy (Cartlidge & Shaw, 1981) and as a consequence, quality of life issues have become of critical importance. One of the most important of these, is occupational functioning or RTW (Prigatano, 1989).

The meaning and significance of work in the lives of New Zealand people was the focus of a recent study by Gendall (1997). This study reported that work is important to New Zealanders, and a job means more to them than just a way of earning money. In fact, "nearly 40% of New Zealanders believe that work is a person's most important activity, and, two thirds say they would enjoy having a paid job even if they did not need the money" (p. 3). Almost all of those surveyed (95%) stated that they would prefer to have a paid job and that one of the most important characteristics of a job, was being useful to society.

Moreover, while having a job is important to the average New Zealander, RTW after TBI is of even greater personal importance to the head injured person. For in the face of many deficits following injury, RTW can frequently become a symbol that some recovery is possible and that life still has a purpose, as does return to education.

Rates of Return to Work/Education after Traumatic Brain Injury

People sustaining TBI are at increased risk for unemployment (Dikmen, et al. 1994). Estimates of RTW following TBI vary from 3% to 100%, with studies including participants with a complete range of severity ratings; mild through to severe (Ben-Yishay, Silver, Piasetsky, & Rattock, 1987; Brooks, McKinlay,

Symington, Beattie & Campsie, 1987; Humphery & Oddy, 1989; Johnson, 1987; Lam, Priddy & Johnson, 1991; Stambrook, Moore, Deviaenes & Hawryluk, 1990 and Thomson, 1989). The differences in proportions able to RTW post-injury are likely to be a function of the differences between studies, including a wide spectrum of patient populations selected as the research sample and considerable variations in the occupational outcome measures used.

In comparison to rates of employment before TBI, rates of RTW are poor following TBI. Fabiano & Crewe (1995) reported a 93% employment rate among their participants prior to TBI and a RTW rate of only 43% post injury. Similarly, Levin, Grossman, Rose, & Teasdale (1979) and Brooks, et al. (1987) reported high rates of employment pre-injury 96% and 86% respectively, and lower post TBI, RTW rates of, 22% and 29%, respectively. Further, Girard, Brown, Burnett-Stolnack, Hashimoto, Hier-Wellmer, et al. (1996) reported that only 39% of participants were productive at pre-morbid levels or better.

In addition, rates of RTW have been noted to decline over time indicating that not all of those who RTW are successful. Ben-Yishay, et al. (1987) found that at 12 months 63% of their sample were employable, at 24 months the figure was reduced to 59%, and at 36 months only 50% remained in employment. Olver, Ponsford & Curran (1996) described their RTW statistics as the most disappointing results to emerge from their follow-up study. Of the 68 patients who were employed at the time of their injury only 34 (50%) were still employed at 2 years, but only 27 (40%) were still employed at 5 years. Further, of the 34 subjects who were still employed at 2 years post injury only 23 (68%) were still employed at 5 years post injury. Of those participants who were not employed at 2 years only 4 (12%) had gained employment by 5 years. Fraser, Dikmen, McLean, Miller & Temkin (1988) revealed that although 73% of those working at the time of their injury returned to work, 40% were indicating difficulties at work related to TBI.

Of those who do RTW, there is an overall trend for the nature of the work to be less demanding than at pre-injury. McMordie, Barker & Paolo (1990), found that even though 45% of their sample were able to engage in some work related

activity, only 19% were in competitive employment positions and of those 19%, 84% were working at a job demanding less than their pre-morbid occupation. Certainly no person was reported as working at a job more demanding than his or her pre-morbid position. Similarly, Gilchrist & Wilkinson (1979) reported that although 38.9% of their participants were working after TBI, 15.3% were in a different, usually less demanding occupation.

The employment outcomes of TBI and non-TBI participants have also been compared. Dresser, Meirowsky, Weiss, McNeel, Somon, et al. (1973) followed a control group of participants who had not suffered TBI as well as a TBI sample. Of the control group 95% were employed post injury, but this reduced to 75% for the TBI group.

Studies investigating TBI outcomes have also included return to education (RTE) or a combination of both RTW and RTE (RTW/E) as a measure. Dornan & Schentag (1995) reported that 42% of TBI participants RTW/E, while Rao, et al. (1990) reported a higher figure of 66%. Ruff, et al. (1993) included RTW and RTE as separate outcomes and reported that 31% of former workers had RTW and 66% of former students had RTE 12 months post TBI. Further, Burke, Wesolowski, Buyer, & Zawlocki (1990), studying the outcomes for adolescents with TBI reported that 53% had RTE, 23% were competitively employed and 23% now attended special schools. Finally, Stewart-Scott & Douglas (1998) reported that a 3 years post-injury 85% of participants had either completed their course or were still studying, three students were employed, although only one was in full time employment, and 3 were unemployed.

In summary, RTW/E following TBI is a process fraught with difficulty, which is likely to be unsuccessful, especially when, compared to non-TBI groups. Further, for those who do RTW/E it is more probable that they will return to a position less difficult than the one they held before. In addition, the chances of maintaining even a less difficult position long term following TBI is not good.

Vocational outcomes reported in overseas studies predominantly occur after intensive cognitive rehabilitation and occupational trials, unfortunately these are

not widely available as part of the TBI rehabilitation process in New Zealand (Carr, 1993). This may create a confounding variable when making comparisons between New Zealand studies and those from overseas. Only a small number of studies conducted with New Zealand population samples have been reported. Carr (1993) found that after TBI 46% of participants were not working at the time of their survey. Of those who had occupations (54% at the time of the survey), just under half (25%) had changed their occupation. Furthermore, over half the total number who did RTW, indicated that they had not, nor did they expect to, return to their pre-injury performance. The study also stated that, "It was evident from the results and the comments made, that a significant number of participants who initially returned to work were unable to remain at work, having subsequently lost or left their jobs as a direct consequence of their head injury" (p. 59). Godfrey, Bishara, Partridge, & Knight (1993) in their study of severely head injured people reported 25% of patients failed to RTW, and a further 17% returned to work under special conditions of employment. An Australian study, conducted by Ponsford, Olver & Curran (1995), reported that of the 106 (61%) patients who were employed on a full time basis prior to sustaining a TBI, only 35 (33%) were employed full time at 2 years post injury, nine (9%) were employed part time and 62 (58%) were unemployed.

Carr (1993) also commented that while further research is required in the area, the trend of RTE in New Zealand is similar to that of RTW. "Only half of those who were attending an educational institution full time at the time of the injury were attending full time at the time of the survey" (p. 59). In Australia, Ponsford, Olver & Curran (1995) reported that 27 participants in their study were students before their TBI. At 2 years post injury, just under half (48%) were still studying, 12 (44%) were unemployed and two (8%) were working.

Consequences of Non-Return to Work/Education

The inability to RTW after TBI has significant economic and social impact on the individual, their family and society. For those who are below school leaving age at the time of their TBI and who must legally return to some form of education, these consequences may manifest themselves when they leave school. "A job

brings monetary reward, status within the community, and a sense of personal worth" (Brooks, et al. 1987, p. 5). For the individual, return to a less demanding position or failure to RTW is connected to financial instability (Carr, 1993; Paniak, Shore, Rouke, Finlayson & Moustacalis, 1992) and thus, to financial dependence (Kreutzer, Wehman, Morton, & Stonnington, 1988; McMordie, et al. 1990). "The person with a job and it's associated financial independence, has power and control over their own life in a way that is not possible for the unemployed person" (Brooks, et al. 1987, pp. 5), resulting in a deterioration of quality of life (Klonoff, Snow & Costa, 1986; McMordie & Barker, 1988) and an increase in financial and emotional stress (Dornan & Schentag, 1995).

Non-RTW resulting in loss of financial independence and personal autonomy can have a further flow on effect on social contact. Work represents a major social role in Westernised societies; it requires participation in society and results in an increase in the amount of social support and social activity experienced by a person (Grant & Alves, 1987). Thus, when head injured people are unable to work, they are denied this important opportunity. Moreover, evidence suggests that social support directly contributes to psychological well being and mitigates the deleterious effects of stress and anxiety (Hansson, Jones, & Carpenter, 1984).

Together with financial dependence, reduced social support and social activity and increased stress and anxiety, failure to RTW can result in a loss of self-esteem (Dikmen, et al. 1994). Westernised societies often use employment to make the distinction between members who are productive and contributing from those who cause resources to be expended for their maintenance. Thus, in a society that customarily bases its estimates of a persons status or value on their ability to undertake gainful employment, it is no surprise that TBI survivors view RTW as an important criterion to their recovery, and also as a measure of personal worth.

There is a substantial economic cost associated with TBI. It has been described by many as the 'silent epidemic', one that strikes most vehemently at teenagers and young adults who make up the primary working population.

Approximately 63% of all those who sustain TBI are aged between 15 and 64 (Lezak, 1995) effectively turning many potentially productive workers into social welfare recipients. Lifetime costs for care and rehabilitation, lost earnings and other indirect costs of TBI place a significant burden on the health care and social welfare resources of western countries. In The United States alone, hospital costs for severe TBI are estimated at around $105,570 (US dollars) per person every year and are rising (Mackenzie, Shapiro & Siegel, 1988). Approximately 373,000 people are discharged from hospital each year in the United States (Kraus & Sorenson, 1994) often returning to their homes and families who then endure the burden of care and in many cases a substantial part of the costs of care. In addition, while the costs to the family are high, when they are unable to care for their TBI family member, the costs to society are further increased. Approximately $90.8 million (1981 US dollars) is spent annually in the United States on caring specifically for TBI patients in nursing homes (Kraus & Sorenson, 1994).

In New Zealand, much of the financial cost of TBI is the responsibility of ACC. For the year 1 July 1995 to 30 June 1996, 6,858 new TBI claims were registered with ACC at a cost of $7,579.000 (ACC, 1996). Godfrey, et al. (1993) reported that compensation for salary alone, is likely to cost at least $0.5-million for each patient who fails to RTW. Further, Carr (1993) reported that cost estimates for public hospital in-patient care of TBI in New Zealand, obtained from the then Department of Health, totalled approximately $25,419,145. It is important to note that these estimates are only the tip of the iceberg when it comes to the true costs associated with TBI in New Zealand. For, if other direct medical and welfare costs, and indirect costs arising from patients returning to lower paid jobs or work under special conditions (e.g. salary subsidies), were included, the cost of TBI in New Zealand would escalate enormously.

CHAPTER 4

REVIEW OF VARIABLES INDICATIVE AND PREDICTIVE OF RETURN TO WORK OR EDUCATION

Introduction

As has been stated previously, occupational and educational functioning represents the most fundamental, real world, outcome criteria for rehabilitation. In addition, because of its clear links to financial status, autonomy and self-esteem, research on RTW/E after TBI merits priority. For health care professionals in the field of rehabilitation, a better understanding of the RTW/E process will inevitably allow for the planning of appropriate care and must inevitably have an impact on outcome (Wehman & Kreutzer, 1991). The first step in this understanding must come from the identification of the variables associated with the success or failure in the attempt to RTW/E.

These variables are divided into predictors and indicators and will be discussed briefly here. "Predictors include all relevant accident and acute data (Klonoff, et al. 1986). Predictors to be discussed further in the present study include: pre injury work history, demographic characteristics, substance abuse, criminal behaviour, injury severity and early post trauma sequelae. "Indicators are those measures or observations of cognitive, emotional and sensorimotor functioning obtained when determining job placement" (Crepeau & Scherzer, 1993, p. 6). Indicators to be discussed further in the present study include: global cognitive functioning, memory, attention and information processing, executive functioning, language and communication changes in pre-morbid personality, aggressiveness, depression, irritability and length of rehabilitation. Indicators permit the rehabilitation professional to determine the most appropriate and realistic employment goals for the head-injured person.

Predictors

Pre-injury Characteristics

Research in this area has covered numerous characteristics, the most common of these being, pre-injury work history, the demographic characteristics (i.e. age

at the time of the accident, years of education, gender, ethnicity), as well as substance abuse, criminal history, and injury severity. Each of these is reviewed below.

Pre injury work history. Pre injury work history has been examined from a variety of perspective's. These have included occupational levels (e.g. skilled, semi-skilled, and unskilled), job classification (e.g. clerical, managerial), and employment status, (e.g. employed/unemployed full/part time employment, sheltered employment and retired). Income level has also been employed as a measure of pre -injury work status, as has social class and pre-injury work stability. It is likely that this variety in methodology accounts for the differences found in the related literature.

Lower post-injury occupational level has been associated with low pre-injury occupational level (Lubusko, Moore, Stambrook & Gill, 1994; Stambrook, et al. 1990). Fraser, et al. (1988), classified participants by their pre-injury job classification reporting that individuals employed in structural occupations (e.g. building trades) were more likely to RTW in their former occupations than were professional managerial, clerical, or service workers. In addition, Ruff, et al. (1993) and Dikmen, et al. (1994) found that those with an unstable pre-injury work history are less likely to RTW.

Some studies have failed to establish any association between pre-injury work history and RTW. Fabiano & Crewe (1995), for example, failed to find any relationship between pre-injury job classification (as measured by the Dictionary of Occupational Titles) and RTW following TBI. Furthermore, Brooks, et al. (1987), Dornan & Schentag (1995) and Johnson (1987) reported non-significant relationships between job classification and RTW/E.

Demographic characteristics. A review of the available literature reveals age to be an important factor in RTW, especially age at the time of injury (Brooks, et al. 1987; Katz & Alexander, 1994; McMordie & Barker, 1988). More specifically it appears that age has the greatest negative effect on RTW after the age of 40 – 45 years (Brooks, et al. 1987; Edna & Cappelen, 1987). There is a trend of

greater recovery when a person is younger (up to age 25 – 27 years) at the time of injury (Asikainen, Kaste & Sarina, 1996; Dornan & Schentag, 1995; McMordie, et al. 1990; Rao, et al. 1990). Brooks, et al. (1987) reported a RTW rate of 39% in those aged less than 45 years of age and a RTW rate of 12% in those aged over 45.

Older age at time of injury has also been strongly related to taking longer to RTW and to returning to jobs of lower occupational level than pre-injury levels (Dikmen, et al. 1994; Stambrook, et al. 1990). Lubusko, et al. (1994), and Johnson (1987) failed to find significant differences for age at time of TBI. Furthermore, other studies reporting no relationship between age and RTW did not generally included those persons 50 or older (Fabiano & Crewe, 1995; Malec & Basford, 1996).

An important finding in the area of education and RTW has been that higher academic achievement prior to TBI is associated with more positive prognosis after TBI. Consistent with earlier studies, in particular, Brooks, et al. (1987) and Greenspan, et al. (1996) found that individuals who did not complete high school were less likely to be back at work (56%) at 1 year, compared with those who had completed high school (32%) or had attended college (27%). Likewise, Dikmen, et al. (1994); Asikainen, Kaste, & Sarna (1996) and Najenson, Grosswater, Mendelson & Hackett (1980) revealed that participants with less than a high school education were less likely to RTW following TBI than were those with an education above a high school education.

There are however, a number of contradictory results that have not found education to be reliably related to employment outcome. In the same Asikainen, et al. (1996) study as above, a relationship between pre-injury education and occupational outcome was not found in the group of patients with more mild and moderate TBI's. More recent studies, Fabiano & Crewe (1995); Malec, Smigielski, Depompolo, & Thompson (1993); Lubusko, et al. (1994) and Dornan & Schentag (1995) substantiate this demonstrating no significant relationship between years of education and RTW/E following TBI.

The relationship between gender and RTW is as yet unclear and has been described as "remaining obscure" (McMordie, et al. 1990). In the available literature, two studies reported no significant correlations between gender and RTW/E following TBI (Dornan & Schentag, 1995; Fabiano & Crewe, 1995), while two others revealed that females had better outcomes than males (Brooks, et al. 1987; McMordie, et al. 1990). In their review, Crepeau & Scherzers (1993), reported that in samples made up of predominantly severe TBI's the proportion of women able to RTW was slightly greater, with the opposite occurring after less severe TBI's, when the proportion of men able to RTW was greater.

The influence of ethnicity on RTW has received little attention. A review of the currently available literature reveals that the study conducted by Greenspan, et al. (1996) is the only one to have included ethnicity. Initial analysis indicated that ethnicity was a significant factor in occupational outcome until other factors were adjusted for.

Substance Abuse and Criminal Behaviour

The association between RTW and substance abuse and criminal behaviour prior to TBI has also received little attention. Williamson, et al. (1996) report a relationship between pre-existing substance abuse and/or criminal behaviour and negative outcome after TBI, as did Dornan & Schentag (1995), who found a significant inverse relationship between alcohol abuse and RTW/E. Those with reported alcohol abuse made up 46.2% of participants who were not able to RTW/E. In addition, Sander, Kreutzer & Fernandez (1997) reported a substantially higher proportion of employed persons were classified as moderate or heavy drinkers, whereas there were more abstainers among the unemployed.

Injury Severity

A persistent finding in this area of research is that severity of injury, as measured by Length of Coma, Glasgow Coma Scale, or Duration of Post-Traumatic Amnesia (PTA), is negatively, powerfully and reliably related to the increased likelihood of RTW (Webman, West, Kregel, Sherron, & Kreutzer,

1995). There is clear ordering by subgroup, with milder TBI returning to work or education earlier than those with more severe injuries (Dikmen, et al. 1994).

Severity of TBI as measured by coma length is significantly related to employment status (Ezrachi, Ben-Yishay, Kay, Diller, Rattock, 1991). Those who do not RTW after TBI, have on average a longer duration of coma than do their RTW cohorts (Fraser, et al., 1988). Shorter duration of coma ranging from (3.4 days – 7.6 days) was associated with a more positive outcome by, McMordie, et al. (1990), Rao, et al. (1990) and Cifu, et al. (1997). Fabiano & Crewe (1995) also compared employment outcome groups with coma length and found that those involved in sheltered or supported employment had longer periods of coma than those employed full time or enrolled in college. One study identified in the current literature (Lubusko, et al. 1994) did not report a significant difference between length of coma and return to same similar positions or return to worse positions.

There is a positive correlation between RTW after TBI and the Glasgow Coma Scale (GCS) i.e. significantly higher (milder severity) GSC scores are associated with RTW. In their review Crepeau & Scherzer (1993) suggested that the best GSC score on the first day of coma is more related to work status than the GSC score at admission in emergency. Other studies have examined the link between employment outcome and found a GSC score of approximately of 7.5 – 13 is related to RTW and a score of approximately 6.5 – 11 is related to non-RTW (Cifu, et al. 1997; Fraser, et al. 1988). Lubusko, et al. (1994) did not report a significant difference between GCS score and return to a same or similar position and a worse position.

Non-RTW is associated with TBI of a higher severity as measured by PTA (Cifu, et al. 1997; Greenspan, et al. 1996). A period of PTA greater than three weeks is associated with a lower rate of RTW while a significantly shorter mean length of PTA (12 days) is experienced by those who do RTW (Godfrey, et al. 1993). Further, Paniak, et al. (1992) reported that no head injured patient who was gainfully employed (including students) pre-morbidly and had a PTA of more than 33 days was able to gain or improve on their pre-morbid occupational

level. In addition, Lubusko, et al. (1994) reported a significant difference between PTA and return to a same or similar position and a worse position. Those who returned to a worse position showed considerably longer times (M = 40.25, SD = 34.56) than those who returned to a same or similar position (M = 11.50, SD = 10.98). In contradiction to these findings, Johnson (1987) and Brooks, et al. (1987) failed to find a significant relationship between injury severity as measured by PTA and occupational outcome.

Early Post-trauma Sequelae

Few studies report on the prognostic value of post-trauma sequelae in the early recovery phase. Among the list of specific sequelae that have been studied and that will be reported here are physical sequelae and epilepsy.

Dikmen (1994) and Fraser, et al. (1988) have reported that severe other system injuries have a profound effect on RTW/E, are an important limiting factor in RTW/E and that TBI unemployed patients report markedly greater overall physical problems than TBI employed patients. However, Brooks, et al. (1987) reported that physical sequelae, when assessed as the functioning of the whole body rather than separate parts, had no significant relationship with work status and further, Johnson (1987) reported that no handicaps will specifically preclude RTW.

When a more detailed assessment of physical sequelae is made there is a moderate correlation with RTW/E (Rao, et al. 1990). This study found that concomitant injuries (i.e. non central nervous system) are among the variables most related to RTW/E. Greenspan, et al. (1996) also reported that the individual contribution of the motor domain in their functional status measure correlated highly with non-RTW. McMordie, et al. (1990) and Stambrook, et al. (1990) reported that non-working head injured individuals self reported as having significantly more problems with motor impairment and ambulation than head injured persons who RTW. Richardson (1990) reported that epilepsy was an important determinant of RTW.

A summary of the predictors discussed above is shown in Table 6. Some of the predictors listed as contributing towards a positive prognosis after TBI have some contradicting evidence in the literature however the majority of the research support their inclusion in the list.

Table 6
Summary of Return to Work Predictors

Predictors of RTW/E after TBI	
Positive prognosis	**Negative prognosis**
Younger than 40 years old	Older than 40 years old
Good academic achievement	Poor academic achievement
Stable work history	Unstable work history
Shorter duration of coma	Longer duration of coma
Milder severity (GCS and PTA)	Higher severity (GCS and PTA)
No epilepsy	Persistent epilepsy
No complications to other systems	Complications to other systems
No previous brain injury	Previous brain injury
No history of substance abuse	History of substance abuse
No history of criminal behaviour	History of criminal behaviour

Indicators

Cognitive Sequelae

Cognitive sequelae have been widely studied for their impact on RTW. The areas commonly considered are global cognitive functioning, memory, attention and information processing, executive functioning, language and communication abilities, and visuo-spatial abilities.

Global cognitive functioning. Methods of measurement in the area of global cognitive functioning vary widely between studies, and have included intelligence scales, Halstead's Impairment Index, Wechsler Adult Intelligence Scale Revised (WAIS-R), global clinical assessment and questionnaires for significant others. Fraser, et al. (1988) found that impairments separated RTW/E from non-RTW/E participants and that the RTW/E group had diffuse and

severe impairments across all sub-tests. When used, the WAIS-R has been found to be the measure most predictive of RTW following TBI (Fabiano & Crewe, 1995; Lam, et al. 1991). In particular, performance IQ has been shown to be a significant determinant of RTW (Dornan & Schentag, 199; Levin, Grossman, Rose & Teasdale, 1979).

Raven's Progressive Matrices, a measure that proports to reflect global cognitive functioning, has been reported to be moderately correlated with work status (Crepeau & Scherzer, 1993). This is corroborated by Godfrey, et al. (1993) who revealed that patients who RTW, on average, have significantly higher global cognitive functioning as assessed on Raven's Progressive Matrices. Further, their study included participant reports of the total number of neuropsychological symptoms, which was demonstrated to be a highly significant predictor of patients RTW status.

Halstead's Impairment Index, was utilised by Dikmen, et al. (1994) who reported that those with an Impairment Index, ≥ 0.2, at one month had the highest rate of RTW (96% by one year).

Memory. The majority of studies on memory have reported this cognitive function to have an impact on RTW/E. Cifu, et al. (1997) reported that performance on the Logical Memory delay sub-test of the Wechsler Memory Scale – Revised varied between RTW and non RTW groups, with the non-RTW group obtaining substantially lower scores than the RTW group. Likewise, Lam, et al. (1991) found that the RTW group had higher scores on visuospatial memory tests than other groups. Further, Brooks, et al. (1987) reported fewer memory deficits in those who RTW than in those who did not and considered overall that memory score was the most significant discriminator. In addition, when entered into a linear stepwise regression equation, verbal memory was the best predictor of RTW. However, Godfrey, et al. (1993) reported that level of memory functioning was not significantly predictive of RTW, either on cognitive testing (Rey Auditory Verbal Learning Test) or informant report (Memory Impairment Scale).

Attention and information processing abilities. Fraser, et al. (1988) and Brooks, et al. (1987) have reported low correlations between measures of attention and information processing and employment outcome. However, Ainsley & Gliner (1989) who used a therapist questionnaire to measure attention and information processing found high correlations between this variable and work status following TBI. When entered into a stepwise linear regression equation, attention was the second best predictor of RTW.

Both Godfrey, et al. (1993) and Brooks, et al. (1987) reported that patients who RTW had a significantly higher attention capacity as assessed with the Paced Auditory Serial Addition Task, than those who did not. Melamed, et al. (1985) also found that a dual task performance successfully differentiated between patients working on the open market but under protected conditions, and unemployed participants. Further, Lam, et al. (1991) found that on their distractability test, the competitively (unsupported, full-time) employed group gained higher scores (less distractibility) than unemployed groups.

Digit Symbol (WAIS-R) has been extensively used in research on RTW after TBI and is a potentially useful indicator of future employment. Fabiano & Crewe (1995) established strong correlational results when they used the Digit Symbol (WAIS-R) reporting that higher scores for those employed full time than those in supported or sheltered employment or unemployed. Further, Fraser, et al. (1988) and Prigatano, Klonoff, et al. (1984) found Digit Symbol (WAIS-R) to be the best discriminator of employability following TBI.

Executive functioning. Measures of executive functioning and flexibility reputedly correlate strongly with RTW (Ainsley & Gliner, 1989; Melamed, et al, 1985; Najenson, et al. 1980). Fraser, et al. (1988) reported that the non-RTW/E group fell within a decidedly impaired range of the Trail Making Test (part B). In another study, Bayless, Varney, & Roberts (1989), found that the non-RTW group performed lower on the Tinker Toy Test than either 'normal' controls or employed TBI participants. More importantly though, failure on the test was observed almost exclusively among TBI participants who were unable to RTW,

it would appear then that failure on the test has prognostic significance in relation to occupational outcome.

Concept formation, also included under this heading, is also highly correlated with positive employment outcome (Ainsley & Gliner, 1989) although Fraser, et al. (1988) using the Category Test failed to find a significant relationship.

Language and communication. Studies of language and communication ability and RTW following TBI have been reported to be relatively homogeneous with moderate correlations (Crepeau & Scherzer, 1993). Brooks, et al. (1987) analysed language and communication, reporting that "carrying on a conversation" and "understanding a conversation" were the two individual items which differentiated RTW and non-RTW groups.

Visuospatial Abilities. Studies in the area of visuospatial abilities are generally consistent. Brooks, et al. (1987), Fraser, et al. (1988) and Ainsley & Gliner (1989), used the Rey-Osterreith Complex Figure Test (copy) and an item on a questionnaire for therapists, respectively, and all obtained average correlations. Those who failed to RTW/E had lower scores than those who were successful in RTW/E.

Emotional and Behavioural Sequelae

The area of emotional sequelae and behavioural indicators is widely diverse. In their review, Crepeau & Scherzer (1993) stated that they found it very difficult to make an objective synthesis of the area. The concept of emotional sequelae and behavioural indicators differed greatly from one study to another, i.e. either the variables were under-defined or only partially defined, or measured globally or on a scale that included very specific items.

Personality. Changes in personality post TBI have generally been moderately correlated with RTW/E. In their review, Crepeau & Scherzer (1993) found two studies that reported personality changes as significantly predictive of RTW and a further five studies indicating homogeneous results with a moderate correlation, (although the specific nature of the personality changes was not

defined). Weddell, Oddy & Jenkins (1980) and Cifu, et al. (1997) found meaningful differences between RTW and non-RTW groups on the basis of personality.

A lack of social skills and a deficit in self-care abilities are two behavioural indicators that have been identified as important variables in the RTW process. Godfrey, et al. (1993) reported that TBI patients who failed to RTW were rated by informants (relative or close other) as displaying significantly more characteristics of adverse personality change on a TBI behaviour scale, and were rated by independent judges as being less socially skilled. Brooks, et al. (1987) found that self-care and emotional deficits were the strongest predictors of RTW. Of the variables that made up self care, deficits of personal hygiene and being unable to take care of the household proved to be highly significant indicators of non-RTW.

Aggression. Behaviour related to aggression has been moderately correlated with RTW following TBI. In addition, using either questionnaires or interviews with significant others, Walker, et al. (1987) and Stambrook, et al. (1990) reported that post TBI aggression had a moderately negative correlation with RTW. Emotional deficits that best indicated RTW were difficulties in controlling anger and the presence of changeable and/or depressed mood (Brooks, et al. 1987).

Irritability. This is not an extensively studied area and only two studies were found that included this indicator. These studies indicate that irritability is not associated with RTW. (Van Zomeren & Van de Burg, 1985 cited in Crepeau & Scherzer, 1993 and Weddell, et al. 1980), reported this also, regardless of whether it derived from complaints by the patients themselves or a significant other.

Depression. Non-RTW after TBI has been moderately correlated with depression. Self reported depression as well as depression related concepts such as: boredom, depressed mood, crying more readily, indifference and loss

of interest have an effect on RTW following TBI (Brooks, et al. 1887; Ruff, et al. 1993; Stambrook, et al. 1990; Weddell, et al. 1980).

Anxiety, confusion and verbal expansiveness have also been correlated with non-RTW (Stambrook, et al. 1990) as have lack of realism and immaturity (Brooks, et al. 1887).

Rehabilitation

Rehabilitation is an extremely important indicator in the area of RTW and types and duration of post-injury rehabilitation efforts have been shown to affect RTW or other activities. Studies focusing on vocational rehabilitation indicate that community reintegration services and specific vocational rehabilitation are highly correlated with RTW (Crepeau & Scherzer, 1993). Vogenthaler, et al. (1989) cited in Webman, et al. (1995) found that the amount of post injury rehabilitation services received was a significant predictor of RTW or other productive activity. Further, Brooks, et al. (1987), reported social work services were the most likely services to have been delivered to those who RTW, compared to those who were not.

Simply participating in rehabilitation appears to improve RTW outcomes (Prigatano, et al. 1994). Where general rehabilitation (rehabilitation not specifically aimed at RTW) has been examined, results indicate that it is just as important in moderating RTW as vocational rehabilitation. Malec, et al. (1996) found that unemployment rates were 47% with unspecified post-acute brain injury rehabilitation.

Length of hospital stay. A relationship exists between length of hospital stay and RTW after TBI. Overall the studies that use this measure demonstrate that a longer hospitalisation is moderately associated with non-RTW (Crepeau & Scherzer 1993). McMordie, et al. (1990) and Rao, et al. (1990) reported that patients who RTW/E were more likely to spend a shorter time as an in-patient. Cifu, et al. (1997) reported significant differences between their employed and unemployed patient's length of care. Employed persons averaged 18 days acute care hospitalisation in comparison to unemployed patients who averaged

30 days. Rehabilitation stay of employed persons averaged 26 days compared to the 48 days of the unemployed group. In support of this finding, Lubusko, et al. (1994) reported that those who returned to a same or similar position spent fewer days in hospital (M = 25.50, SD = 19.67) than those who returned to a worse position (M = 63.20, SD = 56.16). Johnson (1987) reported that the chances of successful RTW following TBI are improved if special work conditions can be negotiated with employers and if rehabilitation strategies are extended in the period when individuals first RTW.

A summary of the indicators discussed above is shown in Table 7. As before with predictors, indicators listed as contributing towards a positive prognosis after TBI have some contradicting evidence in the literature, however, the majority of the research supported their inclusion in the list.

Table 7
Summary of Return to Work Indicators

Indicators of RTW/E after TBI	
Positive prognosis	**Negative prognosis**
No deficits in executive functioning	Deficits of executive functioning
Vocational rehabilitation	Lack of vocational functioning
Shorter hospital stay	Longer hospital stay
Higher global cognition's	Lower global cognition's
Good language and communication skills	language and communication deficits
No personality changes	Changes from pre-morbid personality
No clinical depression	Clinical depression
No aggression problems	Problems controlling aggression
No anxiety	Anxiety problems
No confusion	Confusion
No verbal expansiveness	Verbal expansiveness

Summary

Many predictors and indicators are only moderately associated with RTW/E and many of those have contradictory finding between studies. However, overall it appears that severity of injury is the most predictive variable of RTW/E, as measured by PTA or GCS. Age it seems has prognostic value only when the sample includes patients over the age of 40 years of age. Higher academic achievement and shorter duration of coma have predictive power. Those with a poorer outcome are more likely to have had a history of substance abuse, criminal behaviour or multiple brain injury, than those who RTW/E. Studies also suggest that certain early post trauma sequelae, specifically motor sequelae, also have predictive potential.

In general indicators are moderately and strongly related to work status. Of these, cognitive deficits of executive functioning, attention and information processing appear to hold the most prognostic power.

In particular, shorter length of hospital stay is a strong indicator of RTW/E as is neuropsychological severity as assessed by measures of global functioning. In the current literature, more studies than not report that memory has a significant impact on RTW/E following TBI and further, that language and communication and visuo-spatial abilities show moderate ability to predict occupational outcome after TBI.

Duration of rehabilitation appears also to be an important factor in RTW/E. Research indicates that participation in any form of rehabilitation programme will enhance the ability to RTW/E. Many authors though do not report the details of their rehabilitation programs, i.e. whether they were formalised in-patient or simply an assemblage of various outpatient services. Where studies identified vocational rehabilitation as an entity, involvement in it was a significant predictor of RTW/E.

General personality change has moderate ability to predict RTW/E, however, the area of research contains contradictory results. Poorer outcomes have

been associated with self-report of depression, aggressiveness, anxiety, confusion and verbal expansiveness. Irritability however has not.

CHAPTER 5
THE PRESENT STUDY

Rationale and Aim for the Study

Although the exact prevalence of TBI is difficult to determine, TBI is known to affect at least 9,000 individuals in New Zealand each year. It is the leading cause of brain damage in previously healthy young adults, many of whom are of working age. In addition, TBI is clearly linked to difficulties in RTW/E and while some research has been conducted about the determinants of RTW/E following TBI, little has been completed in the New Zealand context. This is remarkable given that failure to RTW/E following TBI is associated with tremendous costs.

Failure to RTW/E results in the termination of an individuals ability or future ability to contribute to the economy through work, creating a dependency on government and community funding, (i.e. long-term care facilities and unemployment, sickness or invalids benefits) for financial assistance. However, the impact on society is secondary to the undefinably costs endured by the individual who sustains TBI and fails to RTW/E. These include loss of self-esteem, social contact, social support and lowered socioeconomic status, as well as loss of current or future (for those of school age) financial and personal autonomy. Accordingly it is of great importance to determine the prognosis of those who sustain TBI, and determine those factors that influence a TBI client's ability to RTW/E, in a New Zealand population.

The aim of this study was to evaluate the effectiveness of neuropsychological information (indicators and predictors) in estimating occupational/educational functioning after TBI. By being aware of those factors that may contribute to successful RTW/E or those that may pose significant barriers, an appropriate rehabilitation plan may be formulated, forestalling ineffectual or frustrating attempts to RTW/E. Furthermore, the knowledge of these factors may provide a focus for vocational rehabilitation for each individual.

In part one of the present study this was attempted with a retrospective data analysis. However, many of the variables available on the existing database in part one of the present study were not operationally defined or consistently recorded, therefore, in part two, the variables were recollected in a more systematic and thorough manner. In this way part two of the present study was a partial replication of part one, but, it also differed in some important aspects. Firstly, in part one of the present study the outcome criteria or dependent variable was determined based on information connected with occupational/educational functioning contained on the existing database or in client files and only enough information was available to permit RTW/E and non-RTW/E as outcome criteria. Previous research though, has suggested that more extensive outcome criteria than RTW/E and non-RTW/E should be utilised when measuring occupational/educational functioning following TBI, and therefore, in part two of the present study, employment information was obtained from participants in detail, and job classification and hours working per week after TBI were used as outcome criteria.

In addition, variables that previous research had reported as significantly impacting on occupational/educational functioning following TBI, were not included among those that had been recorded on the existing database or noted in client files (e.g. job classification after TBI and rehabilitation information) and these were included in part two. Furthermore, the personal self reported RTW/E experience of those sustaining TBI and a relative or close other was examined in part two, as this information also was unavailable on the existing database.

The overall aim of the present study is to identify significant indicators and predictors of occupational functioning following TBI, in the new Zealand context.

CHAPTER 6
METHOD
(Parts One and Two)

Overview of Research Design

The present study was conducted in two parts. Part one involved a retrospective, comparative data analysis of variables selected on an empirical and clinical basis as important in the RTW/E process. These variables were selected after a retrospective review of the records of 280 clients who had presented for neuropsychological assessment. Part two of the present study involved a survey, which was also comparative in nature.

Research Setting

The Massey University Psychology Clinic was established in 1987 to provide a high quality service in clinical psychology to the community while also providing placement experience for clinical students. The clinic is a research facility that also provides assessment and management of psychological disorders in addition to an emphasis on clinical neuropsychology.

Ethical Considerations

All clients are made aware of the research and training focus of the Psychology Clinic prior to being seen and most consent to allow information about themselves to be used for teaching and research purposes. Consequently part one of the present study required no participant contact or involvement.

Permission to conduct part two of the present study was obtained from the Massey University Human Ethics Committee. The fundamental issues that surrounded part two of the present study included: informed consent, confidentiality and the continuing and unaffected access for participants, to the services offered by the Massey University Psychology Clinic, regardless of their decision to accept or decline participation in the present study.

To ensure that all participants were aware of their rights as research participants, information and informed consent sheets were provided to all prospective participants (see Appendices A & B). The information sheet informed participants of the purpose of the present study, provided details about the method, and allowed each participant to make an informed decision about participation. The consent sheet was set out in accordance with the requirements of the Massey University Human Ethics Committee, and each participant signed and dated this form to indicate they were aware of, and understood their rights as a research participant. Voluntary participation was emphasised, and no reward was offered contingent on participation.

Each participant's right to confidentiality was strictly enforced and no one, other than the two researchers involved in the present study had access to information. At all times any use of identifying information was kept to a minimum and was eliminated after the writing up of the final dissertation.

PART ONE

Participants

The participants were 280 clients who had been seen previously at the Massey University Psychology Clinic. They had been referred by various agencies for neuropsychological assessment and treatment following TBI, over the preceding 8 years. As the present study focused on return to work or education, participants younger than 5 years old and older than 60 years old were excluded.

Demographic Characteristics

As shown in Table 8 (below), of the 280 participants, 68.5% were male and 31.5% were female. Age at time of neuropsychological assessment for the total sample ranged between 15 - 59 years with a mean age of 30.67 years. Most of the participant's ages fell between 21 and 40 years.

The majority of the participants had between 0 - 5 years of post primary education with an average of 3.93 years. A total of 81.7% the sample identified themselves as European, 16.1% as Maori and 2.2% as Other. Of the total sample most of participants were single, (55.9%), 34.9% were married or in a de facto relationship, and 9.2% were divorced or separated.

Table 8
Demographic Characteristics

Age at Time of Assessment (years)	
Range	15 – 59
Mean	30.67
SD	10.25
Age at time of Assessment (years)	
5 – 20	32.1%
21 – 40	56.4%
41 – 60	11.5%
Post Primary Education (years)	
Range	0 – 9
Mean	3.93
SD	2.08
Post Primary Education (years)	
0 – 5	80.8%
6 – 8	13.5%
9 – 12	5.8%
Gender	
Male	68.5%
Female	31.5%
Ethnicity	
European	81.7%
Maori	16.1%
Other	2.2%
Marital Status	
Single	56.9%
Married/De Facto	34.9%
Separated/Divorced	9.2%

Employment Characteristics

A total of 90.9% were employed at the time of their TBI (includes both part time work and students), while 9.1% were unemployed. Table 9 (below) outlines the demographic characteristics of the participants as a function of employment status at the time of TBI. Those who were employed were on average younger than those who were unemployed. Those who were employed had, on

average, spent more time in education, post primary. For age and education in categories the majority of participants across all categories, were employed. This trend was present for ethnicity, gender, and martial status.

Table 9
Demographic Characteristics of Participants According to Employment Status at time of TBI

	Unemployed	Employed
Age: (years)		
Mean	33.95	30.25
SD	11.07	10.27
Range	19 – 56	5 - 59
Age: (years)		
15 – 20	7.0%	93.0%
21 – 40	9.3%	90.7%
41 – 60	3.8%	96.2%
Post Primary Education: (years)		
Mean	3.19	3.99
SD	1.54	2.09
Range	1 – 6	0 – 9
Post Primary Education: (years)		
0 – 5	9.7%	90.3%
6 – 8	10.0%	90.0%
9 – 12	0.0%	100.0%
Ethnicity:		
European	8.3%	91.7%
Maori	12.8%	87.2%
Other	20.0%	80.0%
Marital Status:		
Single	10.3%	89.7%
Married/De Facto	7.3%	92.7%
Divorced/Separated	9.5%	90.5%
Gender:		
Female	14.9%	85.1%
Male	6.6%	93.4%

Injury Characteristics

As seen in Table 10 (below), severity of TBI ranged from very mild to extremely severe, with most participants sustaining between moderate and very severe TBI. As further shown in Table 9, the majority of the sample (57.4%) sustained their TBI in a motor vehicle accident (this includes motor bike accidents). These rates are similar to prior research.

Table 10
Traumatic Brain Injury Characteristics

Severity	
Very Mild	6.0%
Mild	10.8%
Moderate	24.5%
Severe	20.5%
Very Severe	20.9%
Extremely Severe	17.3%
Cause of accident	
Motor vehicle accident	57.4%
Falls	20.4%
Collision	10.8%
Assault	5.1%
Other	6.3%

Measures

Independent Predictor Variables

The selection of variables chosen as predictors of RTW/E was based on a current review of the literature and clinical experience with head injured clients. The predictors examined in the present study were: Pre-injury employment status, job classification at TBI; demographic characteristics (e.g. age at time of TBI, age at time of neuropsychological assessment, education, ethnicity, marital status and gender), substance abuse before and after TBI; injury severity (as measured by PTA) and early post trauma sequelae (e.g. post TBI epilepsy, motor impairment, visual, hearing and speech difficulties). All variables were retrospectively classified according to data available in client records.

Pre-injury Characteristics

Pre-injury Employment Status. Pre-injury employment status was classified as either employed (included students) or unemployed at the time of their TBI.

Pre-injury Job Classification. Pre-injury job classification was divided into one of 4 groups according to job title, these were: 1) legislators, administrators, managers and professionals; 2) technicians and associated professionals; 3) service and sales workers and clerks; and 4) agriculture and fisheries workers; plant and machine operators and elementary occupations (New Zealand

Standard Classification of Occupations, 1995). This variable included only those that were currently employed, those that were students, 5) were classified as a separate category.

Demographics Characteristics. Age at time of TBI and age at time of assessment were examined as continuous data as well as being collapsed into the categories of 15 – 20 years, 21 – 40 years and 41 – 60 years of age for analysis. Education was also examined in continuous data (years of total post primary education completed) as well as being collapsed into the categories of 0 – 5 years, 6 – 8 years and 9 – 12 years of post primary education completed. Ethnicity was divided into three groups: European, Maori, and Other. Marital status was divided into three categories: single, married/de facto and divorced/separated.

Substance Abuse

Substance abuse was classified according to self-report of prior and current drug and/or alcohol abuse.

Injury Severity

Severity of TBI was classified using length of post-traumatic amnesia (PTA), as set out by Lezak (1995) and then collapsed into mild, moderate and severe groups.

Post trauma Sequelae

The presence of post TBI epilepsy, motor impairment, visual, hearing, and speech difficulties were classified into Yes/No categories.

Post trauma Sequelae

The presence of post TBI epilepsy, motor impairment, visual, hearing, and speech difficulties were classified into Yes/No categories.

Independent Indicator Variables

The selection of variables chosen as indicators of RTW/E was based on a current review of the literature and clinical experience with head injured clients.

The indicators examined in the present study included measures of global cognitive functioning, pre-morbid verbal cognitive functioning, memory, attention, information processing speed and executive functioning.

Cognitive Sequelae

Global Cognitive Functioning. In common with prior research (Fabiano & Crewe, 1995; Lam et al, 1995; Levin et al, 1979), global cognitive functioning was measured using the Wechsler Adult Intelligence Scale – Revised (WAIS-R) (Wechsler, 1981). The Wechsler scales have proven to be excellent and sensitive tests of ability in research and applied settings over a long period (Kline, 1993). Reliabilities are sufficient and validity is excellent. There is a substantial correlation (about .5 - 8) between Wechsler IQ 's and other measures of intelligence (Vernon, 1984; cited in Spreen & Strauss, 1991). More than half a century after its development, the WAIS-R, is regarded as a criterion test of intelligence and is widely used in clinical assessment. The current edition of the WAIS (WAIS – III) was not used in part one of the present research due to the retrospective nature of the study. Measures of global cognitive functioning derived from the WASI-R included a Verbal Intelligence Quotient (VIQ), a Performance Intelligence Quotient (PIQ), and a Full Scale Intelligence Quotient (FIQ).

Memory. Visual memory was measured using The Rey Osterreith Complex Figure Test (Rey, 1941; Osterreith, 1944; Corwin and Bylsma, 1993). Here the client is asked to copy a geometric figure, and then, without prior warning to recall the figure 3 minutes and then 30 minutes later, by drawing it without the stimulus card being presented. Inter-scorer and test retest reliability (using different forms) is good. Strauss & Spreen (1990) and Berry, Allen, & Schmitt (1991) report inter-scorer coefficients between .95 to .98. Test re-test coefficients have been reported using alternative forms ranging from .60 to .76 (Berry, Allen, & Schmitt, 1991).

Verbal memory, was measured using Digit Span, a subtest of the WAIS-R and the Auditory Verbal Learning Test (Rey, 1964). Digit Span involves the

immediate recall of progressively longer lists of numbers. Psychometric properties are detailed above as part of the description of WAIS-R.

The Auditory Verbal Learning (AVLT) provides information on various aspects of memory and involves the learning of lists of words presented in successive trials in the same sequence. The learning trials are followed by an interference word list and then by a recall and recognition memory trial. The AVLT has sound psychometric properties. Ryan and Geisser (1986) found that both the standard and alternate forms of the test were diagnostically valid measures, correctly classifying 75.3% of the clients in their study. Powell, Cripe and Dodrill (1991) reported that that the AVLT effectively differentiated non-neurological from mixed neurologically impaired participants, by correctly identifying 74% of the sample population. Further, trial V discriminated between control participants and brain damaged participants better than any individual measure in either the Halstead-Reitan or Dodrill batteries, and better than the Halstead Impairment Index; only the summary Dodrill Discrimination Index was more accurate. In the present study the trials 1 through to 7 will be included.

Attention. Divided attention was measured using the Trail Making Test B. The test involves joining, with pencil lines, 25 encircled numbers and letters in alternating order. Reliability and test retest reliability for this measure is well reported with coefficients ranging from .66 to .86 (Goldstein & Watson, 1989; Lezak, 1983; Snow, Tierney, Zorzitto, Fisher & Reid, 1988;).

Selective attention was measured using the Stroop Colour Word Test (Stroop, 1935; Jensen & Rohwer, 1966). This measure requires selective attending to one stimulus while blocking out the processing of another. The conflicting shape of the word serves as a distracter when combined with the stimulus (the different colour) that has a less habituated response (Lezak, 1995). The psychometric properties of the Stroop Colour Word Test have been reported as satisfactory (Spreen & Strauss, 1991) and the measure has been well documented as sensitive to attention deficits even those that are extremely subtle (Bohnen, Jolles & Twijnstra, 1992).

Information Processing Speed. Information processing was measured with the Digit Symbol subtest of the WAIS-R. This subtest requires the client to copy symbols into corresponding numbered boxes as quickly as they are able without making mistakes. Psychometric properties are detailed above as part of the description of the WAIS-R.

Executive Functioning. Executive functioning was measured with the Twenty Questions test (Laine and Butters, 1982). This measure requires the client to ask a series of deductive questions with the aim of discovering which of 42 objects displayed on a sheet of paper, the clinician has chosen as the target object. The clients questions can only be answered with 'yes' or 'no' and the idea is that the client find the object that the clinician has chosen with as few questions as possible.

Dependent Measure

The dependent measure in the present study was occupational/educational functioning after TBI. This measure was divided into two categories: return to work/education (RTW/E) and non-return to work/education (non-RTW/E).

Procedure

The present study was a retrospective, comparative analysis of information held on a database. The database contained the results of neuropsychological assessments of 280 clients who had presented with TBI.

The database contained various fields of information ranging from educational, social, employment and medical histories of clients to outcomes of their neuropsychological assessments. All 280 hard copy files were read individually and the following extra information extracted: work history, employment status, job description at time of TBI, date of birth, date of accident, education history, marital status, substance abuse prior to and after TBI and the whether or not a client received a feedback letter. The information was then coded and added to the existing database. The resulting database was then transferred to the statistical program SPSS 8.0.

PART TWO

Part two the present study was a partial replication of part one, however, due to the limitations in part one, it also differed in some important aspects. Firstly, information was collected in a more systematic and thorough manner. Secondly, the outcome criteria used to measure occupational/educational functioning following TBI was more extensive. Thirdly, variables that prior research had identified as significant prognostic factors in occupational/education functioning following TBI, and that were not included on the existing database (e.g. rehabilitation information) were subsequently included in part two of the present study. Lastly, the self reported experience of those sustaining TBI and those close to them was qualitatively examined.

Participants

The participants for part two of the present study were 22 clients who had been seen most recently at the Massey University Psychology Clinic. They had been referred for neuropsychological assessment following TBI. None of the participants had participated in part one of the present study.

Demographic Characteristics

Participants. As shown in Table 11 (below), of the 22 participants 77.3% were male and 22.7% were female. Age at time of survey for the sample ranged between 21 – 59 years with a mean age of 39.05 years. Most of the participant's ages fell between 21 and 40 years. The range of years of post primary education ranged from 1 – 10 years, with a mean of 4.91 years of education. A total of 77.3% of the sample identified themselves as European and 22.7% as Maori.

On average the present sample was earning approximately $9,000 dollars less after their TBI than before. Of the sample, most of the participants were married or in de facto relationship (45.5%), 36.4% had never been married and 18.2% were divorced or separated.

Table 11
Participant Demographic Characteristics

Age at Time of Survey: (years)	
Range	21 – 59
Mean	9.05
SD	10.09
Age at Time of Survey: (years)	
5 – 20	4.5%
21 – 40	59.1%
41 – 60	36.4%
Post Primary Education: (years)	
Range	1 – 10
Mean	4.91
SD	2.69
Post Primary Education: (years)	
0 – 5	47.4%
6 – 8	42.1%
9 – 12	10.5%
Income Level Before TBI:	
Range	$0 - $80,000
Mean	$30,467.22
SD	$17,905.57
Income Level After TBI:	
Range	$0 - $50,800
Mean	$21,689.05
SD	$13,336.75
Ethnicity:	
European	77.3%
Maori	22.7%
Gender:	
Male	72.7%
Female	27.3%
Marital Status:	
Never Married	36.4%
Married/De Facto	45.5%
Divorced/Separated	18.2%

Employment Characteristics

Table 12 (below) outlines the demographic characteristics of the participants as a function of employment status at the time of TBI. Those who were employed were similar in age to those who were unemployed. Those who were employed had completed, on average, spent more time in education, post primary. For age and education in categories the majority of participants across all categories, were employed. This trend was present for ethnicity, gender, and martial status also.

Table 12
Demographic Characteristics of Participants According to Employment Status at time of TBI

	Unemployed	Employed
Age: (years)		
Mean	39.00	39.10
SD	N/A	10.60
Range	39	21 - 59
Age: (years)		
15 – 20	0.0%	100.0 %
21 – 40	0.0%	91.7%
41 – 60	0.0%	100.0 %
Post Primary Education: (years)		
Range	3	1 - 10
Mean	3.00	4.75
SD	N/A	2.53
Post Primary Education: (years)		
0 – 5	11.1%	89.9%
6 – 8	0.0%	100.0%
9 – 12	100.0%	0.0%
Ethnicity:		
European	5.9%	94.1%
Maori	0.0%	100.0%
Gender:		
Female	16.7%	83.3%
Male	0.0%	100.0%
Marital Status:		
Never Married	14.3%	85.7%
Married/De Facto	0.0%	100.0%
Divorced/Separated		100.0%

Injury Characteristics

As shown in Table 13 (below), of the participant sample 40.9% had a mild TBI, while 54.4% had a severe TBI. The majority of the injuries were caused by motor vehicle accidents (72.7%). The time that had elapsed since the participants TBI ranged from 3 – 240 months, with a mean of 65.35 months.

Table 13
Participants Injury Characteristics

Severity	
Mild	40.9%
Moderate	4.5%
Severe	54.5%
Cause of injury	
MVA	72.7%
Fall	22.7%
Collision	4.5%
Months Since Injury	
Median	42.00
Mean	65.35
SD	63.11

Respondents. As shown in Table 14, of the 16 relative's or close other's (respondents) who supplied information on the participants the majority identified themselves as a partner to the participant (56.3%). Parents were the next largest group followed, followed by ex-partners. The length of time that the respondents had known the participants ranged between 1 – 40 years, with a mean of 20.06 years. The majority had daily contact with the participant. A total of 93.8% of the respondents identified themselves as European, while 6.3% identified themselves as Maori.

Table 14
Respondents Demographic Characteristics

Relationship to Participant:	
Parent	25.0%
Partner	56.2%
Ex-Partner	12.5%
Friend	6.3%
Time Known Participant: (years)	
Range	1 – 40
Mean	20.06
SD	11.47
Frequency of Contact:	
Daily	93.8%
Weekly	6.2%
Ethnicity:	
European	93.7%
Maori	6.3%

Measures

Independent Predictor and Indicator Variables

The selection of variables chosen as predictors of RTW/E was based on a current review of the literature and clinical experience with head injured clients. The predictors examined in the present study were 1) Pre-injury characteristics – pre-injury employment status, job classification at TBI; job stability before TBI; demographic characteristics (e.g. age at time of TBI, age at time of neuropsychological assessment, education, ethnicity and gender). 2) Substance use before and after TBI. 3) Criminal offending before and after TBI. 4) Injury severity – PTA and length of unconsciousness. 5) Early post trauma sequelae - post TBI epilepsy and physical impairment.

The indicators examined in the present study were, 1) Cognitive sequelae – memory, divided and selective attention, information processing speed and executive functioning. 2) Rehabilitation – length of hospital stay, length of in-patient rehabilitation and rehabilitation services received. 3) Emotional behavioural sequelae – Symptom Checklist 90 Revised. 4) Participant self report and the report of a relative or close - Patient Competency Rating Scale.

Participant Questionnaire

This screening questionnaire was developed specifically for the present study (see Appendix C). Table 15, outlines the information gathered in the participant questionnaire.

Table 15
Participant Questionnaire

Basic Demographics	**TBI**
- Age	- Time at age of TBI
- Martial status	- Time since TBI
- Ethnicity	- Cause of TBI
- Income (before and after TBI)	- Degree of any of memory loss for events occurring directly after TBI
	- Duration of loss of consciousness
	- Length of impatient rehabilitation

Continued below

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Drugs/Alcohol and Criminal offending
- Use of drugs and alcohol before and after TBI
- Criminal offending before and after TBI

TBI cont. - Length of time spent in hospital
- Epilepsy resulting from their head injury
- Physical impairment

Educational and Employment History
- Years of post primary education
- Qualifications obtained
- Employment status before and after TBI
- Number of hours worked before and after TBI
- Job type before and after TBI (if any)
- Length of time before first attempting RTW/E (if attempted)
- Success or failure at this attempt
- Job stability prior to TBI. This was classified by the number of jobs that a participant had held for 12 months or less up until the time of their TBI. In addition each participant was asked to agree or disagree with a statement pertaining to his or her job stability before sustaining a TBI

Rehabilitation History
- This section included an extensive list of rehabilitation services that participants may have received after their TBI. For each service, participants were asked to indicate: how long they received the service and how beneficial they felt that service was for them in terms of their attempts to RTW/E

Experience with RTW/E
- Rating scale for the impact TBI had on attempts to RTW/E
- If a participant was not currently working or at school, they were asked to rate how able they felt they were to RTW/E if a job/course became available to them. Participants were also given space to provide qualitative information about anything that they felt either helped or hindered their attempts to RTW/E

Relative/Close Other Questionnaire

This screening questionnaire was also developed specifically for the present study (see Appendix D). Few studies of outcome have rested solely on the self-reports of persons with TBI and most researchers have utilised the reports of relatives or both relatives and persons with TBI (Crisp, 1992). Table 16 (below) outlines the information gathered in the respondent questionnaire.

Table 16
Respondent Questionnaire

Basic Demographics - Relationship with the participant - Length of time known - Frequency of contact - Ethnicity
Experience with RTW/E - Respondents were asked to rate the impact the TBI had on the participant's attempts to RTW/E - If the participant was not currently working or at school, how able they felt the participant was to RTW/E if a job/course became available to them -The respondents were also given space to provide qualitative information about anything that they felt either helped or hindered the participant's attempts to RTW/E

Emotional and Behavioural Sequelae

The Symptom Checklist 90 Revised (Derogatis, 1994) was used as a measure of emotional behavioural functioning following TBI (see Appendix F). The Symptom Checklist 90 Revised (SCL-90-R) is a self-report inventory designed to reflect the symptom patterns currently experienced by psychiatric and medical patients. There are 90 items, 84 of which form the basis of 9 primary symptom dimensions measured by the scale and 7 of which form the 3 global items measured by the scale (see Table 17). All 90 items are rated on a 5 point likert-type scale of distress, ranging from 0 (= not at all) to 4 (= extremely).

Reliability data of two kinds are cited from two studies (Derogatis, Rickels & Rock, 1976 and Horowitz, Rosenburf, Baer, Ureno & Villasenor, 1988) in the manual of the SCL-R-90 (Derogatis 1994), internal consistency, and test-retest. The correlations obtained ranged from a low of .77 for psychoticism to a high of .90 for depression. Correlations for all remaining symptom dimensions were satisfactory, in the range of .79 to .89. Although test-retest reliability over extensive periods of time are somewhat inappropriate given that the nature of the scale is to measure current status, correlation coefficients were provided by the manual. They are satisfactory and coefficients range from .68 to .90. Concurrent, discriminative and construct validity have all been reported in

various studies (Derogatis, Rickels & Rock, 1976; Evenson, Holland, Metha & Yasin, 1980; Holcomb, Adams & Ponder, 1983; Hafkenscheid, 1993) as satisfactory.

Table 17
Dimensions Measured by the Symptom Checklist–90–Revised

Primary dimensions		Global dimensions	
1	Somatisation	1	Global Severity Index (GSI)
2	Obsessive-Compulsive	2	Positive Symptom Distress (PSDI)
3	Interpersonal Sensitivity	3	Positive Symptom Total (PST)
4	Depression		
5	Anxiety		
6	Hostility		
7	Phobic Anxiety		
8	Paranoid Ideation		
9	Psychoticism		

Participant and Relative/Close Other Report

The Patient Competency Rating Scale (Prigatano, Altman & O'Brian,1990) was used as a measure of self report for both the participants and a relative or close other in four areas of competency following TBI (see Appendix E). The Patient Competency Rating Scale (PCRS), is a 30 item self report inventory designed to assess the perceptions of competency in the areas of Activities of Daily Living (ADL), Emotional Control, Interpersonal Skill, and Cognitive Abilities (see Table 18, below).

The PCRS has two forms, one for clients and one for their relative, the only difference between the two forms is the replacement of the word 'their' for the 'you' in the relative's form. Participants and their respondents rate the participant's competency for each activity on a five-point likert-type scale. The Likert-type scale ranges from *can't do* [5] to *can do with ease* [1]. The PCRS (relative's form) was also utilised in the present study.

Table 18
The Four Areas of Competency Assessed by the Patient Competency Rating Scale

Activities of daily Living	**Interpersonal**
Preparing meals	Starting a conversation
Dressing	Getting help when confused
Personal hygiene	Handling arguments
Washing the dishes	Acting appropriately
Doing the laundry	Showing affection
Finances	Group activities
Driving	Upsetting others
Meeting responsibilities	
Emotional	**Cognitive**
Adjusting to change	Keeping appointments
Accepting criticism	Staying involved
Controlling crying	Remembering names
Keeping from being depressed	Remembering schedule
Emotions	Remembering things
Controlling laughter	Daily activities
	Understanding new instructions

(Prigatano, 1990)

Prigatano, et al. (1990) reported acceptable reliability for the PCRS for total scores, .97 for the patient's version and .92 for the relative's version. When test re-test correlations were studied for each item, 27 out of 30 items had statistically significant correlations ($p<.05$) for the patient sample and 28 out of 30 were statistically significant for the relative sample. Heilbronner, Millsaps, Azrin, & Mittenburg (1993) reported adequate reliability and factor structure of the PCRS, finding six relatively discrete factors, which support the content validity of the items. Prigatano, et al. (1990), cautioned that ratings provided by patients and their relatives were only perceptions of competency and that those sustaining TBI often underestimate their competency, especially the items related to handling emotional and social interactions.

Dependent Variable

In part two of the present study, two measures of occupational/educational functioning were chosen as dependent variables. The first was the categorical variable of job classification after TBI as defined by the New Zealand Standard Classification of Occupations (1995). The classifications were 1) legislators,

administrators, managers and professional, 2) technicians, associate professionals, sales, service, and clerical workers, 3) agricultural, fisheries and trades workers, machine and plant operators, and elementary occupations, 4) student and 5) Unemployed. The second dependent variable was the interval variable: number of hours working or in education per week after TBI.

Participant and Relative/Close Other Commentary

Both participants and a relative or close other were asked to provide qualitative information of the factors they believed helped or hinder the RTW/E process after TBI.

Procedure

Part two of the present study; was an examination of an independent sample of 22 participants, selected from more recently assessed clients, referred following TBI. Variables that were not clearly operationally defined or consistently recorded were re-collected in part two in a more systematic manner. In addition, variables related to RTW/E that were not included on the original Psychology Clinic database was examined. These included further information on RTW/E, rehabilitation services received, behavioural and emotional sequelae, participant and respondent report and qualitative information on RTW/E from the participants and a respondent.

Each client was given a brief introduction to the study and then asked if they wished to know more about participation. At this time each client was informed that the study was independent of their neuropsychological assessment and that any information they revealed during the course of the study was independent of their assessments and would not be used in their reports unless their express permission was granted. Further, it was also explained to clients that the study was independent of any outside organisation.

If a client agreed to participate they were given an envelope containing two questionnaires; an information sheet, consent form and postage paid return envelope. One questionnaire was for the participant to complete and the other was for a relative or close other to complete. If they had not already been

completed during the neuropsychological assessment, the envelope also enclosed a PCRS, a relative's version of the PCRS and a Symptom Checklist-90-R.

The participants then completed the questionnaires at home and returned them in the postage paid envelopes provided. Questionnaires were then coded by the researcher in preparation for data analyses and transferred to the statistical package SPSS 8.0.

CHAPTER 7
RESULTS

Statistical Analysis

Prior to analysis, data for the present study were checked for missing values and the adequacy of assumptions. Inspections for normality revealed that the data in part one largely conformed to a normal curve and no transformations of variables was required. It is important to note that caution is warranted when making specific statements based on group statistics. Statistics based upon group details should assist but not determine in decision making for any particular case (Kay, Cavallo, Ezrachi & Newman 1988, cited in Fabiano and Crewe, 1995).

Pearson's chi-square analysis was used to examine the relationship between occupational/educational functioning and nominal/ordinal scaled data, in both part one and two of the present study. Where Pearson's chi-square test for independence was applied to a 2x2 table and the total frequency was not greater than 20, or if any cell frequency was less than 5, Fisher's Exact Test (2-sided) was calculated (Lewis & Traill, 1998).

Independent *t* tests were conducted on interval and ratio scaled data. In all cases where *t* tests were applied, two tailed tests were used. This decision was based on the ambiguity of some previous findings, i.e. some studies have reported significant relationships, e.g. Brooks, Mckinlay, Symington, Beattie & Camsie (1987), while others have not, e.g. Klonoff, Snow & Costa (1986). One way ANOVA'S were also used in the analysis of interval and ratio data.

In part two Spearman's rank correlation was also used to examine interval and ratio data. This was used as an alternative to the parametric bivariate correlation as the data for part two violated the linearity assumption for bivariate correlation analysis in many cases.

Several variables in part one were considered for inclusion in the development of multivariate regression models for the prediction of RTW/E and non-RTW/E.

Due to the binary nature of the dependent variable, logistic regression was the preferred choice of analysis. However, the analysis was unable to be carried out due to the high number of missing variables in the database. This is discussed further in chapter 8, discussion.

In part two of the present study, for the dependent variable job classification, the classifications, legislators, administrators, managers and professionals and student, was dropped from the analysis by SPSS because they failed to occur (i.e. none of the participants fell into these categories) in any of the statistical analysis

The Statistical Package for the Social Sciences, SPSS/PC (Norussis, 1998) was used for data analysis.

PART ONE

Predictors

Pre-Injury Characteristics

Pre-Injury Employment Status. Results indicated significant differences between RTW/E and non-RTW/E groups, for different pre-injury employment status's (see Table 19). High levels of non-RTW/E were shown following TBI for both previously employed and unemployed participants, but not for those who were students at the time of their TBI. Of those who were employed at the time of their TBI, 44.9% were able to RTW/E and of those who were unemployed, 31.6% were able to RTW/E. Participants who were students at the time of their TBI had much better outcomes, 72.2% were able to RTW/E.

Table 19
Chi Square Analysis of Pre-Injury Employment Status

Characteristic	Return to Work/Education		χ^2	df	p =
	No	Yes			
	n %	*n* %			
Pre-injury employment status					
(a) Employed	86 (55.1%)	70 (44.9%)	14.90	2	**.001**
(b) Unemployed	13 (68.4%)	6 (31.6%)			
(c) Student	15 (27.8%)	39 (72.2%)			
Job classification at TBI					
(a) Legislators etc	13 (59.1%)	9 (40.9%)	31.61	6	**.000**
(b) Technicians etc	5 (22.7%)	17 (77.3%)			
(c) Service & sales etc	15 (48.4%)	16 (51.6%)			
(d) Agriculture etc	22 (57.9%)	16 (42.1%)			
(e) Plant/machine etc	33 (73.3%)	12 (26.7%)			

Job Classification at TBI. Results indicated highly significant differences between RTW/E and non-RTW/E groups, for different job classifications (see Table 19). As shown in Figure 2, the majority of those who were technicians and associate professionals at the time of their TBI, were able to RTW/E (77.3%). Job types associated with the highest rates of non-RTW/E were plant and machine operators, assemblers and elementary occupations (73.9%),

legislators, administrators, managers and professionals (59.1%) and agriculture fisheries and trades workers (57.9%).

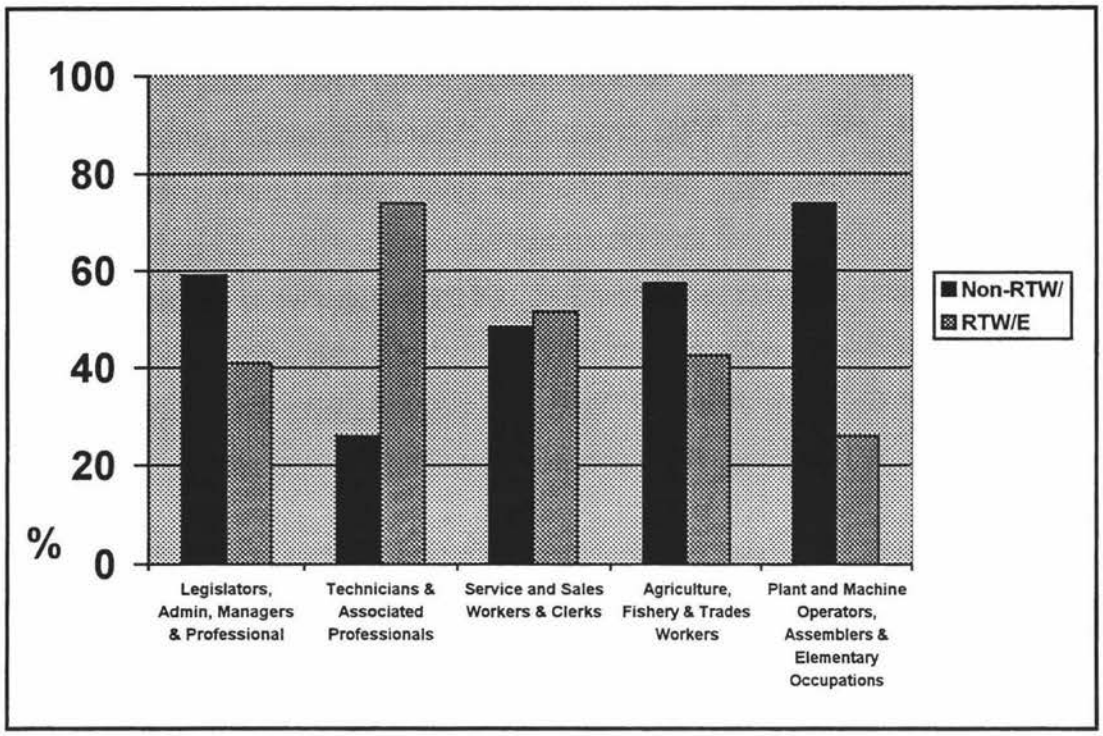

Figure 2. Rates of return to work/education and non-return to work/education according to job classification at the time of traumatic brain injury

Demographics Characteristics. Results indicated significant differences between RTW/E and non-RTW/E groups, for different age groups at time of TBI in categories, years of post-primary education groups and ethnicity groups (see Table, 20, below), but not for age groups at the time of neuropsychological assessment ($\chi^2 = 5.40$, $p = .067$) or gender ($\chi^2 = .678$, $p = .410$).

In the present study, those who were under 20 years at the time of their TBI had the highest rate of RTW/E (61.1%). Those aged 21 – 40 years and 41 - 60 years had somewhat lower rates of RTW/E, (41.9%, and 44.0%) respectively).

Table 20
Chi Square and Independent t Test Analysis of Demographic Characteristics

	Return to Work/Education				χ^2	df	p =
	No		Yes				
	n	%	*n*	%			
Age at TBI							
(a) 5 – 20 years	28	(39.9%)	44	(61.1%)	6.93	3	**.031**
(b) 21 – 40 years	72	(58.1%)	52	(41.9%)			
(c) 41 – 60 years	14	(56.0%)	11	(44.0%)			
Post Primary Education							
(a) 0 – 5 years	101	(52.9%)	90	(47.1%)	8.09	2	**.018**
(b) 6 – 8 years	9	(26.5%)	25	(73.5%)			
(c) 9 – 12 years	7	(46.7%)	8	(53.3%)			
Ethnicity							
(a) European	90	(44.3%)	113	(55.7%)	13.66	2	**.001**
(b) Maori	39	(74.4%)	10	(25.6%)			
(c) Other	4	(80.0%)	1	(20.0%)			

	Independent *t*-test analyses						
	RTW/E		Non-RTW/E				
	M	SD	M	SD	F	df	p =
Education	4.36	2.20	3.62	1.96	-2.75	238	**.006**

As shown in Figure 3 (below), those who had completed between 0 – 5 years post-primary education had the lowest rate of RTW/E (47.1%), while those who had completed 6 – 8 years of post-primary education had the highest rate of RTW/E (73.5%). In addition, the number of years of post-primary education of participants was significantly higher for those who were able to RTW/E (M = 4.31) than those who failed to RTW/E (M = 3.54).

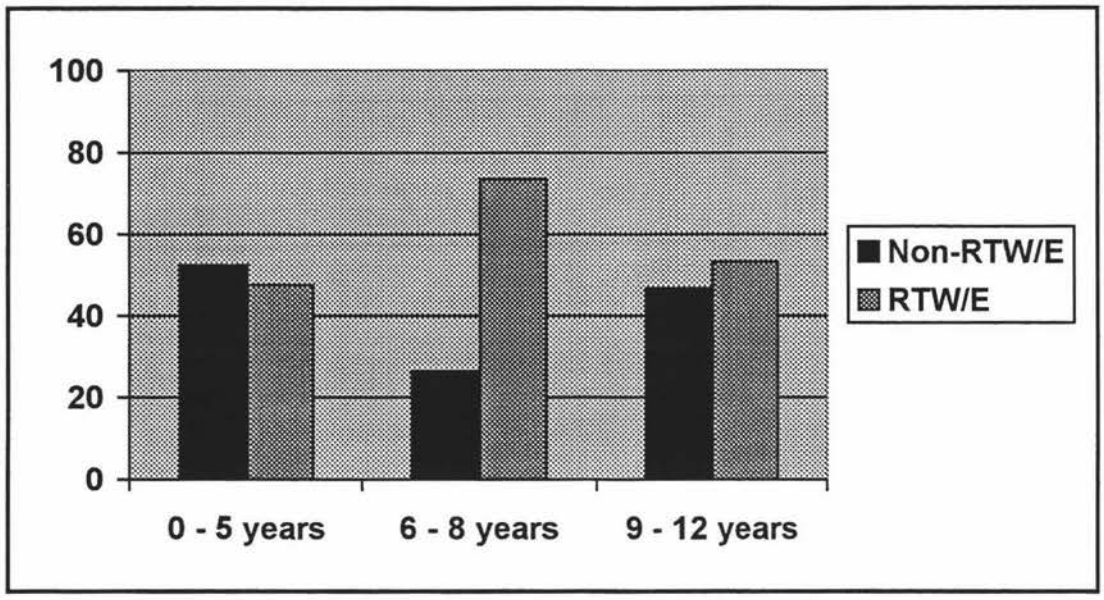

Figure 3. Rates of return to work/education and non-return to work/education according to years of completed post primary education

As shown in Figure 4, those participants who identified themselves as of Maori or of Other decent were the less likely to RTW/E (25.6% and 20.0% respectively) than participants who identified themselves as of European decent (55.7%).

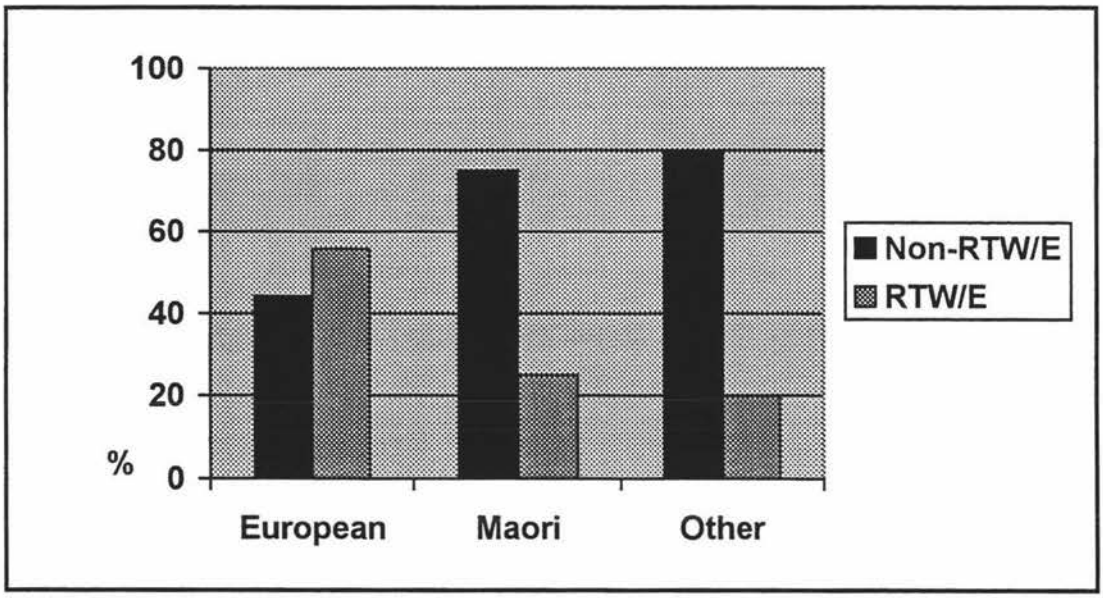

Figure 4. Rates of return to work/education and non-return to work/education according to ethnicity

These rates of RTW/E contrast sharply with the rates of employment at the time of TBI and drop most significantly for Maori and Other groups. At the time of

their TBI, of those who identified themselves to be of Maori descent, 87.2% were employed, and of those who identified themselves to be of European decent, 91 .7% were employed. Rate of RTW/E following TBI is also low when compared to current census statistics. In the general population 83% of Maori who were in the labour force, were in paid employment (Statistics New Zealand, 1997).

Substance Abuse

Results indicated weak but significant differences between RTW/E and non-RTW/E groups, for self reported current drug or alcohol abuse (see Table 21), but not for self reported drug or alcohol abuse prior to TBI ($\chi^2 = 2.50$, $p = .114$). Those participants who reported current drug or alcohol abuse were less likely to RTW/E (27.8%) than those who did not (51.9%).

Table 21
Chi Square Analysis of Substance Abuse

	Return to Work/Education				χ^2	df	p =
	No		Yes				
	n	%	*n*	%			
Current drug/alcohol							
(a) Yes	13	(72.2%)	5	(27.8%)	3.90	1	**.048**
(b) No	111	(48.1%)	120	(51.9%)			

Injury Severity

There were no significant differences between RTW/E and non-RTW/E groups, for different injury severity's, as measured by PTA ($\chi^2 = 2.38$, $p = .304$).

Early Post-Trauma Sequelae

Physical Sequelae. Results indicated weak but significant differences between RTW/E and non-RTW/E groups, for motor impairment (see Table 22, below), but not for epilepsy ($\chi^2 = .496$, $p = .481$) visual difficulties ($\chi^2 = 2.57$, $p = .109$), hearing difficulties ($\chi^2 = .019$, $p = .891$) or speech difficulties ($\chi^2 = .003$, p =

.956). Those participants who reported difficulties with motor tasks were less likely to RTW/E (36.4%) than those who did not (53.1%).

Table 22
Chi Square Analysis of Physical Sequelae

	Return to Work/Education				χ^2	df	p =
	No		Yes				
	n	%	*n*	%			
Motor impairment							
(a) Yes	28	(63.6%)	16	(36.4%)	4.01	1	**.045**
(b) No	91	(46.9%)	103	(53.1%)			

PART ONE

Indicators

Cognitive Sequelae

Global Cognitive Functioning. A significant difference was found between the RTW/E and non-RTW/E groups for Verbal IQ (see Table 23), but not for Performance IQ (F = .642, p = .425) or Full Scale (F = .927, p = .327). Those who were able to RTW/E had a higher Verbal IQ (M = 97.31) than those who did not RTW/E (M = 91.02).

Memory. As is also shown in Table 23, highly significant between group differences were found on the AVLT, trials one through to seven and Digit Span (WAIS-R), but not on the RCFT, copy trial (F = .892, p = .346), delay trial (F = 3.82, p = .052) and the recall trial (F = 2.05, p = .154).

On all trials of the AVLT the RTW/E group recalled more words than the non-RTW/E group. In particular, on trial one, the RTW/E group recalled an average of 5.91 words and the non-RTW/E group recalled an average of 5.13 words. In addition, on trial seven the RTW/E group recalled an average of 8.38 words compared to the non-RTW/E group who recalled an average of 6.29 words. On the Digit Span subtest the RTW/E group obtained a higher mean scaled score

(9.23) than the non-RTW/E group, (7.87).

Attention. Highly significant between group differences were also found on the Trail Making Test B and the Stroop Colour Word test (see Table 23). The RTW/E group took an average of 85.02 seconds to complete the Trail Making Test B, compared to the non-RTW/E, who took an average of 131.04 seconds and an average of 36.80 words, compared to an average of 29.72 words, on the Stroop Colour Word test.

Table 23
Independent t Test Analysis of Cognitive Test Scores

	RTW/E		Non-RTW/E				
	M	SD	M	SD	F	df	p =
Full-scale IQ	94.64	13.88	91.78	13.48	.972	1	**NS**
Performance IQ	95.47	14.34	93.14	13.35	.642	1	**NS**
Verbal IQ	97.31	15.71	91.02	13.93	-2.01	89	**.047**
Digit Span	9.23	2.39	7.87	2.49	3.96	201	**.000**
Digit Symbol	7.97	2.94	6.09	2.28	-4.95	196	**.000**
RCF Copy	33.55	3.33	33.04	3.45	.892	1	**NS**
RCF Recall	20.34	7.22	18.72	7.35	3.82	1	**NS**
RCF Delay	19.40	7.21	17.09	7.60	2.05	1	**NS**
AVLT 1	5.91	1.89	5.13	1.68	-3.28	227	**.001**
AVLT 2	8.02	2.25	6.64	2.31	-4.60	226	**.000**
AVLT 3	9.86	2.59	8.21	2.68	-4.75	224	**.000**
AVLT 4	10.48	2.67	8.89	2.91	-4.28	224	**.000**
AVLT 5	11.09	2.77	9.20	2.90	-5.03	227	**.000**
AVLT Interfere.	5.20	1.55	4.71	.69	2.19	209	**.029**
AVLT 6	8.96	3.55	6.77	3.63	-4.78	224	**.000**
AVLT 7	8.38	3.54	6.29	4.16	-3.68	182	**.000**
Trails B	85.02	35.54	131.04	94.29	3.62	117	**.000**
Stroop Colour Word	36.80	11.80	29.72	14.77	-3.43	164	**.001**
20 Questions 1	9.28	3.83	9.36	4.43	.016	1	**NS**
20 Questions 2	12.61	5.14	12.41	5.62	1.44	1	**NS**
20 Questions 3	9.38	4.89	12.59	8.14	2.53	107	**.013**

Information Processing Speed. As shown in Table 23, a highly significant between group difference was found on the digit symbol subtest of the WAIS-R, with the RTW/E group obtaining a higher mean scaled score (7.97) than the non-RTW/E group (6.09).

Executive Functioning. There were no significant between group differences on trial one ($F = .016$, $p = .899$) and two ($F = .050$, $p = .824$) of the 20 Questions measure, however, there was a significant difference between the two groups on trial three (see Table 23), with the RTW/E group asking fewer questions ($M = 9.38$) than the non-RTW/E group ($M = 12.59$).

PART TWO

Predictors

Pre-Injury Characteristics

Pre-Injury Employment Status. Results indicated no significant differences between job classifications after TBI, for different pre-injury employment status's ($\chi^2 = .995$, $p = .620$). In addition, there were no significant differences between pre-injury employment status's, in number of hours working per week after TBI ($F = .537$, $p = .458$).

Pre-injury Job Classification. Results indicated moderately significant differences between job classifications after TBI, for different pre-injury job classifications (see Table 24). All participants who were legislators, administrators, managers or professionals were unemployed following TBI. Those who were in agricultural, fisheries, trades, machine and plant operations or elementary occupations had the best outcome with 58% able to return to the same job classification after TBI, the remainder however, were unemployed (42%). No participants were able to improve on their employment classification after TBI.

There were no significant differences between job classifications after TBI in numbers of hours working per week after TBI ($F = .991$, $p = .421$).

Table 24
Chi Square Analysis of Pre-Injury Work History at the Time of Traumatic Brain Injury

	Job Classification			χ^2	df	p =
	1*	2**	3***			
Job classification at TBI						
(a) Legislators etc	0	0	2 (100%)	14.32	6	**.026**
(b) Technicians etc	3 (50.0%)	0	3 (50.0%)			
(c) Agriculture etc	0	7 (58.3%)	5 (41.7%)			
(d) Unemployed	0	0	1 (100%)			
Job Changes						
(a) Disagreed	2 (100%)	0	0	13.30	4	**.010**
(b) Agreed	1 (5.9%)	6 (35.3%)	10 (58.8%)			

* Technicians, associate professionals, sales, service and clerical workers.
** Agricultural, fisheries and trades workers machine and plant operators and elementary occupations.
*** Unemployed.

Job Stability. Results indicated significant differences between job classifications after TBI, for job stabilities (see Table 24). Those Participants who agreed with the statement that they had changed jobs more than the average person before their TBI had an unemployment rate of 58.8%, none of those who disagreed with the statement were unemployed. All of those who disagreed with the statement were employed as technicians, associate professionals, sales, service, and clerical workers. Only 5.9% of those who agreed with the statement were technicians, associate professionals, sales, service and clerical workers, while 35.3% were agricultural, fisheries and trades workers, machine and plant operators and employed in elementary occupations.

There were no significant differences between job stabilities, in the number of hours working per week after TBI ($F = .292$, $p = .750$).

There were no significant differences between job classifications after TBI in number of jobs lasting one year or less before TBI ($F = .882$, $p = .433$). Further, there was no significant correlation between number of hours working per week after TBI and number of jobs lasting one year or less before TBI ($r_s = -.102$, $p = .678$).

Demographic Characteristics. There were significant differences between job classifications after TBI, for different tertiary qualifications (see Table 25), but not for age ($\chi^2 = 5.59$, $p = .232$), years of post primary education ($\chi^2 = 6.89$, $p = .142$), ethnicity ($\chi^2 = 1.94$, $p = .380$) or gender ($\chi^2 = 5.91$, $p = .074$).

There were no significant differences between job classifications after TBI in age ($F = 1.03$, $p = .377$) or years of post primary education ($F = .539$, $p = .592$).

Table 25
Chi Square Analysis of Demographic Characteristics

	Job Classification					
	1*	2**	3***	χ^2	df	p =
Highest Tertiary Qualification						
(a) None	1 (07.1%)	3 (21.4%)	10 (71.4%)	15.38	4	**.004**
(b) Certificate	0	4 (100%)	0			
(c) University Qualification	2 (50.0%)	0	2 (50.0%)			

* Technicians, associate professionals, sales, service and clerical workers.
** Agricultural, fisheries and trades workers machine and plant operators and elementary occupations.
*** Unemployed

Of those who had no tertiary qualifications, 71.4% were unemployed after TBI, 21.4% were employed in agricultural, fisheries and trades workers machine and plant operators and elementary occupations and all of those with a trade/national certificate were employed in this job classification also. Of those participants with a university qualification 50% were able to return to the job classification of technicians, associate professionals, sales, service and clerical workers, while 50%, were unemployed. No participant returned to the legislators, administrators, managers or professional occupational classification.

As shown in Table 26, there were significant differences between tertiary qualifications, in number of hours working per week after TBI, but not for age at TBI ($F = .381$, $p = .688$), years of post primary education ($F = .122$, $p = .886$), ethnicity ($F = .529$, $p = .475$) and gender ($F = .049$, $p = .826$).

Table 26
ANOVA Analysis of Demographic Characteristics

	Number of hours				
	M	SD	F	df	p=
Highest Tertiary Qualification					
(a) None	7.93	14.39	3.74	2	**.043**
(b) Trade/National Certificate	33.50	23.85			
(c) University Qualification	12.25	16.13			

Those who had a trade or national certificate as their highest tertiary qualification were working the longest number of hours per week after TBI, while those that had no tertiary qualifications were working the least number of hours.

There were no significant correlation's between number of hours working per week after TBI and age at time of TBI (r_s = -0.117, p = .612) and years of post primary education (r_s = -0.38, p = .868).

Substance Use

Results indicated, there were no significant differences between job classifications after TBI, for different frequencies of alcohol use (χ^2 = 10.66, p = .099), marijuana use (χ^2 = 3.31, p = .508) and LSD use (χ^2 = .502, p = .778) before TBI. Further, there were no significant differences between frequencies of alcohol use (F = .637, = .602), marijuana use (F = 1.07, p = .364) and LSD use (F = .217, p = .646) before TBI, in number of hours worked after TBI.

There were no significant differences between job classifications after TBI frequencies of alcohol use (χ^2 = 5.86, p = .210) marijuana use (χ^2 = 1.54, p = .820) LSD use (χ^2 = 2.25, p = .325) and opiate use (χ^2 = 1.05, p = .591) after TBI. Further, there were significant differences between frequencies of alcohol use after TBI in number of hours worked per week after TBI (see Table 27, below), but not for marijuana (F = .354, p = .707), LSD and opiate use (F = .620, p = .441) after TBI.

Those who used alcohol on a weekly basis worked for an average of 30 hours per week, while those who hardly ever used alcohol worked for an average of 8.4 hours per week. Those who never used alcohol worked zero hours per week.

Table 27
ANOVA Analysis of Substance use after Traumatic Brain Injury

	Number of hours				
	M	SD	F	df	p =
Substance use after TBI					
Alcohol					
(a) Weekly	30.00	22.14	6.28	2	**.009**
(b) Hardly Ever	8.40	11.55			
(c) Never	.00	.00			

Criminal Offending

Results indicated there were no significant differences between job classification after TBI, for criminal offending before TBI ($\chi^2 = 3.66$, $p = .160$) or following TBI ($\chi^2 = 2.13$, $p = .345$). In addition, there were no significant differences between criminal offending groups before TBI ($F = 1.14$, $p = .298$) and criminal offending groups after ($F = 446$, $p = .513$) TBI, in number of hours working per week after TBI

Injury Severity

PTA. Results indicated no significant differences between job classifications after TBI, for different injury severity's, as measured by PTA ($\chi^2 = 2.48$, $p = .648$). In addition, there were no significant differences between injury severity's, in the number of hours working per week after TBI ($F = 1.62$, $p = .224$).

Length of Unconsciousness. There was no significant difference between job classifications after TBI in the length of unconsciousness ($F = 1.82$, $p = .192$). In addition there was no significant correlation between number of hours working per week after TBI and length of unconsciousness ($F = -.293$, $P = .210$).

Early Post-Trauma Sequelae

There were no significant differences between job classifications after TBI, for physical impairment ($\chi^2 = .654$, $p = .721$) or epilepsy ($\chi^2 = .570$, $p = .752$). There were no significant differences between physical impairments ($F = 1.28$, $p = .272$) or epilepsy's ($F = .631$, $p = .436$), in hours working per week after TBI

PART TWO

Indicators

Cognitive Sequelae

Results indicated that there were significant differences between job classifications after TBI for Trails B, but not for trials of the AVLT 1, Digit Span, Digit Symbol, Stroop Colour Word test, Trials 1 – 3 of the Twenty Questions test (see Table 28).

Table 28
ANOVA Analysis of Cognitive Sequelae

	Job Classification								
	1*		2**		3***		F	df	p =
	M	SD	M	SD	M	SD			
Digit Span	8.00		9.40	1.82	10.13	1.36			NS
Digit Symbol	8.50	2.12	6.40	2.79	6.70	2.41			NS
AVLT 1	5.50	.71	4.60	.55	6.60	1.76			NS
AVLT 2	8.00	1.41	7.40	1.95	8.80	2.83			NS
AVLT 3	11.00	2.83	7.20	2.39	9.78	2.91			NS
AVLT 4	12.00	2.83	8.00	1.58	10.40	2.95			NS
AVLT 5	13.00	.00	8.00	1.58	9.80	2.97			NS
AVLT Interfere	5.00	4.24	4.40	.89	5.50	1.65			NS
AVLT 6	13.50	2.12	6.80	1.10	7.70	3.68			NS
AVLT 7	12.00	2.83	4.80	2.17	8.40	4.90			NS
Trails B	71.00	00	17.47	33.20	1.72	.72	5.96	2	**.023**
Stroop Colour Word	37.00	12.73	34.00	14.71	36.20	6.36			NS
20 Questions 1	8.00		7.33	3.21	8.00	4.55			NS
20 Questions 2	15.00		13.00	2.00	11.14	4.26			NS
20 Questions 3	7.00		9.00	6.08	8.14	5.64			NS

* Technicians, associate professionals, sales, service and clerical workers.
** Agricultural, fisheries and trades workers machine and plant operators and elementary occupations.
*** Unemployed

However, number of hours working per week after TBI was not significantly correlated to Digit Span (r_s = -.415, p = .140), Digit Symbol (r_s = -.025, p = .925), AVLT 1 (r_s = -.339, p = .183), AVLT 2 (r_s = .109, p = .678), AVLT 3 (r_s = -.251, p = .349), AVLT 4 (r_s = -.215, p = .408), AVLT 5 (r_s = -.225, p = .385), Interference (r_s = -.144, p = .582), AVLT 6 (r_s = -.089, p = .743), AVLT 7 (r_s = -.102, p = .698), Trails B (r_s = .311, p = .325), Stroop Colour Word test (r_s = .241, p = .351), Twenty Questions 1 (r_s = .147, p = .665), Twenty Questions 2 (r_s = .108, p = .753) and Twenty Questions 3 (r_s = -.233, p = .491).

Rehabilitation

Length of Hospital Stay. There was no significant difference between job classifications after TBI in the number of days spent in hospital after TBI (F = .357, p = .704). There was no significant correlation between number of hours working per week after TBI and number of days spent in hospital after TBI (r_s = -.143, p = .535).

Length of Inpatient Rehabilitation. There was no significant difference between job classifications after TBI in the number of days spent in an inpatient rehabilitation unit after TBI (F = .643, p = .538). There was no significant correlation between number of hours working per week after TBI and number of days spent in an inpatient rehabilitation unit after TBI (r_s = -.208, p = .378).

Months Since TBI. There were no significant differences between job classifications after TBI in the months since TBI (F = .899, p = .425). There was no significant correlation between number of hours working per week after TBI and the months since TBI (r_s = -.295, p = .206).

Rehabilitation Services. Table 29 (below) outlines the percentage of participants who received each service. The services that the participants received most often were the services provided by their Neuropsychologist, General Practitioner and ACC Case Manager. Occupational therapists, Physiotherapists and Neurologists were the next most common services

accessed by participants after TBI. The Transitional Training focus Course was the least utilised service.

Table 29
Percentage of Services Received by Participants after Traumatic Brain Injury

Rehabilitation Service	Frequency Received	Percentage Received
Neuropsychologist	22	100
General Practitioner	19	86.4
ACC Case Manager	18	81.8
Occupational Therapy	13	59.1
Neurologist	12	54.5
Physiotherapy	12	54.5
Speech Therapist	8	36.4
Audiologist	7	31.8
Counselor	2	28.6
Social Worker	5	22.7
Workbridge	5	22.7
Psychiatrist	2	20.0
Psychiatric Nurse	2	20.0
Attendant Care	4	18.2
Ophthalmologist	4	18.2
Options for Training and Employment	4	18.2
Orthopedist	4	18.2
Headway	4	18.2
District Nurse	3	13.6
Transitional Training Focus Course	1	4.5

The five most frequently utilised services (excluding neuropsychology) were then selected for further analysis, to examine their utility as indicators of occupational outcome.

There were no significant differences between job classifications after TBI, for the different rehabilitation services of General Practitioners ($\chi^2 = 2.09$, $p = .352$), ACC Case Managers ($\chi^2 = 4.31$, $p = .116$), Occupational Therapists ($\chi^2 = 5.06$, $p = .080$), Neurologists ($\chi^2 = .633$, $p = .729$) and Physiotherapists ($\chi^2 = .633$, $p = .729$), received after TBI.

There was a significant difference between General Practitioner groups, in number of hours working per week after TBI (see Table 30, below). This

difference was not found for ACC Case Managers (F = .036, p = .8514), Occupational Therapists (F = .122, p = .730), Neurologists (F = 1.16, p = .295) and Physiotherapists (F = 1.62, p = .217).

Table 30
ANOVA Analysis of Rehabilitation Services Received

	Number of hours		F	df	p =
	M	SD			
General Practitioner					
(a) No	48.00	13.86	27.31	1	**.000**
(b) Yes	7.89	12.17			

Length of Rehabilitation Services Received. There were no significant differences between job classifications after TBI, for the different lengths of rehabilitation services for General Practitioners (χ^2 = 9.35, p = .053), ACC Case Managers (χ^2 = 6.36, p = .174), Occupational Therapists (χ^2 = 3.75, p = .290), Neurologists (χ^2 = 2.10, p = .717) and Physiotherapists (χ^2 = 2.38, p = .666), received after TBI. In addition, there were no significant differences between General Practitioners (F = 3.12, p = .089), ACC Case Managers (F = 1.75, p = .219), Occupational Therapists (F = 3.65, p = .083), Neurologists (F = .648, p = .570) and Physiotherapists (F = .327, p = .731), in the number of hours working per week after TBI for

Time Taken to First Attempt to RTW after TBI. There were no significant differences between job classifications after TBI, in time taken to first attempt to RTW after TBI (F = .771, p = .480). In addition, there was no significant correlation between number of hours working per week after TBI and time taken to first attempt to RTW after TBI (r_s = -.305, p = .219).

Emotional and Behavioural Sequelae

There were no significant differences between job classifications after TBI, in the scores of the scales of the SCL-90-R, somatisation (F = .453, p = .646), obsessive-compulsive disorder (F = .631, p = .549), interpersonal sensitivity (F = .125, p = .884), depression (F = .082, p = .922), anxiety (F = .190, p = .829),

hostility (F = 1.49, p = .264), phobic anxiety (F = .226, p = .801), paranoid ideation (F = .310, p = .739), psychoticism (F = .588, p = .571), global severity index (F = .153, p = .860) positive symptom distress (F = .237, p = .792) and positive symptom total (F = .232, p = .796).

There were no significant correlation's between the number of hours working per week after TBI and Somatisation (r_s = -.037, p = .897), Obsessive Compulsive (r_s = -.417, p = .122), Interpersonal Sensitivity (r_s = -.033, p = .907), Depression (r_s = -.351, p = .200), Anxiety (r_s = .216, p = .440), Hostility (r_s = .158, p = .574), Phobic Anxiety (r_s = -.072, p = .799) Paranoid Ideation (r_s = -.375, p = .114), Psychoticism (r_s = .092, p = .745), Global Severity Index (r_s = -.074, p = .793), Positive Symptom Total (r_s = -.150, p = .593) and Positive Symptom Distress (r_s = -.016, p = .955).

Participant and Relative/Close Other Report

There were no significant differences in job classifications after TBI in the areas of activities of daily living (F = .567, p = .587), cognition's (F = 1.32, p = .294), emotions (F = .315, p = .734) and interpersonal competency (F = .044, p = .957) of the PCRS for participants. Further, there were no significant differences in job classifications after TBI in the areas of activities of daily living (F = 3.15, p = .092), cognition's (F = 4.04, p = .056), emotions (F = 2.07, p = .182) and interpersonal competency (F = 2.00, p = .191) of the PCRS for relatives or close others.

As shown in Table 31, there were significant correlation's between the ADL and cognitive areas of competency of the PCRS (respondent) and number of hours working per week after TBI, but not for ADL and cognitive and areas of competency (participant). The more competent a relative or close other judged a participant to be in the areas of ADL's and cognition's, the more hours they were working per week.

There were no significant correlation's between the emotional and interpersonal areas and number of hours working per week after TBI for either respondents or participant's versions.

Table 31
Spearman's Rank-Order Correlation Analysis of the Patient Competency Rating Scale

	Number of hours working	
	r_s	p =
Participant		
ADL	-.232	**NS**
Cognitive	-.269	**NS**
Emotional	-.289	**NS**
Interpersonal	-.375	**NS**
Respondent		
ADL	-.714	**.009**
Cognitive	-.740	**.006**
Emotional	-.523	**NS**
Interpersonal	-.565	**NS**

PART TWO

Qualitative Information

Participant and Relative/Close Other Commentary

Interference with RTW. In this section, both participants and respondents were asked to rate how much the participants TBI had interfered with their ability to RTW following injury. Table 32, outlines the percentage of responses given.

Table 32
Percentage of Participants and Respondents Ratings of Traumatic Brain Injury Interference with Return to Work

Interference	Frequency		Percentage	
	Participant	Respondent	Participant	Respondent
(1) Has not interfered at all	2	2	9.1%	12.5%
(2) Has interfered moderately	5	3	22.7%	18.8%
(3) Totally interfered	15	11	68.2%	68.8%

Ability to RTW/E. In this section, both participants and respondents were asked to rate, (if they were not presently working or in education) how able the participants were to RTW/E if a job or course was offered to them. Table 33 outlines the percentage of responses given.

Table 33
Percentage of Participants and Respondents Ratings of Ability to Return to Work

Ability	Frequency		Percentage	
	Participant	Respondent	Participant	Respondent
(1) Not able to return at all	6	4	40.0%	30.8%
(2) Moderately able	5	5	33.3%	38.5%
(3) Totally able	4	4	26.7%	30.8%

Factors that Helped with RTW. In this section participants and respondents were asked to list the factors that they felt helped them in their RTW. Table 34, outlines the responses given.

Table 34
Percentage of Factors that Helped with RTW

Factors that helped	Frequency		Percentage	
	Participant	Respondent	Participant	Respondent
Rehabilitation	7	3	31.8%	17.6%
Motivation	4	4	18.2%	23.5%
Friends and family	3	5	13.6%	29.4%
ACC	2		9.2%	
Needed the money	2		9.2%	
Counseling	1	1	4.5%	5.9%
Self Confidence	1	1	4.5%	5.9%
Supportive G.P	1		4.5%	
Enjoyed working	1		4.5%	
Routine		1		5.9%

Factors that Hindered RTW. In this section participants and respondents were asked to list the factors that they felt hindered their RTW (see Table 35), outlines the responses given.

Table 35
Percentage of Factors that Hindered RTW

Factor that hindered	Frequency		Percentage	
	Participant	Respondent	Participant	Respondent
Cognitive problems	8	5	28.6%	20.8%
Emotional problems	4	3	17.9%	12.5%
Lack of confidence	3	2	10.7%	8.3%
Lack of rehabilitation	2	2	7.1%	8.3%
Unable to drive	2	1	7.1%	4.2%
Physical problems	2	1	7.1%	4.2%
Unsuitable employment	2	2	7.1%	8.3%
Lack of information	1	2	3.6%	8.3%
Dependants	1		3.6%	
ACC	1	3	3.6%	12.5%
Fatigue		2		8.3%
Lack of Motivation		1		4.2%

CHAPTER 8
DISCUSSION

In this chapter limitations of part one and two of the present study are acknowledged and the results discussed. The chapter concludes with a summary of the present research and suggestions for future research in the area of occupational/educational functioning after TBI.

PART ONE

Limitations of the Present Study)

Composition of the Sample

Ensuring that samples are representative of the population always presents a difficulty. The sample used for the purposes of the present study came from an existing database of 280 clients with TBI who had presented at the Massey University Psychology Clinic, predominantly referred by ACC. As ACC is the sole organisation dealing with TBI requiring rehabilitation in New Zealand, this suggests that the sample derived from it's referrals is representative of a typical clinical population of individuals sustaining TBI. However, there may be limits to sample composition as the database is derived from the clients of one psychology clinic, referred from a limited geographical area and any TBI's that remain unreported to ACC, are not subsequently referred.

Pre-existing Database

There were a number of limitations in reviewing a pre-existing database. Records reviewed were often incomplete, some variables had loose operational definitions, (e.g. data on emotional functioning after TBI) and accordingly, were not able to be included in the analysis. In addition, the clinic has a flexible battery approach to assessment and therefore not all measures are administered to every client. Further, over time, some measures have been dropped and others added.

The database was not initially designed specifically for the purposes of this study and some variables considered significant prognostic factors of

occupational/educational functioning after TBI were not recorded (e.g. rehabilitation data). These variables were followed up in part two of the present study.

Another limitation of the database was the large amount of data missing from the various fields (up to 65%). Due to the case by case nature of logistic regression analysis, it is contraindicated when a large amount of data is missing from various fields. As a consequence, the planned logistic regression was not carried out. Future clinicians should aim to be more clear and consistent in the collection of information from clients, and diligent in the entering of data, so as not to compromise the utility of the system for research and review purposes.

Discussion

Part one of the present study provided support for the contention that the ability to RTW/E is diminished after TBI and that various predictors and indicators can play a role in limiting a person's ability to RTW/E following TBI. Before injury, the majority of participants had been either working or involved in some form of education (89.6%), and after injury only 29% of participants were able to RTW/E. It is difficult to compare absolute proportions of RTW/E across the different studies reported in the literature, due partly to differing rates of unemployment in different communities. However, the percentages in the present study, while slightly larger, are similar to those reported in prior research, including those based on New Zealand samples such as, Carr (1993) and Godfrey, et al. (1993) as well as Ponsford, et al (1995) whose research was based on an Australian sample.

Pre-injury Characteristics

Pre-Injury Employment Status. Pre-injury employment status was strongly related to employment/educational outcome. Many more students were able to RTW/E than either the employed or unemployed and the variation was substantial. The most obvious explanation for this difference, is age. Shown in our data, those who were younger than 20 years of age at the time of injury also had a higher percentage of RTW/E than older participants did. This could be due to our educational system being more flexible and adaptable in meeting the

needs of its returning students than the work place is to meeting the needs of workers. In discussing this issue Ruff et al (1993) pointed out that it is conceivable that schools are able to alter course material and pace learning at a slower rate, while college and tertiary students may limit the number courses they take or select an easier curriculum. Stewart-Scott & Douglas (1998) further ratify this assertion, reporting in their research that post injury, students reported changes including: enrolment in different courses, a reduction in course load to part time study, altered educational and vocational goals, individual tuition and special consideration.

Job Classification. Job classification at TBI was strongly related to occupational/educational outcome. These results contradict the findings of Fabiano & Crewe, (1995), Brooks et al, (1987), Johnson, (1987) and Klonoff, et al (1986), who reported non-significant relationships between occupation and RTW/E. However, they do corroborate the research findings of Fraser, et al (1988), although his specific finding that those in structural occupations had better outcomes than professional, managerial, clerical or service workers differed from the present study. In the present study, those in technicians or associate professional positions had the best outcomes. Plant and machine operators, assemblers and those in elementary occupations were least likely, followed by legislators, administrators, managers and professionals and then agricultural, fisheries and trades workers to RTW/E. Although not reporting significant differences, Johnson (1987) offered an explanation for this finding. He suggested that employers in professional jobs may be more amenable to the idea of a work trial or other work support and the nature of the job may provide better opportunities for such arrangements than manual jobs.

While this contention rationalises the good rate of RTW/E for technicians or associate professionals it does not hold for the presence of legislators, administrators, managers and professionals in the group who had poorer outcomes for RTW/E (40.9%). An explanation for this disproportionately low rate of RTW/E in the latter group, may be the high demands placed on this level of job for planning and organisation skills (executive functioning). Consistent

with this proposition was the finding in the present study, that executive functioning is strongly related to RTW/E. Those who did not RTW/E displayed larger deficits in this area than those who were able to RTW/E did. Ben-Yishay, et al. (1987), have also commented that executive function interferes with adaptation and therefore interrupts the RTW/E process. Lezak (1995) has also made the point that while in some cases the difficulties following TBI are not enough to render individuals completely unemployable, it does keep them from being able to advance in their positions, e.g. to managerial level.

A rationalization for the poor outcomes of plant and machine operators, assemblers, elementary occupations, agricultural, fisheries and trades workers is that while they may not face the same cognitive demands as the legislators, administrators, managers and professionals, they do have physical jobs that exacerbate fatigue, a common occurrence following TBI. Further, any physical impairment resulting from a TBI may impact on a person's ability to RTW/E. In the present study, motor impairment was significantly related to RTW/E although this finding was not highly significant.

Demographic Characteristics. In the present study the results for age, support the findings of the current literature, which suggest, that those over the age of 40 years are more likely to fail to RTW/E (Asikainen, Kaste & Sarina, 1996; Brooks, et al. 1987; Dornan & Schentag, 1995; Edna & Cappelen, 1987; Katz & Alexander, 1994; McMordie, et al. 1990; McMordie & Barker, 1988 and Rao, et al. 1990). The diminishing rate of RTW/E may be explained in two ways. Firstly, at a younger age an individual may be more flexible and adaptive when attempting to RTW/E. Randle (1972) cited in Humphrey & Ody (1987) describes this as a reduction in powers of adaptation with older age. It is conceivable that at a younger age, changing future direction to build on residual strengths and minimise weakness may be an easier task than when a person is older and potentially more firmly occupationally established. Secondly, employers may be reluctant to take back an employee with a limited working life ahead of them.

In the present study and in common with previous research, years of post-primary education was significantly related to RTW/E. Humphrey & Oddy (1987) suggested that higher education and professional training appeared to be important factors in RTW/E. This suggests that the more skills that a person has to utilise in RTW/E the more successful their RTW/E will be. However, when education was collapsed into categories, the results did not support this contention. Those with 6 – 8 years post primary education, rather than 8 –12 years had the highest percentage of RTW/E. Education examined in this way, therefore, may reflect instead, the number of qualifications held by a person, rather than their total years of post primary education. This is because the years the categories were divided into reflect the time it usually takes a person to complete 1) secondary education, 2) an undergraduate degree/trade certificate/diploma and 3) a post graduate degree. Correspondingly, the finding for education measured in this way also appears to support the trend shown for job classification, that there is a point where a person with too many qualifications and consequently a higher level position, has difficulty with RTW/E. Results did, however, indicate that fewer years of education adversely effect a person's ability to RTW/E.

Ethnicity has received relatively little attention in the literature and the results of the present study do not support the one study in which this variable has been included. Greenspan et al, (1996), failed to find that ethnicity was associated with employment/education outcome. However, in the present study the percentages of those able to RTW/E varied substantially. In particular, those who were of Maori decent had low rates of RTW/E (25.6%) compared to those who were of European decent. Rates of RTW/E for those of Maori descent were especially low when compared with the employment rate in the present study at the time of TBI, which was 87.2%.

This finding suggests that rehabilitation professionals and others involved in the return to work process of those sustaining TBI, must consider the utility of their services for those of non-European decent. Current rehabilitation services in New Zealand are predominantly based on the western medical model, and the

results of the present study indicate that this is not a successful model for those with close affiliations to non western cultures (i.e. Maori culture)

As expected and in common with the majority of previous research Fabiano & Crewe, (1995), Klonoff, et al. (1986) and Dornan & Schentag, (1995), gender was not found to have a significant relationship with occupational/educational outcome.

Substance Abuse

Self reported drug or alcohol abuse prior to TBI did not have a significant relationship with RTW/E. However, in common with prior research, in particular Williamson, et al. (1996), the majority of those reporting current drug or alcohol abuse were unable to RTW/E. This relationship however, was weak, and the role that drug or alcohol abuse plays in determining occupational/education outcome following TBI remains unclear. As stated in chapter 2, productive involvement in the community, especially through work is an important role in a person's life and non-RTW/E has many deleterious consequences. Therefore, it can be considered that those who sustain TBI may resort to the use of drugs or alcohol as a result of their loss of ability to RTW/E, rather than the other way around. Dornan & Schentag (1995) and Sander, et al. (1997), although reporting significant results between drug or alcohol abuse and occupational/educational outcome, reported an inverse relationship, that was not found in part one of the present study.

Injury Severity

In contrast to a large body of research evidence that indicates that severity is a highly reliable and consistent predictor of occupational/educational outcome, results of the present study did not indicate a statistically significant relationship between injury severity (PTA) and occupational/educational outcome. This finding is the same as in two studies, Johnson (1987) and Brooks, et al. (1987) who also failed to find a significant relationship between injury severity as measured by PTA and RTW/E. Neither study, however, made comment on why this might be, in the face of a large body of evidence to the contrary. One suggestion may be that PTA is not a reliable enough predictor of RTW/E

following TBI and that other measures such as GCS or length of coma may have more utility.

Physical Sequelae

This area of investigation revealed mixed results. Epilepsy, visual, hearing and speech impairments were not significantly related to occupational/educational outcome, although motor impairment, was. This relationship however, was weak, barely reaching significance level.

The finding that motor impairment was related to RTW/E has been reported in previous literature, in particular, by Greenspan, et al. (1996), McMordie et al, (1990) and Stambrook, et al, (1990). Humphrey and Oddy (1987) pointed out that perhaps it is to be expected in that those already handicapped by their TBI would find it harder to overcome the physical disabilities arising from a sudden injury, in their attempts to RTW/E. Therefore, it is not unexpected that motor impairment in particular, should effect occupational/educational outcome following TBI. This is associated in the present study, with the finding that the two job classifications requiring physical labor (plant and machine operators, assemblers, elementary occupations and agricultural, fisheries and trades workers), had the lowest and third lowest rates of RTW/E. Further, the majority of the current sample had sustained moderate to extremely severe TBI which are more likely to be associated with serious other systems injuries.

Cognitive sequelae

Overall, the findings of the present study indicate that a superior performance on measures of neuropsychological functioning are in the main related to higher rates of RTW/E. This suggests that psychometric assessment can play an important role in occupational rehabilitation and RTW/E.

Global Cognitive Functioning. Research in this area has produced divergent results, with three measures of global cognitive functioning being reported as significant as well as non-significant in various studies (Dornan & Schentag, 1995; Fabiano and Crewe, 1995; Lam, et al. 1991; Levin, et al. 1979). In the

present study only Verbal IQ emerged as significantly related to occupational/educational outcome, although this relationship, was not strong.

Memory. Research into the influence of memory on the ability to RTW/E has produced widely anomalous results. There were no significant between group differences for all three trials of the CFT, suggesting that visual memory does not play a significant role in determining occupational/educational outcome. This is contrary to the findings of Lam, et al. (1991), who used the Benton Revised Visual Retention Test as a measure of visual spatial memory. Crepeau & Scherzer (1993) in their review, also made the comment that the parameters of the memory studies they reviewed varied as much as the correlation's. Further research that attempts to make some standardisation in this area of research would be useful.

Results for the AVLT (verbal memory) on all trials were strongly related to occupational/educational outcome, as were the results for Digits Span (WAIS-R). The finding for the AVLT is discordant with findings of Godfrey, et al, (1993), who specifically utilised the AVLT as a measure of memory, and reported that memory functioning was not significantly indicative of RTW/E following TBI. However, in general, the results for memory in the present study are accordant with the current research. These results suggest that an intact verbal memory has a positive effect on RTW/E following TBI.

Attention and Information Processing. In the present study both attention and information processing were strongly related to occupational/educational outcome. Divided and selective attention, as measured by Trails B and the Stroop Colour Word test, were able to differentiate between those who were able to RTW/E and those who were not, with the RTW/E participants having a superior ability in both these areas than non-RTW/E participants. Although they used differing measures of attention Ainsley & Gliner (1989), Godfrey, et al. (1993), Brooks, et al. (1987), Melamed, et al. (1985) and Lam, et al. (1991) all reported that attention was a significant predictor of successful RTW/E.

As expected and in accordance with the previous research of Fabiano & Crewe (1995), Fraser, et al. (1988) and Prigatano, et al. (1984), Digit Symbol (WAIS-R) was strongly related to occupational/educational outcome in the present study. These results suggest that the ability to process information efficiently has a role in successful RTW/E.

Executive Functioning. In common with prior research, (Fraser et al. 1988), results from the present study indicate significant differences between the RTW/E sample and the non-RTW/E sample on the Twenty Questions Test, trial three. This suggests that a deficit in the area of executive functioning may negatively affect RTW/E. Furthermore, this finding moderately supports a postulation made by Ben-Yishay, et al. (1987), that executive function interferes significantly with adaptation and therefore interrupts the RTW/E process.

In summary, verbal IQ, memory, attention, information processing and executive functioning are likely to each impact separately as well as in conjunction with each other to reduce the ability of a person returning to work following TBI. Each of these functions is likely required in almost all forms of employment and therefore a deficit in one or more of these areas will make carrying out required job tasks difficult if not impossible.

PART TWO

Limitations of the study

Composition of the sample

The most obvious constraint was the limited number of participants. A larger sample size would increase the power of the statistical analysis. This was especially notable for the chi square analysis. The small number of participants resulted in low frequencies (≤ 5) in each cell of the contingency table, making it difficult to obtain significant results.

For practical reasons a voluntary sample of clients presenting at the Massey University Psychology Clinic was best suited to part two of the present study,

this however, invited problems with in-built bias (Dunham, 1988). In spite of participants in the present study being voluntary it became apparent that there was a culture of fear among many TBI clients surrounding any information they might disclose. For example several were concerned that the information might result in a reduction of their compensation claims. Although confidentiality was explained in detail and further modified to include reassurances that ACC was in no way involved in the present study, it is possible that many potential participants chose not to participate for this reason. The perceived, potentially threatening nature of the topic of RTW/E after TBI may have, therefore, restricted both the size and heterogeneity of the sample.

Instruments

Limitations were apparent in the measures used. There was a reliance on self-report and inherent in self-report measures are problems of validity, these problems outlined below, however, apply to other studies utilising self-report. In the first instance, validity may compromised as the data provided is subjective and may bear little relationship to "reality", as others know it. This is particularly important to note in the present study as "awareness" of deficits following TBI, separate from the psychological process of denial, may occur following TBI. An attempt to contain this problem was made by having a relative or close other provide information where it was appropriate.

Secondly, self-report devices tend to rely on the retrospective memory of patients and therefore can be vulnerable to inaccuracies and biases. This is especially relevant in the present study as memory problems and retrograde and antrograde amnesia are common difficulties after TBI. In the majority of cases participants were knowledgeable about their injury, having relayed their details to many professionals in the course of their rehabilitation. Of those who were not, the majority had a relative or close other who was able to provide them with assistance when it came to recalling data surrounding their injury (e.g. length of unconsciousness).

Thirdly, people are not always truthful, they may deceive themselves, such as an alcoholic who does not admit their dependency, or they may deceive the

researcher, such as when they do not want reveal perceived undesirable aspects of themselves (Barker, Pistrang & Elliott, 1994). The extent that this problem may have impacted on the present study became apparent when introducing the study to clients. It was at this stage that their apprehension at disclosing information that ACC could appropriate in some manner was encountered. An attempt to contain this problem was made by clearly stating on the questionnaire, in those areas deemed sensitive (e.g. drug and alcohol use) that the information was entirely confidential.

The time factor involved in filling out the questionnaire could also have posed a problem.

Discussion

As with part one of the present study, part two provided support for the contention that the ability to RTW is diminished following TBI. Before injury a majority of the participants has been working (95.2%), and after injury only 45.5% were able to RTW. Part two of the present study provided limited support for the contention that various predictors and indicators can play a role in limiting a person's ability to RTW following TBI.

Pre-injury Characteristics

Pre-injury Employment status. All participants in the part two of the present study were either employed or unemployed at the time of TBI. None were of school age or involved in any form of education, neither did any return to any form of education, consequently, part two of the present study refers to RTW or occupational outcome. Pre-injury employment status was not significantly related to occupational outcome, as measured by job classification after TBI or number of hours working per week after TBI.

Job Classification. There was a significant relationship between job classifications after TBI and pre-injury job classifications. The findings of the present study indicated that those with the lowest job classification (agricultural, fisheries, trades, machine and plant operators and those in elementary occupations) had the best outcomes, with the lowest unemployment rate after

TBI and the highest return to previous job classification after TBI. In contrast, the highest job classification had the worst outcome with all legislators, administrators, managers and professionals' unemployed after TBI. No person returned to an occupation higher than his or her previous occupation.

These findings are supported by Fraser, et al. (1988) who reported that those in structural occupations (e.g. building trades) were more likely to return to their former occupations than were professional, managerial, clerical or service workers. These results do not support the contention made in part one of the present study, that professional positions are easier to return to than manual positions because employees in these positions are more amenable to work trails and other work support. In fact the results suggest the opposite that manual positions are easier to return to. The difference in results between parts one and two may be a reflection of the different outcome measures used. Both parts, however, did find significant results for this variable, indicating that the area of pre-injury job classification warrants further research.

Pre-injury job classification was unrelated to occupational outcome as measured number of hours working per week after TBI.

Pre-Injury Job Stability. This variable was operationally defined in the present study in two ways. The first was participant agreement or disagreement with the statement "before my TBI, I changed jobs no more than the average person". Defined in this way, job stability before TBI was significantly related to job classification after TBI. This finding is similar to Dikmen, et al. (1994) who found that those with an unstable pre-injury work history were less likely to RTW. However, Dikmens definition of job stability differed from the present study. Those who disagreed with the statement, i.e. those who had an unstable pre-injury job history, were all employed as technicians, associate professionals, sales, service and clerical workers after TBI, none were unemployed as might have been expected. The finding of the present may reflect the nature of the job type, rather than the personal ability of a person to hold down a job before their TBI.

The second operational definition for pre-injury job stability, was number of jobs a participant held, lasting less than one year, prior to TBI. There were no significant results for this variable and it may be considered that one year is not a suitably short enough period to define job stability, for example, six months may be a more appropriate length of time.

Demographic Characteristics. There were no significant results for demographic characteristics, apart from highest tertiary qualification, which was found to be significantly related to job classification after TBI. This finding supported the contention made in part one of the present study, that the significant finding for years of post primary education divided into categories may reflect qualifications held, and further, that there is a level of education where a person has to many qualifications. Support for the contention made in part one was also provided in the analysis of hours working per week after TBI. These results indicated that those participants with trade/national certificate level qualifications were on average working significantly more hours per week, than those with a university qualification or those with no tertiary qualifications.

Substance Use

Substance use before TBI was found to be unrelated to occupational outcome. Further, there were no significant relationships between substance use after TBI and job classification after TBI. However, there were significant between group differences for alcohol use in hours worked per week after TBI. Results indicated that the more hours a participant worked per week after their TBI the more they drank. Drinking after TBI, it appears, may be related to working rather than not working.

This inverse relationship between substance use and occupational outcome has been reported previously in the current literature by Dornan & Schentag (1995) and Sander, et al. (1997). Previous research has suggested that persons sustaining TBI are at increased risk to alcohol and drug abuse due to contributing factors such as coping with injury related stress, social isolation, boredom and inactivity (Sander, et al. 1997). From these factors and the results of part one of the present study, it is possible to infer that those who are

unemployed are likely to be at greater risk for high levels of alcohol and drug use. However the results of previous research and that of part two of the present study do not support this contention, they support the opposite, that those who are employed are more susceptible to alcohol use.

A rationalisation for this finding may be that the alcohol use is a result of the stress that likely accompanies the RTW/E and maintenance of RTW/E following TBI, especially considering the numerous deficits a persons may be faced with over coming in the work place as a result of their TBI. Also, the financial implications and physical disabilities following TBI may restrict access to alcohol, through reduced money to purchase alcohol and increased difficulty with mobility and transport to access liquor outlets. In addition to these contentions, Sander, et al. (1997) suggests that as research indicates high levels of drinking before injury among those people sustaining TBI, that after finding employment persons may have re-acquired the means to resume their former drinking patterns. Those sustaining TBI are also reported to be more susceptible to the effects of alcohol and further that the more severe the injury the lower the tolerance (Lezak, 1995). Despite the non-significant results for severity in the present study, it may be possible to contend that those who RTW have a less severe injury, more tolerance to alcohol and therefore are likely to drink more. The contrasting relationship being feasible for those that do not RTW.

Criminal Offending

In contradiction to prior research, in particular, Williamson, et al. (1996) criminal offending before and after TBI was not found to be significantly related to occupational outcome as measured by both job classification and number of hours working per week after TBI.

Injury Severity

In contrast to the majority of research, but in line with the findings of part one of the present study, injury severity was not significantly related to occupational outcome as measured by both job classification or number of hours working per week after TBI.

Length of unconsciousness

Previous research (Cifu, et al. 1997, Ezrachi, et al. 1991, Fabiano & Crewe, 1995, Fraser, et al. 1998, McMordie, et al. 1990 and Rao, et al. 1990), has reported coma length or length of unconsciousness to be significantly related to employment status following TBI. However, in the present study there were no significant results for length of unconsciousness, similar to Lubusko, et al. (1994) who reported that coma length did not reliably predict occupational/education outcome following TBI.

Early Post Trauma Sequelae

Physical sequelae. Physical sequelae were not significantly related occupational outcome as measured by job classification or number of hours working per week after TBI.

Cognitive Sequelae

In the present study, divided attention as measured by Trails B was the only measure of cognitive sequelae that was significantly related to occupational outcome as measured by job classification or number of hours working per week after TBI. As with part one of the present study and in common with prior research, this suggests that those who are unemployed following TBI have a reduced ability to divide their attention, compared to those in the job classification of agricultural, fisheries and trades workers machine and plant operators, elementary occupations or technicians, associate professionals, sales, service and clerical workers.

External

Rehabilitation. Length of hospital stay, length of inpatient rehabilitation, months since TBI and time taken to first attempt to RTW/E was not significantly related occupational/education outcome as measured by job classification and number of hours working per week after TBI.

Rehabilitation Services Received. In the present study there was an inverse relationship with a general practitioner and the number of hours working after TBI. Those that did not see a General Practitioner were working on average

more hours than those who did. A possible rationalisation for this finding may be that those who see a general practitioner also have other serious health related complaints that prevent them from working, or further, that the services of a General Practitioner indicate the severity of a persons TBI is higher and therefore more likely to impede occupational/educational outcome.

Results of statistical analysis indicated that the remaining four most accessed services were not significantly related to occupational outcome and neither was the length of time they were accessed for. This is in contradiction to current research that has reported both type and length of rehabilitation to be significant indicators of RTW/E following TBI. However, this research is predominantly carried out on overseas populations that differ in the type and duration of rehabilitation services available in New Zealand. The study sample was also limited in size and as prior research has indicated that rehabilitation is an important factor in RTW/E, further investigation of this area is justified.

Results for this section also indicate that rehabilitation services following TBI are wide ranging in nature and that persons sustaining TBI do not receive a uniform service. These findings are similar to those of Carr (1993) who reported that although services in New Zealand are wide ranging, comprehensive services were unavailable. The services of a General Practitioner and an ACC Case Manager are the only two services that the majority (over 80%) of the present sample received. The services of Neuropsychologists were not regarded, as this service was the source of participant recruitment. Over 50% of the sample received the services of an Occupational Therapist, Neurologist, and Physiotherapist. Very few participants received the services of agencies designed to assist in RTW/E (apart from ACC), which is concerning given the high rate of non-RTW/E in the present sample (55.5%). This suggests that participants were either unable or unwilling to access relevant services or were unaware of their existence.

Emotional and behavioural Sequelae

For job classification there were no significant between group differences on any of the scales of the SCL-90-R. In addition, there were no significant

correlation's between the scales of the SCL-90-R and number of hours working per week after TBI. These findings are in contradiction to prior research (Brooks, et al. 1987; Ruff, et al. 1993; Stambrook, et al. 1990; Walker, et al. 1987 and Weddell, et al. 1980) who have reported emotional indicators to be moderately associated with RTW/E following TBI. In particular, aggression, depression, anxiety, confusion, lack of realism and immaturity.

These findings may be a result of a lack of awareness on the part of the participants, concerning their emotional sequelae following TBI or that emotional sequelae as measured by the SCL-90-R is not a reliable indicator of job classification or number of hours working after TBI. In addition, the SCL-90-R may not be an appropriate measure of emotional sequelae following TBI. The SCL-90-R is a measure, however, that has sound psychometric properties and further research with a larger TBI sample may be appropriate.

Participant and Relative/Close Other Report

Activities of daily living and cognitive areas of competency as reported by a relative or close other of the participant were strongly correlated with number of hours working per week after TBI, however, results did not give a significant correlation for the emotional area of competency. As with part one of the present study and in common with prior research, the results of part two indicated that cognitive ability is an important indicator of RTW/E. In addition, it appears that being competent in carrying out the activities required for daily living is a good indicator of ability to RTW. This result has also been reported by prior researchers, in particular, Brooks, et al. (1987) who found that being unable to take care of the household proved to be a highly significant indicator to occupational functioning following TBI. It appears that being unable to take care of those activities considered basic to everyday functioning, is a strong indicator of a persons inability to carry out work related activities.

Furthermore, it was the competencies as judged by a relative or close other that were significant, there were no significant findings for the participants judgements of competency. This suggests that a relative or close other is more able to judge a person's competency, in relation to hours working after TBI,

particularly in the areas of ADL's and cognition's, than the participants are themselves. This outcome may reflect a lack of awareness, on the part of the participant, concerning their deficits following TBI. In addition, it highlights the importance of using multiple sources of information when considering RTW/E and indicates that a relative or close other is a reliable source of some information when attempting to assess the probability of RTW/E following TBI.

Participant and Relative/Close Other Commentary

On average, both participants and relatives or close others were in agreement as to how much the TBI had interfered with the participant's ability to RTW/E. In both cases the majority felt that the TBI had totally interfered with a person's ability to RTW/E, while only a few (9.1% and 12.5% respectively) felt that the TBI had not interfered at all with ability to RTW/E. Participants and respondents differed in opinion the most (by 9.2%) concerning belief about not being able at all to RTW/E, with more of the participants indicating they believed they could not RTW/E at all, than respondents. However, for moderate and total ability to RTW/E, more respondents felt the participants could RTW/E than participants did, although this difference was not large (around 5%).

In common with prior research, but differing from the findings of the present study, rehabilitation was the most commonly stated factor that participants felt helped them RTW/E. Self-motivation, friends and family were the next most commonly stated factors. It is interesting to note, that while the services of a General Practitioners were one of the most commonly received services after TBI (86.4%), in the present study, only 4.5% of the sample felt they had been any help in RTW/E. Respondents felt that friends and family were the most important factor in RTW/E for the participant. They placed self-motivation second, similar to the participants, however, only 17.6% believed that rehabilitation had helped the participant RTW/E. In common with prior research and part one of the present study cognitive problems were the factors that both the participants and the respondents believed most hindered RTW/E. For both parties, emotional problems were the next most commonly sited factor that hindered RTW/E and this also conforms to prior research, although not with the findings of the present study.

Summary

In conclusion, part one of the present study indicated that non-RTW/E is associated with older age at the time of injury, (≥ 40 years old), lower levels of education, non-European decent, current drug or alcohol abuse, motor impairment and unemployed at the time of injury. If employed at the time of injury those who do not RTW/E are more likely to have been employed as Legislators, Administrators, Managers, Professionals, Plant and Machine Operators and in Elementary Occupations. Non-RTW/E is also associated with lower performances on measures of verbal IQ, memory, attention, information processing and executive functioning. Antithetically, RTW/E following TBI is associated with younger age at time of injury, (≤ 40 years), higher education, European decent, no reported alcohol or drug abuse, motor impairment and being a student at the time of injury or employed as Service and Sales worker or Clerk. RTW/E following TBI is also associated with higher performances on measures of verbal IQ, memory and executive functioning.

In summary of part two of the present study, results indicate that the variables of pre-injury job classification, job stability, highest tertiary qualification, alcohol use after TBI, ability to divide attention and receiving the service of a General Practitioner impact on occupational outcome following TBI. Relative or close other report of cognitive competency and ADL competency were the two variables able to determine the number of hours working per week after TBI. Furthermore, it appears that the beliefs of the participants and their relative or close other in the present study acquiesce with current research, that is, that cognitive factors hinder RTW/E. This indicates that those sustaining TBI and their relative's or close others may be valuable sources of qualitative information when attempting to determine those factors that may hinder a persons ability to RTW/E following TBI.

Research from part one and two of the present study suggest that indicators and predictors of occupational outcome are better able to predict RTW/E and non-RTW/E than job classification after TBI or number of hours working per

week after TBI. However, the limited sample size of part two made obtaining significant results difficult.

Conclusions and Suggestions for Future Research

In the New Zealand context it appears that predictors and indicators of RTW/E after TBI are similar to those reported in previous overseas research. Overall the most notable and robust findings in the present study were that pre-injury job status; pre-injury job classification, cognitive sequelae, ethnicity and education are valuable predictors and indicators of occupational/educational outcome after TBI.

Further, research into the specific aspects of cognitive difficulties and how they relate to the type of work a person did prior to TBI and most likely wishes to return to is warranted. In particular one of the more important conclusions of this study is the need for future research to clarify the contribution of executive functions to RTW/E. A case study approach, which follows newly traumatically brain injured individuals over the first few years of their TBI, and any attempts to RTW/E, may provide valuable information not accessed by a questionnaire methodology.

Job classification after TBI and number of hours working after TBI were an attempt to increase the specificity of occupational/educational outcome measures. While the limited sample size made obtaining significant results difficult, these measures still displayed some utility. Further research is warranted, that uses more detailed measures of outcome following TBI, including these two measures, in an attempt to clarify a person's ability to RTW/E after TBI. Further measures of occupational/educational outcomes might include: job satisfaction, and a breakdown of job tasks as they relate to cognitive abilities (e.g. requirement of job for efficient information processing).

The finding that ethnicity impacts on occupational/educational outcome as measured by RTW/E and non-RTW/E is an extremely relevant finding and warrants further research. Rates of failure to RTW/E following TBI may be able to be improved if the mechanisms working against those of non-European

ethnicity, returning to productive employment or education are identified. It has already been suggested in the present discussion that the western medical model under which rehabilitation services are delivered should be investigated as a possible cause and future research may be able to highlight other problems facing minority groups when attempting to RTW/E after TBI.

The results for part one and part two of the present study indicate that their may be different patterns of employment outcome depending on the measure used to determine alcohol use or abuse and the occupational/educational outcome measures used. This suggests that further research aimed at clarifying these issues is warranted.

Further examination of rehabilitation in general provided in New Zealand justifies further research. Although not a largely significant finding in the present study, past research and the limited nature of part two of the present study, suggest that this area could still provide valuable information about the ability to RTW/E following TBI.

The present study has identified a number of 'obstructions' to RTW/E following TBI, however, as discussed by Brooks, et al, (1987), the absence of these are not necessarily a guarantee that the client will be able to work, however, their presence makes RTW/E contrary to expectation. In the formulation of rehabilitation plans, the predictors and indicators identified in the present study, are suggested to be worthy of close and systematic observation.

In conclusion, the present study has presented promising results; several predictors and indicators have been identified as significant factors, influencing occupational/educational outcome following TBI. In addition, several have been distinguished that deserve further examination. It is hoped that these results will encourage further research into the function that various predictors and indicators play in the occupational/educational outcome of those sustaining TBI.

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Massey University
COLLEGE OF HUMANITIES & SOCIAL SCIENCES

APPENDIX A

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INFORMATION SHEET

STUDY OF RETURN TO WORK FOLLOWING HEAD INJURY
DEPARTMENT OF PSYCHOLOGY
MASSEY UNIVERSITY

Olivia Cassin and Dr Janet Leathem are conducting this study from the Psychology Department at Massey University. The research will go towards the completion of Olivia's Masters Degree and we hope will help people with Head Injuries who wish to return to the workplace in the future.

You are being asked to take part in a study that is aimed at finding out about return to work after a head injury. A number of clients who attended the Massey University Psychology Clinic for Neuropsychological Assessment following a Head Injury are being asked to complete a questionnaire. They are also being asked to get someone who knows them well to fill in the Relative or Close Other questionnaire.

The questionnaires ask about your experience of attempting to get back to work and whether or not you are currently in paid employment.

Today you and the person you choose are being asked to fill in these questionnaires and return them in the provided envelope as soon as you can.

- **It is not compulsory.**
- **Filling in the questionnaire implies consent, however, you have the right to refuse to take part and you can even stop part way through or leave out a question if you wish.**
- **At all times your replies are confidential. This means that even when you are asked to write your name on a questionnaire only the researcher and her supervisor will be reading them.**
- **Your name will also be removed and replaced by a number and when we write up this study later, there will no way that any person can identify who you are or what your answer was.**
- **This study is independent of any outside organisation.**

If you have any questions, please ask the researchers. Olivia Cassin can be contacted through the Psychology Clinic at Massey University, telephone 3505196. She can also answer questions later if you wish.

Olivia M Cassin
Researcher

Janet Leathem (Ph.D.)
Senior Lecturer
Clinic Director

Massey University
COLLEGE OF HUMANITIES & SOCIAL SCIENCES

APPENDIX B

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PARTICIPANT CONSENT FORM

STUDY OF RETURN TO WORK FOLLOWING HEAD INJURY
DEPARTMENT OF PSYCHOLOGY
MASSEY UNIVERSITY

Principal investigator: Ms Olivia M Cassin

Participant Name; .....

Name of Institution: Massey University

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that:

- I am able to ask further questions at any time during the study.
- I do not have to participate in this study, I have the right to withdraw from the study at any time, and I do not have to answer every question on the questionnaire.
- My wish to not participate in this study, or not to answer every question on the questionnaire, will in no way adversely affect any further treatment I may require from the Massey University Psychology Clinic.
- I will provide information to the researchers on the understanding that my name will not be used without my permission.
- The information will only be used for this research and publications arising from this research project.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signed: .....

Name: .....

Date: .....

Massey University
COLLEGE OF HUMANITIES & SOCIAL SCIENCES

APPENDIX C

School of Psychology
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RETURN TO WORK FOLLOWING HEAD INJURY
MASSEY PSYCHOLOGY CLINIC, MASSEY UNIVERSITY

RESEARCHER

Ms Olivia M Cassin
MA Student
MASSEY UNIVERSITY

CLIENT'S QUESTIONNAIRE 1998

(1) Name.....

(2) Date of Birth - Month..... Day.....Year.....

(3) Are you presently?

Never Married ☐ Married ☐ Separated ☐
Divorced ☐ De Facto ☐

Other ☐ Please state .....

(4) With which ethnic group do you most closely identify?

NZ European ☐ Maori ☐ Pacific Island Group ☐
Asian ☐

Other ☐ Please state .....

(5) What was your personal yearly income (before tax) in the year before your head injury?

$.....

(6) What is your present personal yearly income? (before tax)

$.....

(7) Are you currently taking any medications prescribed for you by a doctor?

No ☐
Yes ☐ Please list..... .....

(8) In the spaces provided could you please give the details about your head injury or injuries in the order that they happened to you.

a) Accident 1. Date..... ..... Your age at the time.....

- What caused the head injury?

.....

.....

.....
(If you need more room please use the back of the page.)

- Do you have a gap in your memory about the things that happened right **AFTER** your accident? This includes any time spent unconscious or in a coma.

No ☐
Yes ☐

5 minutes or less	☐
5 to 60 minutes	☐
1 to 24 hours	☐
1 to 7 days	☐
1 to 4 weeks	☐
More than 4 weeks	☐

- Did you lose consciousness?

No ☐
Yes ☐ For how long .....

.....

.....

.....
(If you need more room please use the back of the page.)

• As a result of this head injury did you spend time in hospital? (Excluding rehabilitation units)

No ☐
Yes ☐ For how long .....

• As a result of this head injury did you spend any time in an in-patient rehabilitation unit?

No ☐
Yes ☐ For how long.....

If you have had more than ONE head injury, there is room for the details of these at the end of the questionnaire. Please write the details there.

(9) Do you have any **PHYSICAL IMPAIRMENT** as a result of the accident/s in which you sustained your head injury/s?

No ☐
Yes ☐ Please describe

.....

.....

.....

.....

.....

(If you need more room please use the back of the page.)

(10) Do you suffer from epilepsy as a result of head injury?

No ☐
Yes, but it is controlled with medication ☐
Yes, but medication does not completely control it ☐

(11) Have you ever suffered from any major illness?

No ☐
Yes ☐ Please describe

.....

(12) The following are list of services that you may have used **AFTER** your head injury. Did you receive any of these services? If you received a service please circle a number to indicate how helpful that particular service was for you and then beside it write down how long you received the service for. If you did not receive a service, leave it and go on to the next one.

	Not helpful	A little helpful	Very helpful	for how long did you receive the service?
Physiotherapy	1	2	3	
General Practitioner	1	2	3	
Occupational Therapy	1	2	3	
Social Worker	1	2	3	
Clinical Psychologist/ Neuropsychologist	1	2	3	
Neurologist	1	2	3	
Audiologist	1	2	3	
Opthamologist	1	2	3	
Orthopedist	1	2	3	
Speech Therapist	1	2	3	
District Nursing	1	2	3	
ACC Case Manager	1	2	3	
Workbridge	1	2	3	
Headway	1	2	3	
Options for Training and Employment	1	2	3	
Phoenix Connections	1	2	3	
Transitional Training Focus Course	1	2	3	
Options for Independent Living	1	2	3	
Attendant Care	1	2	3	
Day Respite Care	1	2	3	
Other				
.....	1	2	3	

The next questions are important to the study, however, they are entirely optional and everything you answer will be kept completely confidential.

(13) Had you been drinking or taking <u>NON PRESCRIPTION</u> drugs at the time of your accident?

No ☐
Yes ☐ Please state what

.....

(14) BEFORE your head injury how often did you use.....? **(Please circle your answer)**

	Never	Hardly Ever	Weekly	Daily
(a) Alcohol	4	3	2	1
(b) Marijuana	4	3	2	1
(c) LSD (acid etc)	4	3	2	1
(d) Inhalants (glue etc)	4	3	2	1
(e) Opiates (morphine etc)	4	3	2	1
(f) Methadone	4	3	2	1
(g) Amphetamines (uppers)	4	3	2	1
(h) Barbiturates (downers)	4	3	2	1
(i) Cocaine (crack)	4	3	2	1
(j) Other (Please state) _____	4	3	2	1

(15) How often do you **PRESENTLY** use...? **(Please Circle your answer)**

	Never	Hardly Ever	Weekly	Daily
(a) Alcohol	4	3	2	1
(b) Marijuana	4	3	2	1
(c) LSD (acid etc)	4	3	2	1
(d) Inhalants (glue etc)	4	3	2	1
(e) Opiates	4	3	2	1
(f) Methadone	4	3	2	1
g) Amphetamines (uppers)	4	3	2	1
(h) Barbiturates (downers)	4	3	2	1
(i) Cocaine (crack)	4	3	2	1
(j) Other (please state)	4	3	2	1

(16) BEFORE your head injury had you been convicted of a criminal offence?

No ☐
Yes ☐ How many times? .....

(17) AFTER your head injury and up until today have you been convicted of a criminal offence?

No ☐
Yes ☐ How many times?.....

Questions **18, 19, 20** are asking about your educational history. They are aimed at gathering information about the schools/university/training courses you attended **BEFORE** your head injury.

(18) How many years did you spend at Secondary School?

1	☐	4	☐
2	☐	5	☐
3	☐	More than 5	☐ Please state

(19) What was the highest qualification you gained at Secondary School?

……

(20) Before your head injury did you go on to complete any further education/training/university, **OTHER** than Secondary School?

No ☐ (please go to question **(21)**
Yes ☐ (please continue with the rest of this question)

- If you answered **YES,** to the question above, how many years did you spend in further training?

1	☐	4	☐
2	☐	5	☐
3	☐	More than 5	☐ Please state

- What was the highest qualification you gained?

……

(21) This question is asking about your work history. Please list the jobs you had **BEFORE** your head injury and the length of time you did them for.

Job	**Length of time you worked at the job**
.....	
.....	
.....	
.....	
.....	

(If you need more room please use the back of the page)

(22) Was the last job/school/course you listed above, the job/school/course you were doing at the time of your accident?

No ☐ Yes ☐

What job/school/course were you doing?

.....

(23) What was your employment status **AT THE TIME** of your head injury**?**

Working full time (paid)	☐ How many hours.....
Working part time (paid)	☐ How many hours.....
Sheltered or supported employment (paid)	☐ How many hours.....
School/University/Training	☐ How many hours.....
Not Working	☐
Other	☐ Please state.....

(24) Have you had any **PAID** jobs or gone back to school **AFTER** your head injury? If you have, please list them in the order that they occurred in the space provided below along with how long you were there, or if you are still there.

None attempted yet ☐

School / Job	**Length of time you worked at the job**
.....	
.....	
.....	
.....	
.....	

(If you need more room please use the back of the page)

(25) What is your employment status at the **PRESENT** time?

Working full time (paid)	☐ How man hours.....
Working part time (paid)	☐ How many hours.....
Sheltered or supported employment (paid)	☐ How many hours.....
School/University/Training	☐ How many hours.....
Not Working	☐
Other	☐ Please state.....

(26) How long was it **AFTER** your head injury before you returned to work or school/university/training? (even if you didn't stay with the job or course for long)

Not attempted ☐

How long.....

(27) Was this first attempt successful?

Not applicable ☐
No ☐
Yes ☐

(28) Before my head injury I changed jobs **NO MORE** than the average person

Did not work before my head injury ☐
Disagree ☐
Agree ☐

(29) Are there some things that you, personally feel, **HELPED** you to **return to work** or school/university/training? If there are please make a list of them below.

Not applicable ☐

.....

.....

.....

.....

.....

.....

(30) Are there some things that you, personally feel, **HINDERED** your returning to work or school/university/training? If there are please make a list of them below.

Not applicable ☐

.....

.....

.....

.....

.....

(31) Overall how much has your head injury interfered with your ability to work? Please circle your answer.

1.....2.....3

Has not interfered at all

Totally interfered with my ability to work

For those NOT working or in education

(32) If work were available now, how able do you feel about returning? Please circle your answer.

1.....2.....3

Not able to return at all

Totally able to return to work

Please write the details of any further head injuries here. If you need more room please use the back of the page.

b) Accident 2. Date..... Your age at the time? .....

- What caused the head injury?

.....

.....

.....

.....

- Did you lose consciousness? No ☐
  Yes ☐ For how long?.....

.....

.....

- Do you have a gap in your memory about the things that happened right **BEFORE** your accident?

No ☐
Yes ☐ For how long?

.....

• Do you have a gap in your memory about the things that happened right **AFTER** your accident?

No ☐
Yes ☐ For how long ……

• As a result of this head injury did you spend time in hospital? (Excluding rehabilitation units)

No ☐
Yes ☐ For how long?……

• As a result of this head injury did you spend any time in an in-patient rehabilitation unit?

No ☐
Yes ☐ For how long?……

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APPENDIX D

RETURN TO WORK FOLLOWING HEAD INJURY
MASSEY PSYCHOLOGY CLINIC, MASSEY UNIVERSITY

RESEARCHER

Ms Olivia M Cassin
MA Student
MASSEY UNIVERSITY

RELATIVE'S OR CLOSE OTHERS QUESTIONNAIRE 1998

(1) Name .....

(2) What is your relationship to the person?

.....

(3) How long have you known this person?

.....

(4) How often do you have contact this person?

Daily ☐
Weekly ☐
Monthly ☐
Other ☐ Please state.....

(5) With which ethnic group do you most closely identify?

NZ European ☐ Maori ☐ Pacific Island Group ☐
Asian ☐
Other ☐ Please state... .....

(6) What are some of the things you personally feel **HELPED** them to **return to work** or school/university/training? Please list them in order of most importance.

Not applicable ☐

…… ……

…… ……

…… ……

…… ……

…… ……

…… ……

…… ……

(If you need more room please use the back of the page.)

(7) What are some of the things you personally feel **HINDERED** them returning to work or school/university/training? Please list them in order of most importance.

Not applicable ☐

…… ……

…… ……

…… ……

…… ……

…… ……

…… ……

…… ……

…… ……

(If you need more room please use the back of the page.)

(8) Overall how much has their head injury interfered with their ability to work? Please circle your answer.

1.....2.....3

Did not interfere with their ability to work at all

Totally interfered with their ability to work

For those NOT working or in education

(9) If work were available now, how able do you feel they are to return? Please circle your answer.

1.....2.....3

Not able to return to work at all

Totally able to return to work

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APPENDIX E

The following are questions that ask 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 circle the appropriate number.

	Can't do	**Very difficult to do**	**Can do with some difficulty**	**Fairly easy to do**	**Can do with ease**
How much of a problem do I have in preparing my own meals?	5	4	3	2	1
How much of a problem do I have in dressing myself?	5	4	3	2	1
How much of a problem do I have in taking care of my personal hygiene?	5	4	3	2	1
How much of a problem do I have in washing the dishes?	5	4	3	2	1
How much of a problem do I have in doing the laundry?	5	4	3	2	1
How much of a problem do I have in taking care of my finances?	5	4	3	2	1
How much of a problem do I have in keeping appointments on time?	5	4	3	2	1
How much of a problem do I have in starting conversation in a group	5	4	3	2	1
How much of a problem do I have in staying involved in work activities even when bored or tired?	5	4	3	2	1
How much of a problem do I have in remembering what I had for dinner last night?	5	4	3	2	1
How much of a problem do I have in remembering names of people I see often?	5	4	3	2	1

	Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease
How much of a problem do I have in remembering my daily schedule?	5	4	3	2	1
How much of a problem do I have in remembering important things I must do?	5	4	3	2	1
How much of a problem do I have driving a car if I had to?	5	4	3	2	1
How much of a problem do I have in getting help when I'm confused?	5	4	3	2	1
How much of a problem do I have in adjusting to unexpected changes?	5	4	3	2	1
How much of a problem do I have in handling arguments with people I know well?	5	4	3	2	1
How much of a problem do I have in accepting criticism from other people?	5	4	3	2	1
How much of a problem do I have in controlling my crying?	5	4	3	2	1
How much of a problem do I have in acting appropriately when I'm around friends?	5	4	3	2	1
How much of a problem do I have in showing affection to people?	5	4	3	2	1
How much of a problem do I have participating in group activities?	5	4	3	2	1
How much of a problem do I have recognising when something I say or do upsets someone?	5	4	3	2	1
How much of a problem do I have in scheduling daily activities?	5	4	3	2	1
How much of a problem do I have in understanding new instructions?	5	4	3	2	1
How much of a problem do I have in consistently meeting my daily responsibilities?	5	4	3	2	1

	Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease
How much of a problem do I have in controlling my temper when something upsets me?	5	4	3	2	1
How much of a problem do I have in keeping from being depressed?	5	4	3	2	1
How much of a problem do I have in keeping my emotions from affecting my ability to go about the day's activities?	5	4	3	2	1
How much of a problem do I have in controlling my laughter?	5	4	3	2	1

APPENDIX F

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SCL-90-R

Name:_____ Technician:_____ Ident. No._____

Location:_____ Visit No.:_____ Mode: S-R_____ Nar_____

Age:_____ Sex: M_____ F_____ Date:_____ Remarks:_____

INSTRUCTIONS

Below is a list of problems and complaints that people sometimes have. Read each one carefully, and select one of the numbered descriptors that best describes HOW MUCH DISCOMFORT THAT PROBLEM HAS CAUSED YOU DURING THE PAST_____INCLUDING TODAY. Place that number in the open block to the right of the problem. Do not skip any items, and print your number clearly. If you change your mind, erase your first number completely. Read the example below before beginning, and if you have any questions please ask the technician.

EXAMPLE

HOW MUCH WERE YOU DISTRESSED BY:

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

Ex. Body Aches..... Ex. Answer [3]

HOW MUCH WERE YOU DISTRESSED BY:	
1. Headaches	
2. Nervousness or shakiness inside	
3. Repeated unpleasant thoughts that won't leave your mind	
4. Faintness or dizziness	
5. Loss of sexual interest or pleasure	
6. Feeling critical of others	
7. The idea that someone else can control your thoughts	
8. Feeling others are to blame for most of your troubles	
9. Trouble remembering things	
10. Worried about sloppiness or carelessness	
11. Feeling easily annoyed or irritated	
12. Pains in heart or chest	
13. Feeling afraid in open spaces or on the streets	
14. Feeling low in energy or slowed down	
15. Thoughts of ending your life	
16. Hearing voices that other people do not hear	
17. Trembling	
18. Feeling that most people cannot be trusted	
19. Poor appetite	
20. Crying easily	
21. Feeling shy or uneasy with the opposite sex	
22. Feelings of being trapped or caught	
23. Suddenly scared for no reason	
24. Temper outbursts that you could not control	
25. Feeling afraid to go out of your house alone	
26. Blaming yourself for things	
27. Pains in lower back	
28. Feeling blocked in getting things done	
29. Feeling lonely	
30. Feeling blue	
31. Worrying too much about things	
32. Feeling no interest in things	
33. Feeling fearful	
34. Your feelings being easily hurt	
35. Other people being aware of your private thoughts	
36. Feeling others do not understand you or are unsympathetic	
37. Feeling that people are unfriendly or dislike you	
38. Having to do things very slowly to insure correctness	
39. Heart pounding or racing	
40. Nausea or upset stomach	
41. Feeling inferior to others	
42. Soreness of your muscles	
43. Feeling that you are watched or talked about by others	
44. Trouble falling asleep	
45. Having to check and doublecheck what you do	
46. Difficulty making decisions	
47. Feeling afraid to travel on buses, subways, or trains	
48. Trouble getting your breath	
49. Hot or cold spells	
50. Having to avoid certain things, places, or activities because they frighten you	
51. Your mind going blank	
52. Numbness or tingling in parts of your body	

PLEASE CONTINUE ON THE FOLLOWING PAGE ▷

SCL-90-R

HOW MUCH WERE YOU DISTRESSED BY:	Descriptors 0 Not at all 1 A little bit 2 Moderately 3 Quite a bit 4 Extremely
53. A lump in your throat	☐
54. Feeling hopeless about the future	☐
55. Trouble concentrating	☐
56. Feeling weak in parts of your body	☐
57. Feeling tense or keyed up	☐
58. Heavy feelings in your arms or legs	☐
59. Thoughts of death or dying	☐
60. Overeating	☐
61. Feeling uneasy when people are watching or talking about you	☐
62. Having thoughts that are not your own	☐
63. Having urges to beat, injure, or harm someone	☐
64. Awakening in the early morning	☐
65. Having to repeat the same actions such as touching, counting, washing	☐
66. Sleep that is restless or disturbed	☐
67. Having urges to break or smash things	☐
68. Having ideas or beliefs that others do not share	☐
69. Feeling very self-conscious with others	☐
70. Feeling uneasy in crowds, such as shopping or at a movie	☐

HOW MUCH WERE YOU DISTRESSED BY:	Descriptors 0 Not at all 1 A little bit 2 Moderately 3 Quite a bit 4 Extremely
71. Feeling everything is an effort	☐
72. Spells of terror or panic	☐
73. Feeling uncomfortable about eating or drinking in public	☐
74. Getting into frequent arguments	☐
75. Feeling nervous when you are left alone	☐
76. Others not giving you proper credit for your achievements	☐
77. Feeling lonely even when you are with people	☐
78. Feeling so restless you couldn't sit still	☐
79. Feelings of worthlessness	☐
80. The feeling that something bad is going to happen to you	☐
81. Shouting or throwing things	☐
82. Feeling afraid you will faint in public	☐
83. Feeling that people will take advantage of you if you let them	☐
84. Having thoughts about sex that bother you a lot	☐
85. The idea that you should be punished for your sins	☐
86. Thoughts and images of a frightening nature	☐
87. The idea that something serious is wrong with your body	☐
88. Never feeling close to another person	☐
89. Feelings of guilt	☐
90. The idea that something is wrong with your mind	☐
91. Difficulty in speaking when you are excited	☐