The Influence of Cultural Background on Experiences and Beliefs about Traumatic Brain Injury and their Association with Outcome

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The aim of the study was to compare beliefs and experiences of traumatic brain injury (TBI) in patients with TBI from the dominant English-speaking culture in Australia versus those from minority culturally and linguistically diverse (CALD) backgrounds and examine the relative influence of beliefs, acculturation, along with demographic and injury-related variables on outcome. The primary measures included the Illness Perception Questionnaire-Revised (IPQ-R), and the Craig Handicap Assessment and Reporting Technique (CHART). Participants were 70 individuals with mild to severe TBI, including 38 of English-speaking background (ESB) and 32 from CALD backgrounds. Although similar to the ESB participants in education, preinjury employment status, injury severity and experience of TBI, the CALD participants differed significantly from ESB participants on acculturation variables. CALD participants also experienced greater negative emotions and were less likely to have internal locus of control causal beliefs than ESB participants. Regression analyses indicated that describing one's value system as other than Australian, poorer understanding of TBI and greater negative emotional reactions, along with fewer years of education were associated with poorer outcomes on the CHART. Thus, in treating patients from different cultural backgrounds it is important for health professionals to understand beliefs about and responses to TBI, as they could potentially impact on coping, emotional adjustment and long-term outcome.

Key words: traumatic brain injury, culture, beliefs, emotions, outcome

Numerous studies have documented the complex range of cognitive and behavioural changes associated with TBI, which have a significant long-term impact on vocational, social, and emotional functioning (Ponsford, Sloan, & Snow, 1995). Outcome studies have shown that factors such as age (Hoofien, Vakil, Gilboa, Donovick, & Barak, 2002) and injury severity, as measured by posttraumatic amnesia (PTA) duration and Glasgow Coma Scale (GCS) scores, are relatively strong predictors of outcome, but account for less than 30 percent of the variance in outcomes (Ponsford, Olver, Curran, & Ng, 1995). Other studies have demonstrated that coping style, social factors (Moore & Stambrook, 1992; Moore, Stambrook, & Wilson, 1991; Snead & Davis, 2002) and motivation for and participation in rehabilitation (Cavallo & Saucedo, 1995; Gallaher & Hough, 2001; Wallace & Bogner, 2000) may also influence outcome. These factors may be influenced, in turn, by illness beliefs and cultural background. However, the documentation of the problems and experiences of individuals with TBI has been largely confined to patients of Western English-speaking backgrounds, and the perceptions and experiences of TBI among people from different cultural groups remain poorly understood.

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The term 'culture' can refer to groups of people on the basis of ethnicity, gender, religion, social class, and sexual orientation (Harley, Feist-Price, & Alston, 1996). Cultural norms and values guide beliefs about what is considered healthy (Brown, Ballard, & Gregg, 1994), how physical symptoms should be interpreted, appropriate illness behaviour and expression of symptoms (Gallaher & Hough, 2001), treatment norms and outcomes of illness or injury (Banja, 1996; Fitzgerald, 1992). Attitudes to illness and disability, coping style and utilisation of supports are also said to be shaped by cultural norms and values (Gallaher & Hough, 2001). When examining health beliefs and practices in multicultural societies, it is important to assess the degree to which patients identify with and retain their own customs and their acceptance of host cultures; that is, their degree of acculturation (Berry, 1980; Berry, 1997). While research investigating acculturation and health beliefs and practices has yielded inconsistent findings, some authors have found that certain aspects of health seeking and utilisation are impacted upon by level of acculturation (Sue & Sue, 1990; Suinn, Ahuna, & Khoo, 1992).

People with a chronic illness are said to create cognitive representations of the illness in order to understand and cope with the associated difficulties (Heijmans & deRidder, 1998; Weinman, Petrie, Moss-Morris, & Horne, 1996). A theoretical framework explaining these illness representations has been developed by Leventhal and colleagues (as cited in Heijmans & deRidder, 1998; Weinman et al., 1996), known as the Self-Regulation Model. According to this framework, illness is represented in four themes: illness identity (symptoms and labels patients associate with illness), cause (personal ideas about etiology), timeline (perceived duration of the illness), and consequence (expected effects and outcomes). Lau and Hartman (as cited in Heijmans & deRidder, 1998) proposed cure/control (whether the illness is curable or manageable) as a further dimension. This same framework of understanding chronic illness could arguably be applied to the understanding and experience of TBI, which often results in chronic sequelae. Illness representations have been shown to impact on coping, psychosocial functioning (e.g., return to work) and compliance with medical advice (Heijmans & deRidder, 1998; Moss-Morris, Weinman, Petrie, Horne, Cameron et al., 2002). It has been suggested that these representations of illness are shaped by cultural beliefs (Gallaher & Hough, 2001). However the extent to which this is the case following TBI has not been investigated.

Another construct of relevance in this context is that of illness locus of control (LOC). Some studies have suggested that LOC may vary according to cultural background, and that LOC can impact on the experience of and beliefs about illness and injury, potentially influencing coping style and acceptance of disability. In some cultures, LOC is externalised so that the ill individual is not seen as responsible for his or her symptoms (Stanhope, 2002). On the other hand, in Western cultures, LOC tends to be internalised, meaning that the ill individual is thought to exercise some degree of control over his or her environment, resulting in a sense of responsibility or ownership of symptoms (Stanhope, 2002). Bates and Rankin-Hill (1994) found that LOC was related to cultural identity, both of which were associated with adaptation to chronic pain. Moore and colleagues (1992, 1991) investigated the impact of LOC beliefs and coping style on outcome following TBI. They found that those with higher external LOC and a more negative, less self-controlling coping style showed poorer outcomes than those with a more internal LOC and a positive, self-controlling coping style. In a sample of patients with TBI, Snead and Davis (2002) found an association between positive attitudes towards disability and acceptance of one's own disability, which in turn was associated with better quality of life, mental health and community integration. Thus, it appears that LOC is a potentially important component of the experience of illness/injury that may vary according to acculturation.

It is important to acknowledge that beliefs and perceptions about TBI might also reflect sociodemographic differences between some cultural groups, which have been shown to impact upon health care utilisation and may also influence functional outcome. These include lower levels of preinjury education and employment and lower socioeconomic status (SES; Armengol, 1999; Blackmer & Marshall, 1999; Rosenthal, Dijkers, Harrison-Felix, Nabors, Witol et al., 1996; Sherer, Nick, Sander, Hart, Hanks et al., 2003).

There has been little research directly examining beliefs about TBI among individuals from culturally diverse backgrounds and minority groups in Western societies (Ferrari, Obelieniene, Russell, Darlington, Gervais et al., 2001). Symptom expectation following mild TBI was investigated by Ferrari et al. (2001) in a sample of Canadian and Lithuanian nationals, and by Ferrari, Constantoyiannis and Papadakis (2001) in a sample of Canadian and Greek nationals who had not sustained a brain injury. While the Canadian, Lithuanian, and Greek groups showed similar expectations regarding acute symptoms following TBI, in both studies the Canadians were more likely than the other two groups to expect chronic symptoms, with the Greek participants 'largely unaware of the possibility of chronic sequelae after minor head injury' (Ferrari et al., 2001, p. 258).

In an Australian study by Simpson, Mohr and Redman (2000), a small sample of Italian, Lebanese and Vietnamese TBI patients reported physical, cognitive and psychosocial difficulties that were consistent with findings from previous TBI outcome studies, irrespective of cultural background. However, differences were evident in their expectations and understanding of rehabilitation (Simpson et al., 2000). The patients' cultural communities were reportedly perceived as supportive, although many patients and their families felt ashamed and withdrew from their communities, arguably because of the belief that social wrongdoing brought on the injury (particularly in the Vietnamese sample) or their perception that brain injury was associated with madness (Simpson et al., 2000). However, the extent to which these beliefs differed from those of Anglo–Australians with TBI was not examined in this study.

Saltapidas and Ponsford (2007) compared motivation for and participation in rehabilitation, outcomes and attitudes to role changes following TBI in two groups of patients, one from the dominant English-speaking culture in Australia and the other from minority culturally and linguistically diverse (CALD) backgrounds. Although both groups had similar education and preinjury employment status, similar length of inpatient rehabilitation, similar levels of rehabilitation participation and positive attitudes towards rehabilitation, CALD participants showed poorer outcomes in several domains, including postinjury employment, cognitive independence, mobility and social integration on the Craig Handicap Assessment and Reporting Technique (CHART; Mellick, Walker, Brooks, & Whiteneck, 1999; Walker, Mellick, Brooks & Whiteneck, 2003; Whiteneck, Charlifue, Gerhart, Overholser, & Richardson, 1992) and showed greater distress about changes in ability to perform certain life roles. These findings suggested that differences in outcome and levels of distress over role changes may occur in those from CALD backgrounds following TBI, independent of socioeconomic background and access to rehabilitation. It was concluded that there was a need to further investigate possible reasons for this, including beliefs and emotional response to injury.

Study Rationale and Objectives

The present study represented an extension of the study by Saltapidas and Ponsford (2007) aiming to compare beliefs about core symptoms, causes, chronicity, consequences and recovery following TBI, between people from majority English-speaking background (ESB) and minority CALD groups in Australia who were less discrepant in SES status and who had more equitable access to rehabilitation. A second aim was to examine the relative influence of beliefs, acculturation, demographic and injury-related variables on outcome. On the basis of the available literature suggesting cultural differences in beliefs and experiences of illness and injury, it was hypothesised that there would be differences in beliefs about core symptoms, causes, chronicity, consequences, and recovery following TBI including locus of control, between people from majority ESB and minority CALD backgrounds when demographic and injury related variables were controlled for. Second, it was hypothesised that injury beliefs and acculturation, along with demographic and injury severity variables, would make a unique contribution to outcome, measured on the CHART.

Method

Participants

The patient group was the same as that included in the study by Saltapidas and Ponsford (2007). Patients with mild to severe TBI were recruited from the database of all patients with head injuries who had been referred for rehabilitation. All participants were treated, in a comprehensive multidisciplinary inpatient and outpatient rehabilitation program, in the context of a statewide no-fault accident compensation system. All had been discharged from inpatient rehabilitation, and were deemed cognitively capable of giving informed consent and of comprehending the questionnaires with or without the aid of an interpreter by their treating neuropsychologist. Exclusion criteria included neurological disorder apart from TBI or any psychiatric disturbance, including drug or alcohol abuse, requiring treatment. On the basis of available information from the database, approximately 16.8% (*n* = 151) of Epworth Hospital TBI patients treated within the previous 8 years were born overseas, with 13.1% (*n* = 118) of those born in a non-English speaking country, thus being classified as CALD. All CALD patients who met inclusion criteria were consecutively sampled from the database, beginning with those who had sustained their injury between the years of 1998 and 2001, and 2002 and 2004. Patients from ESB backgrounds were also consecutively sampled from the same time periods until a group of similar size and demographic background to that of the CALD group had been recruited. Sixty-five ESB patients and 75 from CALD backgrounds were contacted. Of those, 58.5% (*n* = 38) of ESB and 42.7% (*n* = 32) of CALD patients participated, 9.23% (*n* = 6) of ESB and 17.3% (*n* = 13) of CALD patients declined, and for 21.5% (*n* = 14) of ESB and 25.3% (*n* = 19) of CALD patients, contact details were incorrect or had changed, or patients were medically unwell. A further 10.7% (*n* = 7) of ESB patients were excluded from the study because they were born in an English-speaking country other than Australia, and 14.7% (*n* = 11) of CALD were excluded from the study because they were later identified as second generation CALD patients (i.e., born in Australia, with parents born in non-English-speaking countries). It was felt that this was necessary in order to more clearly delineate the ESB and CALD groups.

A total of 70 participants were recruited, with 38 participants (22 male, 16 female) categorised as ESB, and 32 participants (15 male, 17 female) CALD, having been born overseas in non-English speaking countries. This grouping was necessary due to the small numbers of participants from each country of birth. The majority of those born overseas were from China (15.6%), Vietnam (12.5%), Greece (12.5%), and Italy (9.4%), with two participants each from Hong Kong, Malta, and India, and one each from Czechoslovakia, Croatia, Germany, Lebanon, Singapore, Slovenia, Sri Lanka, Thailand, Ukraine, and Uruguay. English was the first language for 12.5% of CALD participants. Ten CALD participants (31.3%) indicated that they were unable to communicate in English and required the assistance of an interpreter. Interpreters from the same cultural background were hired through an interpreting service and were sent a questionnaire package prior to the meeting with the participants. Questionnaires were translated verbatim orally via interview. In all instances the psychologist conducting the interviews endeavoured to ensure that participants understood the concepts being discussed. All ESB participants indicated that they spoke only English.

The participants recruited were aged between 17 and 72 years (*M*: 39.06, *SD*: 14.85) and had sustained TBI an average of 2.25 years previously (range = 4–89 months). Table 1 gives the means and standard deviations of demographic, treatment and injury-related variables for ESB and CALD participants, and results of *t* tests comparing the two samples. ESB and CALD participants did not differ significantly on any of these variables. In terms of injury severity, 29.2% of the sample sustained an injury with PTA < 7 days, 25.7% had PTA lasting 7–14 days and 40% of patients had PTA duration > 15 days, PTA duration having been determined by prospective monitoring using the Westmead PTA Scale (Shores, 1989).

There was no statistically significant difference between the groups in terms of SES, measured by the Daniel Occupation Prestige Scale (Daniel, 1983). There were also no statistically significant group differences in terms of preinjury employment status, with 79% of the ESB participants and 75.4% of CALD participants working or studying prior to injury. However, as reported by Saltapidas and Ponsford (2007), significantly fewer CALD participants were in open employment postinjury, CALD participants showed poorer outcomes on the cognitive independence, social integration and mobility subscales and poorer overall scores on the CHART (Whiteneck et al., 1992) and greater distress about changes in ability to perform the life roles of parent and homemaker (Sherer et al., 2003).

Measures

Demographic Information and English Proficiency

Demographic information was obtained using a questionnaire. With participants' permission, injury and treatment details were obtained from medical records and the relevant funding agencies. The reading subtest (word reading) of the Wide Range Achievement Test (3rd ed.; Wilkinson, 1993) was used to measure English language proficiency. Postinjury employment status was categorised according to whether the person was employed on a full-time or part-time basis or not employed (due to being medically unfit for work or unemployed, being a homemaker or retired). The Daniel Occupational Prestige Scale (Daniel, 1983) was used as a measure of preinjury SES status.

Acculturation

The Brief Acculturation Scale (BAS; Paniagua, 1998) was used to measure acculturation. It provided a brief assessment of generation, preferred language and social activity, which are thought to be three significant variables in the process of acculturation (Suinn, Ahuna, & Khoo, 1992). The BAS allows for measurement of acculturation across different cultural groups, allowing for modification of items according to the cultural

TABLE 1
Means, Standard Deviations and *t* Test Results for Demographic and Injury-Related Variables

Injury related variables	ESB		CALD			
	M	*SD*	*M*	*SD*	*t*	*p*
Age (years)	36.58	13.37	42.00	16.15	−1.54	.129
Education (years)	12.77	1.66	12.40	3.07	.569	.555
Inpatient stay (days)	51.06	36.75	44.17	26.67	.881	.382
Duration of PTA (days)	17.08	15.42	18.90	20.04	−.416	.678
Time postinjury (months)	23.42	17.44	32.59	21.58	−1.93	.058

groups being studied (Paniagua, 1998). In the present study, item 1 (measuring generation) was not modified, although an explanation was added to assist participants. For item 2 (preferred language used) the phrase ‘native language other than English’ was added to distinguish between participants whose native language was English. The word ‘ethnic’ was added to item 3, examining socialisation preferences, in order to distinguish between socialising within one’s own ‘ethnic’ racial group (indicative of low acculturation), or within a nonethnic racial group; that is, with Australians or those from other English-speaking countries (thought to represent high acculturation). Cronbach’s alpha coefficient for the modified scale was adequate at .76. BAS scores of 1 to 1.75 indicated low acculturation, 1.76 to 3.25 medium acculturation, and 3.26 to 5 high acculturation (Paniagua, 1998). In addition, subjective ratings of cultural value system and strength of cultural identity were included, with participants asked to rate their cultural identity and value system as follows: 1— *fully culture of origin*, 2 — *part Australian, part culture of origin*, 3 — *Australian*; and to rate how strongly they identified with their culture of origin on a Likert scale ranging from 1 (*not at all*) to 5 (*very strongly*).

Beliefs about TBI

The Illness Perception Questionnaire-Revised (IPQ-R; Moss-Morris et al., 2002) assesses cognitive representations of illness, on the following subscales: identity (symptoms of illness), timeline-acute/chronic (perceived duration of illness), timeline cyclical (predictability of symptoms), consequences (expected outcomes), personal control and treatment control (whether illness is curable or manageable), illness coherence (degree of understanding of illness), and emotional representations (emotions experienced as a result of the illness). While this scale is not specific to TBI, it was selected as it captured beliefs of relevance to this investigation and was designed to be adapted to suit the chronic illness/injury under investigation (Moss-Morris et al., 2002). Analyses of the IPQ-R by the original authors showed good internal consistency for each dimension, with Cronbach’s alpha ranging from .79 to .89. In addition, analyses demonstrated good interrelationships between the dimensions, and test–retest reliability was stable over a 3-week period, with scores ranging from .46 to .88. For the purpose of the current study, the IPQ-R was modified, with the word ‘illness’ replaced by ‘injury’. Cronbach’s alpha coefficients for the subscales ranged from .84 to .96.

Most original scales were retained. However, the original causal scale, examining the perceived causes of injury, was modified as some items did not pertain to brain injury. Using Principal Components Analysis (PCA), two components were extracted under scree testing and eigenvalue greater than 1.0 criterion, accounting for 52.83% of the variance (33.48% and 19.35% respectively). These were identified as components measuring internal locus of control beliefs (ILOC; Cronbach’s alpha = .82) and external locus of control beliefs (ELOC; Cronbach’s alpha = .81). Higher scores indicated greater agreement with subscale items (including the two new LOC scales), except for the Illness Coherence scale, where higher scores indicated poorer understanding of TBI.

Outcome

The Craig Handicap Assessment Reporting Technique (CHART; Whiteneck et al., 1992) was selected to objectively quantify handicap following TBI. The CHART measures role fulfillment in the following areas: physical independence (number of paid and unpaid hours of assistance), mobility (number of days outside of the home, use of transportation, independent access to rooms in the home, number of hours out of bed and number of nights spent away from home), occupation (number of hours working, studying, homemaking, and engaging in recreational activities), social integration (romantic involvement, household composition, and frequency of contact with relatives, friends, work colleagues, and strangers), and cognitive independence (amount of assistance required as a result of cognitive difficulties; Mellick et al., 1999). The Economic Self-sufficiency scale, used to measure total household income, was omitted from the present study (Ponsford, Olver, Nelms, Curran & Ponsford, 1999) as it was not representative of disability in this sample, since the majority of participants received statutory benefits, with medical costs funded by relevant agencies. The raw score from each subscale is converted to a scaled score, ranging from 0 to 100, with 0 representing maximum handicap and 100 representing the 'normal' range. The CHART total score was the sum of scores from the physical independence, cognitive independence, mobility, occupation and social integration subscales. This scale has been shown to be a valid and reliable measure of handicap following TBI (Mellick et al., 1999; Walker et al., 2003; Whiteneck et al., 1992).

Procedures

Ethics approval for the study was obtained from relevant university and hospital institutions. Research centre staff identified potential participants from the Epworth Hospital patient database, who were then recruited. A meeting was then arranged by the researcher, either at the hospital or in participants' homes. Formal consent was obtained prior to administration of the questionnaires, and interpreters were used for all participants who had required them at any stage during their rehabilitation.

Data Analysis

All analyses were conducted using the Statistical Package for Social Sciences (SPSS) version 11.0 for Windows. Differences between the groups on individual variables were examined using independent samples *t* tests, with alpha set at .05. Discriminant function analyses, with outliers removed, were used to analyse the combined discriminative value of the acculturation and belief variables. To accommodate the poor cases to variable ratio, the variables were grouped into two blocks for the analyses: acculturation variables and IPQ-R (Moss-Morris et al., 2002) variables (i.e., beliefs about TBI; Tabachnick & Fidell, 1996). Pearson Product-Moment Correlations were conducted to examine potential relationships between IPQ-R and outcome variables.

Multiple regression analyses using the enter method were conducted to examine the relationships between demographic, injury related, acculturation, TBI belief variables and outcome, as measured by CHART total score. Because of the low cases to variables ratio, all analyses were carried out separately with four blocks of independent variables (IVs): demographic variables including age, education and SES; injury-related variables including length of inpatient stay, time postinjury and PTA duration; acculturation variables comprising English proficiency, degree of acculturation, self-rated cultural identity, strength of cultural identity and self-rated value system; and TBI belief variables as measured by the IPQ-R subscales (Identity, Consequences, Timeline, Personal and Treatment Control, Illness Coherence, Timeline Cyclical, Emotional Representations, and ELOC and ILOC). The significant contributing variables from these analyses were then entered into a subsequent multiple regression analysis to examine the relationship between these variables as a model and to examine their ability to predict TBI outcome.

Results

Acculturation Variables

A statistically significant difference was found between the ESB and CALD groups on all acculturation variables as indicated by a discriminant function analysis (Wilk's $\lambda = .098$, $\chi^2(6) = 137.32$, $p = .000$). This correctly classified ESB or CALD group membership for 100% of participants, suggesting that CALD participants had lower acculturation and English proficiency, had lived in Australia for a shorter length of time, were more likely to describe themselves and their values as 'fully culture of origin' or 'part culture of origin and part Australian', and were more likely to have identified with their culture of origin to a lesser degree than ESB participants.

Beliefs About TBI

Table 2 gives the means and standard deviations for ESB and CALD groups on each of the eight IPQ-R subscales and the two new locus of control components and the results of univariate ANOVAs (conducted as part of the discriminant function analysis). The groups differed significantly on the Consequences, Emotional Representations and ILOC variables.

TABLE 2

Means, Standard Deviations, and Univariate ANOVA Results for IPQ-R Subscales

IPQ-R 10 subscales	ESB (*n* = 38)		CALD (*n* = 31)			
	M	*SD*	*M*	*SD*	*F*	*p*
Identity	11.87	5.91	14.45	4.86	3.81	.055
Consequences	19.10	5.18	21.80	5.68	4.26	.043*
Timeline acute/chronic	18.21	6.21	18.10	6.42	.006	.941
Personal control	21.74	4.77	20.13	4.77	1.94	.168
Treatment control	18.47	4.71	18.39	4.41	.006	.938
Illness coherence	11.47	4.75	12.87	5.87	1.20	.278
Timeline cyclical	10.94	3.59	12.65	4.21	3.27	.075
Emotional representations	16.68	5.27	20.19	7.44	5.24	.025*
External locus of control	11.47	3.70	13.29	4.89	3.08	.084
Internal locus of control	10.24	3.83	8.42	3.51	4.15	.046*

Note: $^*p < .05$.

Table 3 shows the results of a discriminant function analysis carried out on these variables to identify which variables best differentiated the ESB and CALD groups. The resulting discrimination function, with Wilk's $\lambda = .753$, $\chi^2(10) = 17.59$, $p = .062$ approached significance. This function correctly classified group membership for 69.6% of all participants in this sample, 68.4% of the ESB group and 71% of the CALD group. The variables that made the largest contribution to the function were Emotional Representations, Consequences, ILOC and Identity. The difference between the groups on the Identity variable was not statistically significant, although the p value was low ($p = .055$).

Correlation Analyses

An examination of the interrelationship between IPQ-R and outcome variables was undertaken in light of differences found between the groups on these outcome measures (Saltapides & Ponsford, 2007). Correlations between IPQ-R variables, as well as outcome and postinjury employment status are shown in Table 4.

The Emotional Representations variable was significantly correlated with all IPQ-R variables, including ELOC ($r = .449$), but excluding ILOC, with correlations ranging from –.253 to .677. In addition, of all IPQ-R variables ER showed the strongest correlation with CHART total score ($r = -0.621$, $n = 63$, $p = .000$, $r^2 = 0.386$). The association between these two variables was negative, indicating that those with higher Emotional Representations scores (greater negative emotional reactions) had lower CHART total scores (poorer outcome). Emotional Representations was also positively correlated with post injury employment status ($r = 0.501$, $n = 64$, $p = .000$, $r^2 = 0.251$) with higher Emotional Representations scores associated with higher postinjury employment score (indicative of unemployment). Emotional Representations was, on the other hand, not significantly correlated with injury severity as measured by PTA duration ($r = 0.166$, $p = 0.183$). The correlation between PTA and postinjury employment was also nonsignificant ($r = 0.181$; $p = .107$).

Multiple Regression Analyses Examining Association Between Demographic Factors, Injury Severity, TBI Beliefs, Acculturations and Outcome

Of the demographic variables, education, age and SES together predicted a significant propor-

TABLE 3

Structure Matrix and Standardised Canonical Discriminant Function Coefficients for the IPQ-R Subscales Discriminant Function

	Structure matrix	Coefficients
Emotional representations (ER)	.488	–.009
Consequences (CONS)	.440	.417
Internal locus of control (ILOC)	–.435	–.530
Identity (ID)	.416	.280
Timeline cyclical (TLC)	.386	.435
External locus of control (ELOC)	.375	.481
Personal control (PC)	–.297	–.372
Illness coherence (IC)	.233	.020
Treatment control (TC)	–.017	.202
Timeline (acute/chronic) (TL)	–.016	–.869

TABLE 4

Correlations Between IPQ-R and TBI Outcome Variables (CHART Scores and Employment)

	ID	TL	CONS	PC	TC	IC	TLC	ER	ELOC	ILOC	CHART	Employ
ID	1.000											
TL	.536**	1.000										
CONS	.649**	.579**	1.000									
PC	−.417**	−.417**	−.297*	1.000								
TC	−.295*	−.381**	−.221	.654**	1.000							
IC	.362**	.327**	.364**	−.346**	−.174	1.000						
TLC	.261*	.385**	.323**	−.153	−.029	.336**	1.000					
ER	.638**	.475**	.677**	−.437**	−.253*	.446**	.248*	1.000				
ELOC	.355**	.256*	.306*	−.189	−.272*	.204	.172	.449**	1.000			
ILOC	−.166	−.153	−.178	.251*	−.003	.039	−.064	−.234	.200	1.000		
CHART	−.450**	−.378**	−.492**	.392**	.296*	−.587**	−.090	−.621**	−.232	.246	1.000	
Employ	.500**	.167	.356**	−.367**	−.192	.391**	.264*	.501**	.246	−.262*	−.644**	1.000

Note: $^*p < .05$, $^{**}p < .01$, ID = Identity, TL = Timeline (acute/chronic), CONS = Consequences, PC = Personal Control, TC = Treatment Control, IC = Illness Coherence, TLC = Timeline Cyclical, ER = Emotional Representations, ELOC = External Locus of Control, ILOC = Internal Locus of Control, Employ = Employment

tion of outcome measured by CHART total scare, $F_{(3,47)} = 7.65$, $p = .000$, adjusted $R^2 = .285$. Years of education made a significant positive contribution to the regression function with $\beta = .508$, $p = .001$ (SE = 3.21, $t = 3.54$), accounting for 17.9% of the unique variance in outcome. Those who had more years of education tended to have more positive outcomes following TBI. The injury related variables did not significantly predict outcome, $F_{(3,55)} = 2.35$, $p = .082$, adjusted $R^2 = .065$. None of the IVs made a significant unique contribution to CHART total score.

The acculturation variables, taken together, significantly predicted scores on the CHART, $F_{(5,51)} = 6.48$, $p = .000$, adjusted $R^2 = .328$, accounting for almost 33% of the variance in the CHART total score. Self-rated cultural value system was a significant contributor, with $\beta = .590$, $p = .021$ (SE = 17.44, $t = 2.37$), accounting for 5.2% of the unique variance. Describing one's cultural value system as 'Australian' was associated with a more positive outcome.

TBI belief variables, measured on the IPQ-R subscales, combined predicted a significant proportion of outcome, $F_{(10,51)} = 7.20$, $p = .000$, adjusted $R^2 = .504$, accounting for 50.4% of the variance in CHART total score. When examining the coefficients, Illness Coherence was inversely associated with CHART total score, $\beta = -.469$, $p = .000$ (SE = 1.09, $t = -4.26$), uniquely accounting for 14.7% of the outcome variance. Those with a less comprehensive understanding of TBI were more likely to show poorer outcomes. Emotional Representation was also inversely related to CHART total score, with $\beta = -.332$, $p = .033$ (SE = 1.23, $t = -2.19$), uniquely accounting for 3.9% of the outcome variance. Those who experienced greater negative emotions as a result of the TBI were more likely to have poorer outcomes following TBI.

The significant variables from the above regression analyses, including years of education, cultural value system, Illness Coherence, and Emotional Representations were included as independent variables in a final multiple regression analysis. When combined, these variables predicted a significant and substantial proportion of the variance in outcome, with $F_{(4,55)} = 23.34$, $p = .000$, adjusted $R^2 = .602$. Table 5 gives the regression coefficients and the proportion of outcome variance uniquely contributed by each of the variables that loaded significantly on the function.

Education and cultural value system both had a positive association with CHART total score ($p = .002$ and $.010$ respectively), uniquely accounting for 7.0% and 4.9% of the variance in outcome. Illness Coherence and Emotional Representations were inversely associated with CHART total score (both with $p = .008$), and uniquely accounted for 5.1% and 5.2% of unique variance in outcome. These results indicated that those with more education and who were more likely to describe their cultural value system as 'Australian' (rather than culture of origin) were likely to show better outcomes, and those with a poorer understanding of the nature of TBI and

TABLE 5
Regression Analysis for Variables Significantly Associated with Outcome

Coefficients	*β*	*SE B*	*t*	Unique variance contributed
Years of education	.296	2.06	3.23*	.070
Cultural value system	.251	6.55	2.69*	.049
Illness coherence	−.265	.956	−2.77*	.051
Emotional representations	−.278	.814	−2.76*	.052

Note: $^*p < .01$

greater negative emotional reactions tended to have poorer CHART total scores (outcome).

Discussion

Research examining beliefs and understanding of TBI in cross-cultural populations has been extremely limited. The aim of the present study was to compare beliefs about TBI in a highly acculturated ESB majority group (Australian born) with those of a minority group of less acculturated CALD TBI patients and examine the relative influence on outcome of injury beliefs, acculturation, demographic and injury related variables. The results indicated that the ESB and CALD groups differed on the Consequences, ILOC, and Emotional Representations subscales of the IPQ-R (Moss-Morris et al., 2002). There was a tendency for the CALD group to report experiencing greater negative emotions as a result of the injury, including depression, anxiety and fear, and to report experiencing more serious consequences resulting from TBI than the ESB participants. Lesser negative emotional experiences and consequences of TBI were associated with ELOC beliefs and may in turn be associated with coping style. Discriminant function analysis suggested that the ESB group was more likely than CALD participants to believe that their injury was due to their own behaviour, and less likely to believe in external causes such as karma, chance, luck, and God. Those holding ILOC beliefs are more likely to exercise control over the situation (Stanhope, 2002) and take action to overcome difficulties and influence outcome, because responsibility for recovery rests with the individual. ILOC has been associated with greater psychological wellbeing (Sastry & Ross, 1998).

In the present study, ELOC and Emotional Representations were significantly correlated, suggesting a possible relationship between the two variables. Moreover the CALD participants in the present study who were less likely to display ILOC showed poorer outcomes in terms of return to open employment, greater reliability on others for assistance with mobility and cognitive activities, and lower levels of social interaction (Saltapidas & Ponsford, 2007). It is possible that the negative emotional reactions and differing LOC beliefs were associated with outcome, as suggested by correlational analyses in the present study, and consistent with findings by Moore et al. (1991, 1992), and Sastry and Ross (1998). The relatively weak association of injury severity as measured by PTA duration with both Emotional Representations and return to employment would suggest that injury severity alone does not explain the associations evident.

Indeed, in support of the second hypothesis of this study, multiple regression analysis revealed that, when combined, cultural value system, Illness Coherence, Emotional Representations and years of education were significantly associated with outcome, accounting for a large proportion (60.2%) of the variance in outcome. Individually, each of these variables was associated with outcome.

A greater number of years of education were associated with more positive outcomes following TBI. This finding is consistent with that from previous outcome studies. It has been argued that educational attainment, possibly reflecting greater availability of cognitive resources, may act as both a protective and rehabilitative factor following disability (Smart & Smart, 1997). The association of education with outcome highlights the importance of examining this variable as a potential mediator of negative outcomes following rehabilitation in minority groups.

Cultural value system was, however, also significantly associated with outcome in the present study, with those who described their value systems as other than Australian tending to have poorer outcomes. It is possible that this may reflect the influence of culturally bound beliefs and values about illness and injury, including causes of injury, LOC and coping styles. While the present study has highlighted this issue in a general sense, there is a need for further study of these variables in specific cultural groups.

The Emotional Representations variable was also significantly associated with outcome, with those experiencing greater negative emotions (fear, anxiety and depression) more likely to have poorer CHART total score. This suggests that emotional adjustment and coping are of significance in predicting outcome. The importance of this finding in a cross-cultural context is underscored by findings that coping styles differ between cultural groups (Bates & Rankin-Hill, 1994; Nabors, Seacat & Rosenthal, 2002) and that these can impact on outcome following TBI (Snead & Davis, 2002). Given the influence of cultural value system and emotional reactions on outcome in the present study, it would appear that beliefs, attitudes and coping styles in the context of injury are important variables to examine further in future outcome studies.

A poorer understanding of the nature and symptoms of TBI was also associated with poorer overall outcome. This may be a consequence of poor cognitive function, which is commonly associated with more severe injuries (Victor & Ropper, 2001). Understanding about TBI might also vary among people of different cultural backgrounds, given culturally bound beliefs about health and illness (Cavallo & Saucedo, 1995; Ferrari et al., 2001; Gallaher & Hough, 2001). However, illness coherence did not differ between the ESB and CALD groups in this study.

Contrary to previous findings (Haslam, Batchelor, Fearnside, Haslam & Hawkins, 1995; Johnstone, Mount, Gaines, Goldfaders, Bounds et al., 2003; Skeel, Bounds, Johnstone, Lloyd, & Harms, 2003) common outcome predictors, including age and injury severity, were not found to contribute significantly to the prediction of TBI outcome in the present study. This might have been partly related to the use of a multidimensional handicap measure as opposed to some of the more commonly used unidimensional outcome measures, such as return to employment, which is arguably more likely to be associated with age and have also been more strongly associated with PTA duration (Machamer, Temkin, Fraser, Doctor, & Dikmen, 2005; Ponsford et al., 1995). It nevertheless suggests that variables other than injury severity were contributing to outcome. Previous outcome prediction studies have not included variables measuring acculturation or emotional response to injury and, indeed, many previous outcome studies have excluded those from CALD backgrounds due to a requirement to speak English for completion of assessment measures.

Methodological Limitations and Directions for Future Research

The results of the present study indicated some differences between ESB and CALD groups on the basis of certain beliefs about TBI, although a larger sample size and fewer predictor variables would have improved the statistical power of the analyses. Therefore, caution must be exercised when interpreting these findings. Nonetheless, the findings are sufficiently indicative to warrant further investigation with larger samples.

It is acknowledged that a thorough investigation of intra- and intergroup differences in terms of TBI beliefs and practices was precluded by grouping all CALD participants into one group. This was necessary because of the small numbers recruited from each cultural group. Unfortunately, even in a city as large and culturally diverse as Melbourne, within the scope and available resources of this study it proved impossible to capture sufficiently large groups of TBI individuals from a single cultural background. In order to achieve this in future studies, multi-centre studies are likely to be necessary. Despite this limitation, some differences between the ESB and CALD groups did emerge, providing a basis for the conclusion that there are cross-cultural variations in TBI beliefs and experiences and that these deserve further attention. Those from a culture other than the dominant culture may have differing beliefs about injury that may impact on outcome and that therefore deserve attention. Given the lack of research into the influence of cultural factors on response to and recovery from TBI, this finding represents an important first step. Future studies should endeavour to investigate the experiences and beliefs of samples of TBI patients with different levels of acculturation, within their own cultural groups and with an English-speaking, Anglo–Australian TBI control group.

Because of the lack of previous studies examining cross-cultural issues in TBI groups, the measures employed in this study had not previously been employed in TBI studies. It would not be realistic to develop measures suitable for each culture that potentially sustains a TBI. We acknowledge the limitations of translating measures. However, the interpreters were of the same cultural background as the participants and in all instances the psychologist conducting the interviews worked with them to ensure that participants understood the concepts being discussed.

The IPQ-R (Moss-Morris et al., 2002) showed a high level of internal consistency and proved useful in exploring cognitive representations of TBI, particularly with the addition of the ELOC and ILOC subscales, illuminating some beliefs which varied between groups and impacted upon outcome. However, a number of issues and beliefs of relevance to culturally diverse TBI individuals were not explored. These included attitudes and experiences of interactions with health professionals and interpreters in a TBI context (Chu, 1998), the importance and the role of family in rehabilitation and recovery

(Cavallo & Saucedo, 1995; Man, 2001; Ponsford, Sloan & Snow, 1995), stigma associated with TBI and community perceptions (Simpson et al., 2000), personality styles, and coping style (Man, 2001; Snead & Davis, 2002). Further exploration of these issues may prove useful for devising appropriate interventions aimed at facilitating reintegration into the community and improving outcome for CALD TBI patients.

The results of the present study indicated differences between ESB and CALD patients in their emotional reactions to injury. Although this variable was examined as part of the IPQ-R, a more comprehensive investigation of the experience of depression and anxiety following TBI and their potential impact on outcome and adjustment would be of great value, particularly in cross-cultural TBI populations, whose emotional experience has not been adequately documented. Nevertheless, examining emotional reactions specific only to the brain injury, meant that responses to these items may have been less likely to be attributed to acculturative stress.

Conclusions

Cross-cultural issues in health care are clearly very complex, potentially varying not only within each cultural group, but also interacting with situational factors, levels of support available, family systems and involvement and community expectations. This study has highlighted many of the difficulties in conducting cross-cultural research, and underscored the need for further studies. It has shown that despite having similar sociodemographic backgrounds, access to a comprehensive system of rehabilitation, and similar motivation for and participation in rehabilitation to ESB participants, the CALD group in the present study were still reporting worse outcomes in some areas of functioning (Saltapidas & Ponsford, 2007), which appeared to be associated with differing LOC beliefs and emotional responses to injury. Specifically, those from CALD backgrounds displayed greater negative emotional responses following TBI. Differences between the groups were also indicated in their beliefs about causes of injury, with the ESB more likely to have ILOC (and thus greater control) beliefs than the CALD group, as well as differences in perceived consequences and outcomes following TBI. The present study also found that variables related to culture, emotional response, understanding of injury and education were more strongly related to outcome than variables traditionally related to outcome, such as age and injury severity. It appears, therefore, that the ways in which a person interprets and understands what is happening to them, as well as their emotional reactions and possibly coping styles following TBI, may differ in those less acculturated and, in turn, are of significance in predicting outcome. As such, inclusion of these variables in future outcome prediction studies is imperative. While age and injury severity may not be able to be altered, culturally influenced attitudes and responses to TBI, which can arguably impact negatively on outcome, have the potential to be addressed during the rehabilitation process. A greater understanding of these issues is important as it could potentially guide the formulation of rehabilitation strategies and interventions that are more culturally meaningful, in an effort to improve outcomes and adequately meet the needs of ESB and culturally diverse individuals with TBI.

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