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# Abstracts of the 36th Brain Impairment Conference, May 2-4, 2013, Hobart

## Thursday 2<sup>nd</sup> May

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### Workshop 1

#### **Facilitating psychosocial adjustment after brain injury: Self-awareness and goal planning interventions**

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Issues related to self-awareness, self-identity and adjustment underpin psychosocial outcomes of people with acquired brain injury. The past decade has seen the development of assessment and intervention approaches to address these related issues in neurorehabilitation. Collaborative goal planning is one intervention commonly used in brain injury rehabilitation to optimise outcomes but realistic goal setting can be difficult in clients with impaired self-awareness. It can also be argued that attainment of meaningful client-centred goals can enhance self-awareness, facilitate a positive sense of self, and promote psychosocial adjustment following brain injury. This one day workshop will present current and emerging research evidence supporting self-awareness and goal planning intervention approaches in rehabilitation and community settings. Theoretical models of self-awareness and self-identity will be used to guide assessment and treatment planning, which will be illustrated in case examples. Evidence-based examples of the use of goal planning and other rehabilitation techniques such as occupation-based interventions, metacognitive skills training, psychotherapy, groups and feedback interventions will be presented. The workshop will provide a forum for interdisciplinary discussion and debate about key factors underpinning psychosocial adjustment in brain injury rehabilitation, and practical strategies for addressing these.

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### Workshop 2

#### **Data collection tools in neurological rehabilitation - principles and practice**

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Clinicians and researchers are faced with a bewildering array of measures. Often one is chosen for no better reason than it is easily available or a friend suggests it. Yet, in principle at least, measurement is crucial in delivering an effective service to patients, and efficiently from the payer's perspective.

This workshop will (hopefully) use examples and questions from participants to draw out and illustrate some general principles concerning the

selection of measures, whether in day-to-day clinical practice, audit and quality improvement activities, or research.

The main message will be that the widely used ‘psychometric approach’ is daunting and overly prescriptive, and that a simpler ‘signal detection’ approach may be more helpful.

The starting point in selecting any measures has to be that the person wishes to collect data in order to answer a question. Thus the first step that the investigator has to undertake is to specify the question. This should usually lead to a definition of the data needed to answer the question. The investigator may then think of other questions, such as “*how do I make allowance for the severity of the disability?*”, and may thus need to define other data needed.

Once the different sets of data have been identified, then the investigator simply (!) has to find the data collection tool that will collect the requisite data. This approach leads automatically to the concepts of:

- Validity (the data must answer the question)
- Reliability (with sufficient certainty and known accuracy)
- Sensitivity (without missing any important change or difference)
- Feasibility (and in practice must be usable by the person collecting data, and acceptable to the patient)

Which leads to the conclusions that good measures are:

- Short (so that they will be used and acceptable)
- Simple (so that they reduce data loss and errors)
- Generic (so that they are widely used in many diseases and situations)

The workshop’s success depends upon participants being prepared to ask questions and to disagree, and it is helpful if you bring a question about data collection tools that concerns you, whatever your practice.

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## Workshop 3

### **Using single-case experimental methodology to assess clinical change: rules of thumb and navigating the pitfalls**

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Tate, Robyn L.<sup>1</sup>

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Single-case experimental methodology has a long tradition in clinical psychology, speech pathology and special education. Within the evidence-based medicine movement there has been increasing recognition of the value of this methodology, with the Oxford Centre for Evidence-Based Medicine recently classifying the randomised n-of-1 trial as Level 1 evidence for treatment decision purposes (Howick et al., 2011). Single-case methodology is complex, however, and the literature contains many reports with design flaws and other weaknesses that detract from their potential to provide Level 1 evidence. The present workshop is in three parts. Part 1 describes the common types of single-case experimental designs and provides a taxonomy for their classification. In Part 2, recent evidence standards recommended for single-case experimental designs from the field of special education are presented. Part 3 of the workshop

examines the practical application of single-case methodology in clinical practice and research in neurorehabilitation drawing on the current literature.

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## Workshop 4

### **Analysis of the single case in clinical practice: Quantitative methods without tears**

Crawford, John R.<sup>1</sup>

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The workshop will provide a largely non-technical guide to recently-developed quantitative methods for the analysis of the single case with an emphasis on methods that are directly relevant to practice in clinical practice. Topics covered will include (1) the use of regression equations in clinical neuropsychological assessment. There is a large reservoir of published data in neuropsychology that could be used to build regression equations, which in turn could then be applied to assessment of the single case (examples include inferring change from the discrepancy between a case's predicted score at retest given their score at first testing). To encourage the use of these data, the present author and colleagues have developed methods and accompanying computer programs that (a) take summary data from a sample as inputs, (b) then builds an equation, and (c) applies it to a case, and (d) provides inferential statistics to aid clinical interpretation of the results. Also covered will be (2) the multiple base rate problem in neuropsychology. Neuropsychologists use multiple tests and so, although a single test score considered in isolation may be unusually low (or a single difference between a pair of tests unusually large), it will not be unusual to exhibit at least one such low score (or large score difference) from among the large number of tests administered. One solution to this problem is to estimate base rates for multiple tests using Monte Carlo simulation. Programs that perform such analyses will be illustrated (these programs are either tailored for use with particular neuropsychological test batteries or are generic in that neuropsychologists can use the methods with tests of their own choosing). Also covered will be the advantages of using the humble percentile rank in neuropsychological assessment as a supplement to the use of derived scores (some problems with percentile ranks will also be addressed). Methods for measuring change by comparing a case's percentile ranks at two time periods will also be illustrated. The computer programs referred to above are freely available over the Internet at [www.abdn.ac.uk/~psy086/dept/psychom](http://www.abdn.ac.uk/~psy086/dept/psychom).

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## Workshop 5

Chair and Discussant: Vicki Anderson

## Concussion: what's the real story?

Anderson, Vicki<sup>1</sup>

<sup>1</sup>*Murdoch Children's Research Institute*

**O**verview The field of concussion is highly controversial in Australia and internationally. Surprisingly, evidence for the field has been slow to develop, thus restricting clinical management. This symposium aims to provide an evidence base from which clinical decision making can develop, by presenting research across child, adolescent and adult samples. We will also consider the key legal aspects and community knowledge and perspectives of concussive injuries.

## Subconcussive injury in professional boxing

Clausen, Helen<sup>1,2</sup>; Anderson, Vicki<sup>3</sup>; Darby, David<sup>4</sup>; McCrory, Paul<sup>4,5</sup>

*Centre for Health, Exercise and Sports Medicine, University of Melbourne (PhD student research)*

<sup>2</sup>*World Boxing Council (Mexico), Medical Advisory Board*

<sup>3</sup>*Murdoch Children's Research Institute*

<sup>4</sup>*The Flory Institute of Neuroscience and Mental Health*

<sup>5</sup>*Melbourne Brain Centre - Austin Campus*

**B**ackground and Aims: A range of elite athletes are at risk of repetitive subconcussive injury and concussion, and professional boxers may be unique in this regard. There is, however, no empirical prospective research of acute injury in this population, of whom 17% may suffer chronic sequelae (Roberts, 1969). The single, published prospective study was poorly designed, using measures insensitive to concussion and subject to the effects of repeated testing (Ravdin, et al., 2003). The aim of the present study was to explore the impact of participation in professional boxing bouts on aspects of neurocognitive function.

**Method:** Using reliable change indices to measure change, professional boxers (N = 32) were assessed in a serial fashion (Baseline: 30+ days pre-bout; Immediate post-bout: 20 minutes post-bout; 2 days post-bout; 7 days post-bout and 15 days post-bout). Measures previously demonstrated to be sensitive to concussion and used in this study included reaction time (Moser et al., 2007; Makdissi 2006, [RT]), symptom report (Alla et al., 2009) and the Standardized Assessment of Concussion screening tool (McCrea et al., 2003 [SAC]). A group of matched controls completed the same RT tasks at similar time intervals. Demographic information and speculative risk factor data for acute injury in boxers were also collected.

**Results:** Relative to control data, professional boxers demonstrated significant slowing of RT post-bout; also reported symptoms and had impaired delayed memory on the SAC. Group RT recovery occurred between 7 and 15 days, with 8% of individual boxers continuing to be significantly impaired when tested 15 days post-bout. Pre-bout sparring/training practices were negatively correlated with the degree of impairment in RT.

**Conclusions:** Professional boxers are at risk of acute cognitive change and report symptoms in the absence in ringside physician diagnosed concussion. The timeframe for recovery is consistent with that observed in athletes diagnosed with concussion arising from other sports (e.g. NFL, AFL). The primary predictor for impairment was pre-bout sparring practices. This research has

had an impact on the management of professional boxers internationally, with testing and monitoring programs now underway.

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## The Cognitive Effect of Exercise Following Concussion in Children and Adolescents: When is Return to Play Safe?

Manikas, Vicky<sup>1,2,3</sup>; Babl, Franz<sup>3,4</sup>; Dooley, Julian<sup>3,5</sup> and Anderson, Vicki<sup>1,2,3</sup>

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**Background and Aims:** There is currently a paucity in literature regarding the post-concussive trajectory of the child and adolescent populations. Furthermore, the effect that exercise may have on subject symptom report and cognitive functioning in post-concussed children and adolescents has yet to be determined. In order to benefit the development of effective return-to-play guidelines, the present study aims to identify the following: what is the cognitive effect of exercise on a child or adolescent during the post-symptomatic phase of concussion recovery, and how does this change over time?

**Method:** Cognitive functioning was assessed using Cogsport (assessing four areas of cognitive ability), whilst concussive symptom report was measured via the Sports Concussion Assessment Test (SCAT) and the Neurobehavioural Rating Scale (NRS). A sample of concussed ( $n = 30$ ) children and adolescents aged between 10 and <18 years, presenting with concussive symptoms at the emergency department of The Royal Children's Hospital in Melbourne were recruited. Participants were assessed using the above measures once asymptomatic at rest (Day 2: typically three or four days post-injury) then again eight days later (Day 10) to measure change over time. A control group ( $n = 30$ ) also completed the test protocol on one occasion.

**Results:** ANOVAs and T-Tests were used to determine differences before and after exercise and between the two testing days. Results on Day 2 testing found that while there was some decline in cognitive functioning following exercise, there was no difference between concussed and control groups. On Day 10 testing however, significant differences in cognitive functioning were found in concussed participants following exercise on processing speed and detection subtests.

**Conclusions:** This study has some unexpected findings, with concussed participants showing higher levels of cognitive deficit on Day 10 of testing (which in some cases was close to two weeks post-injury) than they did two or three days post-injury. The authors suggest that the added stressor and mental fatigue of returning to their usual school routine may be a factor in the concussed participants and lead to a decline in functioning. This finding also leads to implications regarding return-to-play guidelines, as returning to play on Day 10 may put a child at a higher risk of sustaining a secondary concussion. Recommendations for further research and the development of return-to-play guidelines are discussed.

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## Cognitive recovery following concussion in adolescents

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Dooley, Julian<sup>8</sup>, Anderson, Vicki<sup>1,2,9</sup>

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**B** **background and aims:** Consequences of childhood concussion are poorly understood, and cannot be simply extrapolated from adult models. This study aimed to investigate the impact of concussion on psychomotor function, decision-making, attention and working memory, and to plot the recovery of these domains over 30 days post-concussion.

**Method:** we conducted a prospective, longitudinal study of children and adolescents. A baseline group was assessed pre-concussion (n = 728), and participants who suffered a concussion were then followed up at 5, 10 and 30 days post-concussion, and assessed for cognitive and behavioural status. Cognitive functioning was screened using CogSport for Kids (assessing four areas of cognitive ability) both pre- and post-concussion.

**Results:** Repeated measures ANOVAs were used to determine differences before and after concussion and to plot recovery across time points to 30 days. Results indicated that. Post-concussion, children took longer to complete tasks across all cognitive domains tested. Symptoms persisted to 10 days at least, and return to baseline performance levels were documented by Day 30.

**Conclusions:** These findings have significant implications for decisions regarding both return to play and return to school.

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## Public Understanding of mild Traumatic Brain Injury

McKinlay, Audrey<sup>1,2</sup> and McLellan, Tracy<sup>2</sup>

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**B** **background:** The public's understanding and expectations following a mild traumatic brain injury (mTBI) influences their response to an injury event. However, even among professionals, there is a lack of agreement regarding terminology used to describe these injuries and their expected outcomes.

**Study One Aim:** Examine public understanding of TBI terminology.

**Method:** Participants (n = 102) randomly assigned to two groups (Head/Brain injury). Group 1 were asked whether they had experienced a head injury, later whether they had experienced a concussion. Group 2 were asked the same questions except the words "head injury" were replaced with "brain injury".

**Results:** Fifteen participants endorsed experiencing either a brain or head injury (14.7%), while only 12/15 also endorsed having had a concussion. Seventeen additional participants endorsed having experienced a concussion without a head/brain injury, making a total of 28.4% of participants having

experienced a concussion. Participants were also questioned regarding expected outcomes which differed depending on terminology used.

**Study Two Aim:** Examine factors that might influence public understanding of concussion.

**Method:** Publicly available broadcast information was reviewed to establish the incidence rate of probable concussion in the 2010 National Rugby League's Telstra Premiership, and examined how concussions were managed with respect to return to play procedures.

**Results:** Incidence rate for probably concussions was 11.1/1000 player hours (95% CI 5.78-16.40). Most players were shown continuing or returning to play despite being visibly concussed and described as such by the commentators.

**Conclusions:** There is still considerable confusion among the public regarding mTBI and its outcomes. Confusion is likely increased by the inconsistency in terminology used by professionals, and by media portrayal.

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## Medico-legal issues confronting psychologists in the field of sports concussion

Maddocks, David<sup>1,2</sup>, Clausen, Helen<sup>2,3</sup>

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<sup>3</sup>*World Boxing Council (Mexico), Medical Advisory Board*

**Background:** There has been a great deal of recent media interest in claims of serious long-term health effects in former United States National Football League (NFL) footballers, resulting from concussion/s in their playing days. Some commentators have described the incidence of post-concussive conditions as a "silent epidemic". At the present time, there is a significant amount of litigation before US Courts related to the previous treatment and management (in particular the assessment of recovery and advice given to participants) of former footballers. There are understandably concerns in Australia for participants in the football codes (which are played widely at junior, suburban, regional and elite levels), and other contact sports. For many years, neuropsychologists have had a significant role in the assessment of sport concussive injuries.

**Aims:** This presentation will canvass medico-legal issues for psychologists, relevant to past and future assessment and management of concussed sportspeople. Psychologists clearly owe a 'Duty of Care' in such circumstances. The legal and medical concepts of: (i) 'causation' (i.e. the potential contribution of previous concussive and sub-concussive blows to long-term medical and psychological presentation); and (ii) 'State of Knowledge' (i.e. what was known or ought to have been known about diagnosis, recovery and prognosis) in previous decades and at the present time will be addressed, as well as the legal implications of voluntary assumption of risk, players withholding information on clinical interview and standard of proof.

**Conclusions:** Neuropsychologists are likely to become more involved in concussion management in sport. Definitions (i.e. of concussion and TBI), theories of causation and evidence as to 'state of knowledge' are all subject to close medical and legal scrutiny and constant review. Psychologists must understand the potential medico-legal ramifications of their involvement.

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## Opening Address

### **WILL THE NDIS MEET THE NEEDS OF PEOPLE WITH AN ACQUIRED BRAIN INJURY?**

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Brookes, Derek<sup>1</sup>

<sup>1</sup>*Brain Injury Australia*

This address will provide an update on the design and implementation of the NDIS, an introduction to Brain Injury Australia's NDIS campaign, and an assessment of the extent to which the Scheme is likely to take account of the specific needs of people with an acquired brain injury

FRIDAY 3<sup>RD</sup> MAY  
Session 1: Plenary 1

Chair: Clive Skilbeck

### **Testing for Dissociations in the Single-Case: Problems and Solutions.**

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There has been a resurgence of interest in single case studies in neuropsychology. Much of this work is aimed at detecting dissociations of function. The presentation will provide a largely non-technical guide to the issues and methods surrounding the detection of dissociations; the main focus will be on the most commonly used single case design in which a patient is compared to a (modestly sized) control sample. The conventional criteria for a dissociation require only that a case is "impaired" or "exhibits a deficit" on Task X and is "not impaired" or "within normal limits" on Test Y. Simulation studies have shown that these criteria misclassify alarmingly high numbers of both healthy controls and patients with strictly equivalent impairments on the tasks compared. It is argued that a further criterion is required: that the case's performance on Task Y should be significantly poorer than performance on Task X. Classical and Bayesian methods have been developed that provide such a test and also allow for the uncertainties inherent when using modest control samples. Simulation studies show that the false positive rate for dissociations is low when this additional criterion is applied. More recently these methods have been extended to allow for the effects of covariates when testing for a deficit or dissociation. These new methods add great flexibility and allow more sophisticated hypotheses to be tested. For example, they can (a) increase the power to detect deficits or dissociations, but also (b) test whether effects survive controlling for covariates (e.g., testing if an apparent dissociation survives controlling for general processing speed). All of the statistical methods developed by the author and his colleagues for testing for deficits and dissociations have been implemented in user friendly computer programs (available at [www.abdn.ac.uk/~psy086/dept/SingleCaseMethodology.htm](http://www.abdn.ac.uk/~psy086/dept/SingleCaseMethodology.htm)). Details of these programs and examples of their use will be provided.

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## CONCURRENT SESSIONS 2-4

## Session 2: Symposium - Issues in Analysing Clinical change: Different Recovery Patterns &amp; Missing Data

Chair and Discussant: Clive Skilbeck

**Growth Mixture Modelling: Illustration of its application in TBI research**Gomez, Rapson<sup>1</sup><sup>1</sup>*School of Health Science, University of Ballarat, Mount Helen, Australia*

**Background and Aims:** Conventional latent-growth modelling (LGM) assumes that all individuals are drawn from one observed population. However, it is highly probable that within a population, unobserved subpopulations or classes may exist, with the different classes having their own growth trajectories. Growth-mixture modelling (GMM) technique allows the identification of these unobserved subpopulations. It also allows the inclusion of time-invariant and time-varying covariates, and outcome variables. Although GMM is gaining popularity in longitudinal research, it has rarely been applied to TBI outcome research.

**Method:** The goal of this paper is to demonstrate the application of GMM using anxiety scores (from the Hospital Anxiety and Depression Scale) using a longitudinal, large-scale TBI outcome data set collected over 4 years.

**Results:** Specifically, the presentation of the application of GMM will illustrate steps in the modelling process, especially detection of latent classes, examination and interpretation of the changes in the identified classes, and predictors and outcomes of the identified classes.

**Conclusions:** GMM techniques offer a new, and useful, method for analysing longitudinal outcome data in TBI. Limitations, cautions, and other extensions of the GMM are also discussed.

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**Latent class growth analysis in neuropsychology: Predicting change in older adults' longitudinal cognitive performance following cognitive training**Wolf, Anna<sup>1,2</sup>; Gomez, Rapson<sup>1\*</sup>; Summers, Mathew<sup>1,3</sup>; & Summers, Jeffery<sup>1</sup><sup>1</sup>*School of Psychology, University of Tasmania, Hobart, Australia*<sup>2</sup>*Alzheimer's Australia (Tasmania), Hobart, Australia*<sup>3</sup>*Wicking Dementia Research & Education Centre, University of Tasmania, Hobart, Australia*

**Background and Aims:** Latent class growth analysis (LCGA; Nagin, 1999), a relatively new statistical technique, can identify homogeneous classes of individuals within a heterogeneous population in longitudinal data. This study used LGCA to identify classes reflecting trajectories of verbal memory and executive functioning across a 12-month period, following participation in a cognitive training program. Also examined were age, sex, education and estimated premorbid IQ as predictors of class membership.

**Method:** Employed were data from 315 community dwelling older adults (age range: 55 to 85 years) involved in the Active Cognitive Enhancement (ACE) program training study. The Rey Auditory Verbal Learning Test (RAVLT) and the CogState Ltd Groton Maze task were used to test verbal memory and executive functioning, respectively. Participants were assessed at baseline and at 3- 6- and 12- month follow-ups.

**Results:** A LCGA model demonstrated three classes for short-term verbal memory performance: ‘High’, ‘Moderate’ and ‘Low’ class. Trained participants in the ‘Low’ performance memory class showed the biggest cognitive gains compared to controls ( $p = .007$ ). Age, sex, education and estimated premorbid IQ predicted ‘Low’ memory class membership compared to the ‘High’ memory class ( $p = <.001, <.001, .02$  and  $.002$ , respectively). Models for long-term verbal memory and executive function will be presented at the conference.

**Conclusions:** Current findings show that older adults with ‘Low’ memory performance initially show the greatest, durable effects of cognitive training across a 12-month period. The findings highlight that LCGA is useful to measure and predict older adults’ longitudinal cognitive training trajectories.

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### Missing data: Ignore or impute?

Padgett, Christine<sup>1,2</sup>; Skilbeck, Clive<sup>1,2</sup>

<sup>1</sup>*School of Psychology, University of Tasmania, Hobart, Tasmania*

<sup>2</sup>*Neurotrauma Register, Royal Hobart Hospital, Hobart, Tasmania*

**Background and Aims:** Missing data is ubiquitous in psychological research. When missingness occurs researchers frequently employ deletion or single imputation (for example, substitution of the mean) techniques. However, methodologists maintain that these approaches are unsound and introduce bias. The aim of this paper is to review the nature of missingness with the use of worked examples demonstrating deletion, single and multiple imputation approaches.

**Method:** To demonstrate these techniques, data from the Neuro-Trauma Register (NTR) were employed. The NTR is a longitudinal population study, the primary purpose of which is to investigate the effect of traumatic brain injury (TBI) on neuropsychological and psychosocial functioning. For the purpose of this report, a random sample ( $N = 20$ ) was selected from the NTR database, and performance on the digit span task assessed. To compare deletion, single imputation and multiple imputation techniques, a subset of scores was removed from the complete dataset (based on known dropout of participants at later time-points) and deletion/imputation conducted, allowing comparison of known results to results containing missing data.

**Results:** Complete and partially missing datasets were compared to demonstrate the possible effects of both missing data and imputation on analysis.

**Conclusions:** Missing data undoubtedly has a negative impact on results, regardless of whether it is ignored or imputed. However, contrary to common belief and practice, ignoring missing data and single imputation methods are more likely to introduce bias than using multiple imputation techniques. It is recommended that the latter be used to minimise the deleterious effect of missingness.

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## Validity of Frisch's Rule for Missing data, Quality of Life Inventory (QOLI)

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<sup>1</sup>*School of Psychology, Charles Sturt University, Bathurst, NSW, Australia*

<sup>2</sup>*School of Psychology, University of Tasmania, Hobart, Australia*

**Background and Aims:** The current research investigated the rule that when more than two out of 16 domain scores are missing, scores on Frisch's Quality of Life Inventory (QOLI) are invalid. The aim was to provide a method for clinicians and researchers to deal with missing variables.

**Method:** Two Australian samples were utilised consisting of 259 community dwelling adults and 408 adults surveyed 12 months after traumatic brain injury (TBI). First, the 16 domains of the QOLI were regressed against Quality of Life Index total scores (QLI) to identify which combination of domain scores accounted for the most variance in QLI scores. Second, a series of Receiver Operator Curve analyses investigated the ability of the QOLI to detect depression cases in both samples.

**Results:** The final model for predicting QLI scores comprised 8 domains of the QOLI: *health, love, work, play, help, friends, relatives, and creativity*. This model accounted for equivalent variance as the full 16 domain model. Further, the eight-domain QOLI was equivalent to the 16 domain version in identifying depression cases. Consistent results were found within the TBI sample.

**Conclusions:** This study found the QOLI may be regarded as comprising eight core items, which have similar predictive validity as the whole scale.

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### Session 3: Aspects of Physical Functioning

#### Electrical stimulation for contracture management after acquired brain injury: a randomised trial.

Leung, Joan<sup>1,2</sup>; Harvey, Lisa A<sup>2</sup>; Moseley, Anne M<sup>2,3</sup>; Tse, Charis<sup>4</sup>; Bryant, Jane<sup>5</sup>; Wyndham, Shirley<sup>1</sup>; Barry, Siobhan<sup>6</sup>

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<sup>5</sup>*Balmain Hospital, Sydney, Australia*

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**Background and Aims:** Electrical stimulation has been increasingly used for improving strength and reducing spasticity. Since muscle weakness and spasticity are known contributors to contracture, electrical stimulation is potentially useful for contracture management. The aim of this study is to evaluate if electrical stimulation and splinting are more effective than splinting alone for the management of wrist contracture following acquired brain injury.

**Method:** A multi-centre randomised trial was conducted on thirty-six adults with first stroke or traumatic brain injury and mild to moderate wrist flexion contractures. The experimental group received electrical stimulation to the wrist and finger extensor muscles for 1 hour a day over 4 weeks while the control group did not. Both groups wore a splint for 12 hours a day during this 4-week period. The primary outcome was passive wrist extension measured with a 3 Nm torque and with the fingers in extension. Secondary outcomes

included passive wrist extension, wrist and finger extensor strength, wrist flexor spasticity, motor control of the hand, and global perceived effect.

**Results:** At 4 and 6 weeks, the mean between-group difference (95% CI) for passive wrist extension was 7 degrees (−2 to 15) and −3 degrees (−13 to 7), respectively. There were no meaningful between-group differences for any of the secondary outcomes.

**Conclusion:** It is not clear whether electrical stimulation and splinting is more effective than splinting alone for the management of wrist contracture after acquired brain injury. Until conclusive evidence is available, it may be reasonable to try electrical stimulation as it is inexpensive, well tolerated and not associated with harm.

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## Extracorporeal shock wave therapy as a treatment for neurogenic heterotopic ossification

Reznik, Jacqueline E.<sup>1</sup>; Milanese, Steve<sup>1,2</sup>; & Galea, Mary P.<sup>1,3</sup>

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**Background and aims:** In the traumatic brain injured population van Kampen et al (2011) reported the incidence of neurogenic heterotopic ossification (NHO) as 13%. Extracorporeal shockwave therapy (ESWT) is a technology which uses shock waves to treat chronic painful conditions of the musculoskeletal system (Speed, 2004). This paper summarizes the available evidence for the effectiveness of ESWT on NHO

**Method:** A systematic search of the literature using Medline via Ovid, Scopus, CINAHL and Web of Science was performed. In addition reference lists of articles found were hand-searched for possible relevant literature. The authors' own article which is in press was also included in this review.

**Results:** Following screening all four studies found were included. The articles were assessed for levels of evidence using the Oxford Centre for Evidence Based Medicine (OCEBM) hierarchy of evidence and were critically appraised using the McMaster Critical Review Form for Quantitative Studies. Scores on the OCEBM hierarchy were low, but the articles scored well on the critical appraisal tool.

**Conclusion:** There is a paucity of literature high level evidence available on this subject. The authors, in a single case study on effectiveness of ESWT on HO (in press), found that ESWT appears to be an effective intervention and are now preparing to complete an experimental trial with larger numbers of patients. It is important that higher level research into the use of ESWT for HO be carried out since ESWT is a non-invasive, therapeutic intervention for a potentially devastating complication of many forms of trauma.

Van Kampen, P. J., Martina, J. D., Vos, P. E., Hoedemaekers, C. W. E., & Hendricks, H. T. (2011). Potential risk factors for developing heterotopic ossification in patients with severe traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 26(5), 384–391

Speed, C. A. (2004). Extracorporeal shock-wave therapy in the management of chronic soft-tissue conditions. *Journal of Bone & Joint Surgery - British Volume*, 86(2), 165–171

Reznik, JE. Gordon, SJ. Barker, RN. Keren, O. Arama, Y. Galea, MP. (2012) Extracorporeal Shock Wave Therapy (ESWT) as a treatment for recurrent Neurogenic Heterotopic Ossification (NHO) *In Press: Brain Injury*

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## Autonomic and morphological changes contributing to arousal disturbance in TBI

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**Background and Aims:** Dysregulated arousal following severe traumatic brain injury (TBI) impacts on psychosocial functioning post-injury, especially emotion processing and empathy. Assessing TBI-related arousal changes and underlying mechanisms is thus clinically relevant. Alpha activity and skin conductance levels (SCL) may highlight arousal disturbances. Moreover, brain morphology changes involving the insula and amygdala may contribute to dysregulated arousal. This study aimed to elucidate the neural and autonomic correlates of arousal disturbances following a TBI.

**Method:** Fifteen adults (11 males; mean age 47; mean education 13 years) with a severe TBI and 19 matched controls (12 males; mean age 40; mean education 15 years) ( $p > 0.05$ ) participated. Magnetic resonance imaging (MRI) scan established insula and amygdala volumes. To assess arousal, mean EEG alpha power and SCLs were recorded during eyes closed (EC) and eyes open (EO).

**Results:** Alpha power decreased from EC to EO but this change was muted in TBI ( $p < 0.01$ ). Lower SCLs were found in TBI participants overall. Alpha was greater in posterior versus frontal regions ( $p < 0.01$ ). TBI patients showed greater alpha power in the hemispheres compared to the midline, whereas controls showed midline dominance. There was greater regional differentiation on alpha power during EC, which differed for groups. TBI participants displayed reduced amygdala volume ( $p < 0.01$ ) and insula volume ( $p = 0.05$ ); greater amygdala volume in TBI was associated with greater SCL increased EC-EO.

**Conclusions:** EEG alpha power may provide a sensitive measure of TBI-related arousal disturbances, including hypoarousal, and diminished arousal changes. Brain morphology changes may contribute to attenuated autonomic arousal.

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## Which factors influence the physical activity levels of people with traumatic brain injury when they are discharged home from hospital?

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**Background and Aims:** Restrictions in mobility post moderate to severe traumatic brain injury (TBI) are common, and have been linked with restrictions in community integration. The aims of this study were to identify which factors were associated with greater activity levels during the transition from inpatient discharge to home.

**Method:** Factors associated with community mobility: balance, strength, walking endurance, cardiovascular endurance, anxiety and depression, fatigue and motivation to exercise were assessed in the week prior to discharge in 20 people with TBI. Activity levels (steps/day) were measured using Kinetamap activity monitors at 6 weeks post discharge.

**Results:** All participants with TBI were well below the Australian National Guidelines of 10,000 steps/day (mean steps/day =  $5166 \pm 3053$ ). Although walking endurance was close to normal values<sup>1</sup> (median 6 minute walk test = 467m), the maximal aerobic capacity was below average (mean maximal O<sub>2</sub> uptake = 26.57 ml/kg/min). HADS results indicated normal levels of anxiety and depression. Only the relationship between motivation to exercise (BREQ-2) and steps/day at 6 wks post discharge was significant.

**Discussion:** Although a range of physical and non-physical factors were considered, motivation to exercise was the only variable that had a significant relationship to activity levels at 6 weeks post discharge. All physical measures indicated impairments consistent with moderate to severe head injuries, but none of these measures were significantly related to community mobility. Further data are required to identify predictors of community activity levels, which in future could be used to improve rehabilitation and community integration outcomes.

<sup>1</sup>Enright, P & Sherril D, (1998) Reference Equations for the Six-Minute Walk in Healthy Adults; *Am. J. Respir. Crit. Care Med.* November 1, vol. 158 no. 5 1384-1387

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## Measuring hand performance across the ICF domains following upper limb Botulinum Toxin-A injections

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**Background and Aims:** Measuring spasticity reliably and sensitively following upper limb botulinum toxin A injections (BTX-A) has proven difficult, making it hard to demonstrate functional improvement with this treatment. Dynamic computerised hand dynamometry (DCD) is a new method of measuring elements of hand motor performance during a grasp and release task. The aim of this study was to compare DCD and traditional measures' ability to evaluate upper limb changes following BTX-A injections.

**Method:** 28 adults with spasticity (mean age: 51 years; 7.5 years post ABI) were assessed pre and post BTX-A injections. Hand performance was assessed across the ICF levels of *Body Structure and Function* (Modified Ashworth scale (MAS) and Tardieu Scale), *Activity/Participation* domains (Action Research Arm Test (ARAT) and Goal Attainment Scale (GAS)). DCD motor components evaluated the link between the Body Structure and Function and the Activity/Participation levels of ICF. Wilcoxon tests calculated change between pre and post-intervention scores.

**Results:** Statistically significant changes ( $p \leq 0.01$ ) in hand performance were demonstrated following BTX-A injection at the ICF level of *Body Structure and Function*: MAS and Tardieu scale (wrist) and ICF *Participation* domain:

GAS. DCD elements demonstrated significant change ( $p \leq 0.01$ ) including: Force, Force Velocity, Grip work, and Relaxation Duration.

**Conclusions:** All measures except the ARAT were sensitive to change following BTX-A injections, however, the DCD has theoretical advantages by linking assessment at *Body Structure and Function* and *Activity and Participation* levels of the ICF. Further, DCD shows promise as an emerging outcome measure to demonstrate functional improvement following BTX-A injections.

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## The Incidence of Olfactory Impairment following Traumatic Brain Injury

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**Background and Aims:** Although exact figures are difficult to ascertain, research to date indicates that as many as 50-60% of patients with traumatic brain injury (TBI) admitted to rehabilitation facilities may have olfactory impairments. These incidence estimates have been derived from studies conducted internationally and there is no comparable data available in the Australian context. The aim of this study was to identify the incidence of olfactory impairment following TBI in a consecutive sample of adults admitted to the Brain Injury Rehabilitation Program at Epworth Hospital in Victoria, Australia.

**Method:** Participants were assessed following resolution of posttraumatic amnesia (PTA). Exclusion criteria included history of nasal surgery, olfactory disturbance and psychiatric disorder. All participants were required to be over 18 years and have sufficient communication skills to support the assessment process. Chemosensory function was measured using the Pocket Smell Test (PST) and the University of Pennsylvania Smell Identification Test (UPSIT).

**Results:** Results indicate that 67% of participants ( $n = 127$ ) demonstrated some olfactory impairment on initial assessment. Assessment performance was commensurate with moderate or severe impairment for 28% of participants and 16% were classified as anosmic (no sense of smell). A significant correlation between olfactory impairment (UPSIT score) and severity of TBI (PTA duration) was noted ( $r = -.263$ ,  $p = .004$ ).

**Conclusion:** A substantial proportion of adults admitted for rehabilitation following TBI have olfactory impairment. Accurate assessment and appropriate management of posttraumatic olfactory dysfunction must be incorporated into rehabilitation programs in order to meet the needs of these patients and their families.

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Session 4: Paediatric Rehabilitation

**Stepping Stones Triple P for Parents of Children with Acquired Brain Injury: A Randomised Controlled Trial**

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**B**ackground and Aims: Acquired brain injury (ABI) is a leading cause of acquired disability in childhood, and presents unique challenges for parents, particularly in managing commonly emerging behavioural and emotional difficulties. Paediatric ABI impacts broadly on the entire family system, both in terms of the initial trauma as well as the ongoing adjustment and burden of care, and parental adjustment is a known predictor of child outcome. Despite this, there is currently limited research on interventions to support families beyond hospital discharge. This research project aims to determine the efficacy of Group Stepping Stones Triple P plus a brief stress management workshop based in Acceptance and Commitment Therapy in this population.

**Method:** A randomised wait-list controlled trial has recently been completed, with 59 families with a child aged from 2 to 12 years with an acquired brain injury taking part. Parent-report and teacher-report questionnaires were completed pre and post the intervention period, and 6-month follow up data is still being collected.

**Results:** Analyses will be presented comparing pre- to post-intervention scores between the wait-list group and the treatment group for a range of child, parent, and family outcomes.

**Conclusions:** It is anticipated that the results of this study will be used to inform clinical practice in relation to supporting families following paediatric ABI.

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**Measuring rehabilitation outcomes for children and young people with severe acquired brain injury**

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<sup>2</sup>*Health & Life Sciences, York St John University, York, UK*

**B**ackground and Aims: The International Classification of Functioning, Disability and Health – Children and Youth (ICF-CY) guides us to measure intervention outcomes in terms of participation in activities. This study aims to identify which activity, participation and environmental domains are represented by current outcome measures in a residential rehabilitation setting for children and youth with acquired brain injuries.

**Method:** Action research with participants including all key stakeholders, i.e. researchers, senior management, heads of professions and clinicians. Identify outcome measures used by the multi-disciplinary team and map the most

frequently used measures on to the ICF-CY using the linking rules and replicating Ehrenfors et al's (2009) work.

**Results:** Eighty-two outcome measures and assessments were identified. Thirty-six of these are used frequently and 22 are used as outcome measures. All activity and participation domains were represented to some extent with mobility and self-care (except looking after one's health) particularly well covered. Body function and structure domains covered were mental functions, neuromusculoskeletal and movement-related functions and skin integrity. Environment domains represented were products, technology, support, relationships and attitudes.

**Conclusions:** Activity and participation domains are all broadly covered at the chapter level but there are some gaps at the first branching level. Gaps of note are pain, leisure, play, interpersonal interactions and relationships and the looking after one's health aspect of self-care. More measures reflect the domains of activity and participation than in previous studies but there are gaps and a lack of depth of coverage in significant areas.

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## Managing pain in children and youth with brain impairment at a residential facility

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**Background and Aims:** Pain is poorly managed in contemporary practice. Children and youth with brain impairments have a high risk of experiencing pain due to their injury, health condition, investigative procedures and treatments. This study aimed to audit adherence to guidelines for managing pain in children and youth with brain impairments in a residential setting.

**Method:** A clinical guideline was introduced reflecting national standards and staff were supported to implement the guideline through: training, a local consensus process, educational outreach visits, local opinion leaders, reminders, audit and feedback. Audits were conducted before the guideline was introduced in 2010 (n = 23) and after in 2011 (n = 31) and 2012 (n = 53). Care notes were reviewed to identify documented evidence of pains, pain tools in use, interventions for pain relief and evaluations of interventions.

**Results:** Number of pains/week ranged from 0-26 with 67% having one or more pains. Presence of pain tools increased from 9% to 65%; usage increased from 0% to 15% with tools used including the FLACC scale (Face, Legs, Activity, Cry and Consolability) and Nociception Coma Scale for those with disorders of consciousness. Where pain tools were used a reduction in pain scores was evident. Interventions increased from 54% to 63% and evaluation of interventions from 23% to 70%.

**Conclusions:** Introducing a local guideline reflecting national standards, specific to this group of children and youth, combined with staff support can result in improvements. However, full implementation of guidance to achieve the highest standard of pain management is a challenging, probably long term, process.

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## Working memory development following treatment for childhood medulloblastoma: A 5-year longitudinal study

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**B**ackground and Aims: Children treated for medulloblastoma are at increased risk for poor neurocognitive outcome. We investigated the 5-year developmental trajectory of working memory (WM) in children treated for medulloblastoma with the primary aim to examine the relationship between performance- and rater-based WM measures.

**Method:** This study included 167 patients (age at diagnosis:  $M = 9.20 \pm 3.90$  years) diagnosed with medulloblastoma who received post-surgical risk-adapted craniospinal irradiation and high dose chemotherapy. Serial WM assessments using performance (Woodcock-Johnson-III) and caregiver rating (Behavior Rating Inventory of Executive Function) were completed before craniospinal irradiation, and annually for 5 years.

**Results:** Children treated for medulloblastoma demonstrated a mild but statistically significant reduction in WM standardized scores over time on both performance ( $p < .0001$ ) and rater-based ( $p = .0006$ ) measures; however, mean scores over the 5 years remained in the age-appropriate range on both measures. Younger age at diagnosis and high risk treatment arm were associated with greater decline in WM performance, but not caregiver rating. In predicting impaired WM performance, caregiver WM rating showed low to moderate sensitivity with high specificity across time points.

**Conclusions:** Overall, while children treated for medulloblastoma showed a mild reduction in WM function over time, mean scores at 5-years post-diagnosis remained in the age appropriate range according to performance measures and caregiver rating. Caregiver rating alone does not appear adequate for detecting those at risk of developing WM difficulties. Developmental and medical factors may be used to identify children at greatest risk for developing WM compromise, allowing for improved education and targeted intervention.

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## Evaluating cognitive-communication skills in children with TBI: What do the parents think?

Frith, Matthew<sup>1, 2</sup>; Togher, Leanne<sup>2</sup>; Ferguson, Alison<sup>3</sup>; Levick, Wayne<sup>1, 3</sup>; & Docking, Kimberley<sup>2</sup>

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**B**ackground & Aims: Evidence from adults with TBI and children with autism suggest that questionnaires completed by carers are sensitive to everyday communication difficulties that may not be detected by tests.

The aim of this study was to identify the effectiveness of using parent completed questionnaires to measure clinical change in communication ability after a TBI.

**Methods:** So far the parents of 4 children who have sustained severe TBI have been recruited. They have completed the La Trobe Communication Questionnaire, Children's Communication Checklist and the Behaviour Rating Inventory of Executive Function during the child's hospitalisation then at 3 months and 9 months post discharge from hospital. The children were assessed on the CELF-4. Data at the 9 month interval is still being collected.

**Results:** At 3 months the questionnaires highlighted strengths and weaknesses in social communication and executive function which were not detected by the CELF-4. Data over 9 months post injury will illustrate the trajectory of change in communication and executive function. Comparisons between the questionnaires and CELF will also be discussed.

**Conclusion:** Observer ratings on standardised questionnaires should be incorporated in speech pathology assessments of children post-TBI. Reliance on tests alone may be insufficient. The positive and negative implications of such practice will be considered.

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## Guiding service delivery and monitoring change in pupils with a severe acquired brain injury: the School Function Assessment

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**B**ackground and Aims: Rehabilitation of pupils following severe acquired brain injury includes enabling access to appropriate education and participation in the classroom. This study aimed to examine whether the School Function Assessment (SFA) could be used to guide service delivery and monitor change following a period of inpatient rehabilitation.

**Method:** The SFA was completed on admission and discharge by teachers and therapists for 70 pupils admitted for residential rehabilitation between January 2007 and October 2011. Data analyses applied Kruskal-Wallis for between-group differences and linear mixed effects modelling for SFA interval data. All values given as medians; level of significance was set at 0.05.

**Results:** Seventy pupils included 31 traumatic (TBI), 29 non-traumatic, 10 anoxic (ANOXABI); 42 male, aged 4.5–17.2 years (12.2y). No significant difference in weeks in rehabilitation ( $p > 0.05$ ) between non-traumatic (22wk) and TBI (25wk) but ANOXABI (42wk) group spent significantly longer in

rehabilitation ( $p = 0.03$ ). No significant age difference was found between non-traumatic (11.6y) and ANOXABI (10.7y) groups but TBI (14.6y) group were significantly older ( $p = 0.001$ ). There was no significant difference in time post injury on admission between groups ( $p = 0.35$ ). Significant differences were found between admission and discharge SFA scores for participation, physical and cognitive assistance and adaptation in all groups ( $p < 0.05$ ). The SFA identified each pupil's level of participation in a school setting, enabling identification of target areas for health and education rehabilitation interventions.

**Conclusions:** The SFA can be used to identify education and therapy goals, levels of special educational needs and progress during rehabilitation.

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## CONCURRENT SESSIONS 5–7

### Session 5: Symposium 3 - Self-awareness after traumatic brain injury

Chair: Vicki Anderson

#### **Self-awareness after traumatic brain injury: cross-sectional analysis from 3 months to 20 years post-injury**

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**Background and Aims:** Reduced self-awareness of deficits is common following traumatic brain injury (TBI), impacting rehabilitation, goal-setting and use of compensatory strategies. This study examined the association between time-post injury, PTA duration, depression and self-awareness and its domains.

**Methods:** 149 TBI participants (101 males) with mean age 44.20 years and mean PTA of 26.46 days and their close others completed the Awareness Questionnaire (AQ) and Hospital Anxiety and Depression Scale at either 3, 6, 12, 24, 36, 60, 120 or 240 months post-injury. Discrepancy between TBI participants and close-others' self-report, of current versus pre-injury functioning on the AQ, was examined as a measure of self-awareness across three domains: Cognition, Behaviour/Affect and Motor/Sensory.

**Results:** Poorer self-awareness of deficits was significantly related to longer PTA duration. After controlling for PTA and depression, AQ discrepancy scores were significantly greater at 3 and 6 months post-injury than at later time-points, with TBI participants rating their functioning higher than close others. TBI participants and close-other ratings were more congruent at 12, 36 and 120 months post injury. However, at 24 months post-injury close others rated the TBI participant as performing better than the TBI participants rated themselves.

**Conclusions:** These findings suggest that self-awareness of deficits is an evolving process after TBI. This needs to be taken into account when obtaining self- and close-other reports' of injury-related cognitive, behavioural and motor-sensory changes. Whilst relatives may be most appropriate to report changes early after injury, this may not be the case later, although factors such as injury severity need to be taken into account.

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## Identity and the life course: lived experiences of individuals with traumatic brain injury during the period of transition from hospital to home

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**Background and Aims:** Identity changes, including a loss of self and positive psychological change, have been described following traumatic brain injury (TBI). Life course theory acknowledges the influence of changing state (or transition) on identity. The transition from hospital to home is recognised as a time where psychosocial difficulties can emerge; however, research focuses on stroke, and there has been limited research considering the lived experiences of individuals with TBI. This study aimed to understand the transition experiences of individuals with TBI and implications for self-identity.

**Method:** An interpretive qualitative investigation was conducted with a sample of 16 individuals with moderate ( $n = 2$ ) to severe ( $n = 14$ ) TBI, recruited at discharge from an acute ward or rehabilitation unit. Semi-structured in-depth interviews were completed 9-months following discharge and thematically analysed.

**Results:** Dominant themes were; wanting normality and changing life perspective. Participants described wanting their normal (pre-injury) life and to overcome changes in their activities, health, relationships and independence. Changing life perspective was characterised by accepting role change, or by re-assessing priorities (i.e., more appreciative of family). Sentinel events such as return to work, and environmental factors such as attitudes of others and social stereotypes, served to reinforce identity change and either a contracted (wanting normality) or adjusted (shifting priorities) sense of self.

**Conclusions:** Individuals with TBI experience a dynamic process of identity change during transition from hospital to home, shifting between wanting normality and changing priorities. Supports for individuals in the process of identity transition should be available in community rehabilitation.

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## The relationship between goal attainment and the development of self-awareness in traumatic brain injury (TBI) rehabilitation: descriptive and qualitative case analyses

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**Background and Aims:** Impairment of self-awareness as a result of TBI is considered synonymous with difficulties setting rehabilitation goals and

recognising the need for, and participating in, rehabilitation. A pilot investigation of participants with TBI ( $n = 14$ ) including a subset with severe impairment of self-awareness at baseline ( $n = 4$ ) found that all participants engaged in client-centred goal planning through a 12 week outpatient occupation-based rehabilitation program and made significant gains in goal attainment (Doig, Fleming, Kuipers & Cornwell, 2011). Despite the intervention not specifically targeting self-awareness, the therapeutic process appeared to enhance the self-awareness of participants. The aim of this study was to conduct a secondary analysis of the data to examine the relationship between goal attainment and the development of self-awareness.

**Method:** A mixed quantitative and qualitative analysis of a case series was conducted. Self-awareness and goal attainment were evaluated at four time-points, each 6 weeks apart, before, during and post-intervention. Measures were self and significant other ratings on the Mayo Portland Adaptability Index (MPAI-4) ability subscale, the Canadian Occupational Performance Measure (COPM) and Goal Attainment Scaling (GAS). Self-awareness was measured by comparing patient and significant other ratings. Changes for four participants with severe impairment of self-awareness at baseline were examined by visual inspection of plotted data, and compared with participants with accurate self-awareness at baseline ( $n = 2$ ). Engagement in goal planning and rehabilitation and development of self-awareness was further evaluated using qualitative analysis of semi-structured interviews, field notes and therapist session notes.

**Results:** All participants could self-identify program goals using the COPM and engaged in the rehabilitation program with exception of one participant. This participant demonstrated severe impairment of self-awareness at baseline and required a therapist-directed goal planning approach to generate program goals. All attained overall expected levels of achievement according to the GAS with the exception of the participant who required a therapist-directed goal planning approach (GAS  $t$ -score 42.7 at program end). All participants with severe self-awareness impairment demonstrated improvements (increasing congruency between self and significant other ratings) during and after the intervention compared to baseline, suggesting that the intervention contributed not only to goal attainment but also facilitated self-awareness. In contrast, the two participants with accurate awareness showed self-ratings that were more congruent with ratings of their significant others.

**Conclusions:** Severe impairment of self-awareness was not a barrier to client-centred goal planning, therapeutic engagement and goal attainment. The results suggest that the goal-directed, occupation-based intervention contributed to enhancing self-awareness. Further research is required to investigate this under controlled conditions

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## A Randomised Controlled Trial of Feedback Interventions to Improve Self-Awareness after Traumatic Brain Injury

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**Background and Aim:** Feedback is used in rehabilitation to improve self-awareness in people with traumatic brain injury, but there have been no clinical trials comparing different methods of providing feedback. The aim of this paper was to compare the effect of video, verbal and experiential feedback on impaired self-awareness after traumatic brain injury.

**Method:** Randomised, assessor-blinded trial with concealed allocation. Fifty-four participants with traumatic brain injury and impaired self-awareness (85% male) were recruited from inpatient and community rehabilitation settings. Participants performed a meal preparation task on four occasions and were randomly assigned to receive one of three feedback types: video plus verbal feedback, verbal feedback, or experiential feedback. Primary outcome was improvement in online awareness measured by the number of errors made during task completion. Secondary outcomes included level of intellectual awareness, self-perception of rehabilitation, and emotional status.

**Results:** Receiving video plus verbal feedback reduced the number of errors made during tasks more than verbal feedback alone (mean difference 19.7 errors, 95% CI 9.2 to 30.1) and experiential feedback alone (mean difference 12.4 errors, 95% CI 1.8 to 23.0).

**Conclusions:** Results suggest that the video plus verbal feedback approach used in this study was effective in improving self-awareness in people with traumatic brain injury, and that improvement in self-awareness was not accompanied by deterioration in emotional status.

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## Relationships between threat appraisals, avoidance and self-concept, and the influence on emotional adjustment after traumatic brain injury

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**Background and Aims:** Negative changes in self-concept and subsequent emotional consequences have been consistently reported following traumatic brain injury (TBI). Theoretical perspectives suggest that the experience of task difficulty or failure may lead to threat appraisals and avoidance of everyday activities. These appraisals and reactions are theorised to contribute to poor emotional adjustment by altering people's sense of self. This study

aimed to investigate the relationships between threat appraisals, avoidance and self-concept and the influence on emotional adjustment after TBI.

**Method:** Fifty participants with mild-severe TBI (chronicity: 12-65 months) were recruited from the community and completed the Head Injury Semantic Differential Scale III, Appraisal of Threat and Avoidance Questionnaire, Depression Anxiety and Stress Scales 21, and Brief Symptom Inventory 18, as part of an assessment battery for a broader study.

**Results:** A series of mediated regression analyses were conducted with the Sobel test used to examine the significance of indirect effects. Self-concept significantly mediated the relationships between threat appraisals and depression ( $= 2.66, p = .008$ ), and avoidance and depression ( $= 2.75, p = .006$ ). However, the nature of the relationship differed for anxiety; namely, threat appraisals mediated the relationship between self-concept and anxiety ( $= -2.48, p = .01$ ). All mediations represented large effects (Kenny, 2012).

**Discussion:** The present findings highlight the potential clinical relevance of reducing threat appraisals and avoidance in order to promote a more positive sense of self, with the aim of decreasing depressive symptomology; whereas, a clinical focus on improving self-concept may reduce threat appraisals and related anxiety symptoms.

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## Awareness of Ostracism Following Brain Injury

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**Background and Aims:** Traumatic brain injury (TBI) results in a heterogeneous collection of impairments in cognitive and social functioning. One common outcome of these changes is reduced capacity to maintain social networks, often leading to poor mental health outcomes for these individuals.

**Methods:** This study examines the psychological effects of ostracism on 20 adults with severe TBI and 19 matched healthy control participants. Both groups participated in a pseudo online ball tossing game, Cyberball. Participants view a computer screen where they see three players, one of which they control. On one occasion they were excluded from the game as the other two players failed to throw the ball to the real participant, and on the following occasion they were included fairly. Following each game they completed a self-report questionnaire about their experience.

**Results:** The TBI group self-reported negative psychological effects of ostracism including a lower sense of belonging, self-esteem, and meaningful existence; however, they were affected to a lesser degree than healthy control participants. TBI participants also reported that their feelings were hurt to a lesser extent than did control participants.

**Conclusions:** Individuals with a TBI experience ostracism differently to those without brain injury. These findings are discussed in terms of the role of the negative experience of ostracism in motivating and guiding behaviour to re-establish group membership to prevent future social isolation.

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## Session 6: Measures and mobile technology

**Preliminary analysis of the properties of an ICF-based, observational tool to measure participation outcomes from brain injury rehabilitation**

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**B**ackground: Client-centred practice requires clinical change be assessed in relation to outcomes that are meaningful to the individual. The International Classification of Functioning, Disability and Health (ICF; from the World Health Organization), and particularly the concept of participation, presents an outcome of interest for this purpose. We developed an ICF-based observational tool, called *COMPLEAT: Community Participation Linking Environment Activity and Task*, to assess participation. *COMPLEAT* is designed to assess clinical change longitudinally, including across stages and settings of brain injury rehabilitation.

**Aims:** Describe the tool and report on preliminary analyses of its psychometric properties. Make recommendations for assessing clinical change and further development and testing of *COMPLEAT*.

**Method:** Rasch analyses were used to evaluate data from 26 *COMPLEAT* observation sessions of clients with brain injury. In those sessions performance ratings were made for each activity accounting for assistance/adaptation, time and effort, safety, and functional outcome.

**Results:** Across all observations, person reliability was  $>0.9$  and item reliability  $>0.7$ . The proportion of misfitting items was acceptable, suggesting a unidimensional measure, though data from 3 person observations were unexpected. The item difficulty hierarchy was logical and shows potential to inform clinical interventions. Specifically, *COMPLEAT* items relate difficulty in domains of functioning (communication, mobility, cognitive, etc) to participation in meaningful life activities.

**Conclusions:** The observational approach was demonstrated to be applicable to assessing participation with a range of clients with brain injury in different rehabilitation stages and settings. *COMPLEAT* shows promise as a tool for assessing clinical change in relation to participation and the ICF.

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**Using the ICF to assess whether goals set by arbias reflect improvements in participation that are meaningful to clients.**

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**B**ackground: Participation in life situations is the ultimate rehabilitation outcome for clients with an acquired brain injury. Goals reflect the outcomes that a service provider intends to support an individual client to achieve. Goal attainment allows individualised assessment of clinical change consistent with client-centred practice. However, this is only valid if the goals reflect the change the client wants to achieve by accessing the service.

**Aims:** Investigate whether the goals that service providers set with clients are consistent with the arbias service model's use of the ICF and focus on

Participation. Examine the goals set in relation to the service pathways of clients.

**Method:** arbias staff set goals with each client at the time of initial assessment and commencement of intervention, and record the client's service pathway. The goals for each client were coded using the ICF by an independent reviewer. The codes were analysed within and between groups using the hierarchical ICF classification.

**Results:** Over 90% of coded goals fell within the Participation component of the ICF. Between group comparison results will be presented and discussed.

**Conclusions:** Coding goals using the ICF allowed confirmation that the arbias service model was being implemented in each service pathway. This provides a platform for assessing clinical change based on those goals. Writing goals reflective of meaningful change for clients is assisting arbias to develop a service that will reduce restrictions preventing clients from being involved in life situations of their choice.

ICF – International Classification of Functioning Disability and Health

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## **Is the Mayo-Portland Adaptability Inventory – 4 (MPAI-4) an optimal outcome measure for a community based, Acquired Brain Injury rehabilitation service in Australia?**

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**Background and Aims:** The use of outcome measures in rehabilitation services is increasingly recognised as integral to optimal service delivery. Many post-acute clients with an acquired brain injury have a ceiling effect with the commonly administered Functional Independence Measure (FIM). This study aims to (i) assess the benefit of the MPAI-4 in mapping client's progression through a post-acute rehabilitation program; and (ii) determine the comparative relevance of the MPAI-4 and the FIM in regards to measuring individual capacity to develop independent skills for community based living.

**Method:** A preliminary study was conducted in mid-2011 using a retrospective study design with a more comprehensive study commencing in September 2011 to demonstrate the comparative benefits of the MPAI-4 and the FIM.

The MPAI-4 is administered on admission, at three-monthly reviews, and at discharge, using the professional consensus model. FIM scores are collected at admission, annually and on discharge. Matched statistical analyses of the MPAI-4 will individually demonstrate total and categorical change.

**Results:** Comparison to the FIM initial data demonstrates that the MPAI-4 is a more comprehensive measure of long term change in this population. Initial results from the MPAI-4 analysis of clients demonstrates a positive trend of measureable improvement in clients across each sub-area and total score. Full statistical analysis will be available at time of conference in May 2013.

**Conclusion:** The incorporation of the ABI specialised Mayo-Portland Adaptability Inventory-4 provides greater insight and is a valuable tool to guide rehabilitation programs into physical, psychosocial and community integration skill sets.

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## Analysis and validation of the Acceptance and Action Questionnaire II and the Acceptance and Action Questionnaire – ABI

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**Background and Aims:** Acceptance of changes following acquired brain injury (ABI) is potentially an important therapeutic mechanism and outcome. However, there are few validated measures of acceptance for people with ABI. This study involved preliminary validation of two measures of acceptance in an ABI population, the Acceptance and Action Questionnaire II (AAQ-II) and the Acceptance and Action Questionnaire – Acquired Brain Injury (AAQ-ABI).

**Method:** A total of 75 participants with an ABI were recruited from Liverpool Brain Injury Unit and completed research measures on average 21 months after their injury. They were administered self-report measures of mood and avoidance, in addition to the two measures of acceptance. Demographic information and neuropsychological data was also collected. The measures of acceptance were readministered between 7-14 days later.

**Results:** The AAQ-II demonstrated good internal consistency ( $\alpha = .86$ ) and satisfactory test-retest reliability ( $r_s = .70$ ). Exploratory factor analysis of the AAQ-ABI, revealed a two-factor structure but the second factor had low internal reliability ( $\alpha = .22$ ). Consequently, 9-items that appeared to capture acceptance were retained. The 9-item measure correlated highly with the AAQ-II ( $r_s = .73$ ) had good internal consistency ( $\alpha = .86$ ) and good test-retest reliability ( $r_s = .84$ ). Convergent validity with the Appraisal of Threat and Avoidance Questionnaire (ATAQ) (ATAQ-T,  $r_s = -.66$  and ATAQ-A,  $r_s = -.72$ ) and Depression Anxiety Stress Scale-21 (Depression,  $r_s = -.67$ ) was also good.

**Conclusions:** Preliminary analysis of both the AAQ-II and AAQ-ABI indicate they are both suitable measures of acceptance in an ABI population with the ABI specific measure of acceptance demonstrating superior test-retest reliability.

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## Validation of the Quality of Life Inventory (QOLI) as a measure of outcomes following traumatic brain injury (TBI) in Australia

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**Introduction and Aims:** Rehabilitation efforts ultimately seek to optimise quality of life. Yet, few measures of clinical change in this area have been validated for use within the Australian traumatic brain injury (TBI) context. One measure that has undergone extensive development in the US is Frisch's QOLI. Before it could be used with confidence in Australia, its validation was required in the local context. As such, the aims of this research were to

investigate the psychometric properties of the QOLI in samples of Australians from both nonclinical and TBI populations.

**Method:** Two samples were recruited. These included 259 healthy adults, stratified by age and gender and 901 adults with traumatic brain injury who also returned QOLI responses. Analyses investigated the normative distribution, factor structure, reliability and validity of the measure in the community sample. These properties were also examined in the TBI sample, as well as outcomes following injury.

**Results:** Some differences were observed between the general community and injured samples' normative distribution and that of the generic-US based standardisation sample. Confirmatory factor analyses showed a three factor structure best fitted the data in both Australian samples. The psychometric properties of the QOLI were acceptable in the nonclinical sample and the utility of the three factor structure was demonstrated when examining outcomes over time following TBI.

**Conclusion:** The QOLI demonstrated acceptable psychometric properties in the Australian context. A three factor structure was the best fitting model and may be useful in understanding clinical outcomes following injury.

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## Factors influencing the use of electronic technology for persons following Traumatic Brain Injury

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**Background and Aims:** Smart technology has great potential to facilitate independence and promote social connection in people with traumatic brain injury (TBI). Despite the broad application of these technologies, people with TBI continue to show significantly reduced rates of usage in comparison to the general population. The aim of this review was to identify and describe factors that have been found to influence the use of mainstream technology by people with TBI.

**Method:** A systematic search was conducted of relevant databases using the following keywords: 'emerging technology', 'cognitive rehabilitation', 'assistive technology' and 'brain injury.' Additional manual searches of reference lists of key journal articles and articles from expert authors in the area were completed. Twenty-four articles that examined technology use for persons with TBI were reviewed and data extraction focused on factors influencing use.

**Results:** Levels of use of technology for persons with TBI ranged between 29%-82%. Non-users' reported reduced understanding of how-to-use technology, difficulty due to cognitive and sensory impairments and problems trouble-shooting. Cognitive factors included the severity of memory and executive impairments and reduced insight. Function and task preference influenced use with social networking and leisure being the most desired functions. Confidence of caregivers and therapists increased the likelihood of device use. Type of training, type of device and patient involvement in device selection were also identified as important factors.

**Conclusion:** Successful use of electronic technology following TBI requires an individualised approach with consideration of multiple factors including the types of activities, type of training, patient needs and the characteristics of the system.

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## Client's Perspectives of Smartphone Technology in Acquired Brain Injury Rehabilitation

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**Background and Aims:** The use of smartphones is increasingly commonplace in the wider community however people with Acquired Brain Injuries (ABI) continue to be under-represented in accessing this technology. Current trends suggest the implementation of smartphones in rehabilitation programs and further research into the benefits and barriers is required. The aim of this study was to evaluate the practical application of smartphones from the perspective of clients with an ABI in order to guide effective utilization of this technology.

**Method:** A qualitative study design was employed with five clients of a brain injury rehabilitation service who are current smartphone users. Participants were interviewed using structured questionnaires which were audio-taped, transcribed and analysed.

**Results:** All clients stated that access to a smartphone was of high importance and enabled them greater social opportunities. Despite the overwhelming demand for this technology, minimal assistance was available for set up, phone payment, syncing & backup procedures, phone usage and applications. Clients were either not aware of or under-utilising smartphone technology or demonstrated inefficiency in their use. A shortfall in therapist training to guide clients in technology selection and integration was identified and smartphones were under-utilised for rehabilitation purposes.

**Conclusion:** Procedures to support a more inclusive and seamless access to smartphone technology for people with ABIs is required. This includes education and training for health professionals to gain confidence and skills to integrate this technology into rehabilitation programs. Rehabilitation services are recommended to support clients with access to this technology and the socialisation, compensatory and remedial skill potential they offer.

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### Session 7: ABI rehabilitation and outcomes

#### Comparison of long-term outcomes following traumatic brain injury and orthopaedic trauma

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**Background and Aims:** Whilst it has been well-demonstrated that traumatic brain injury (TBI) results in long-term cognitive, behavioural and emotional difficulties, less is understood about how these outcomes differ from those with orthopaedic trauma. This study aimed to compare outcomes at 10 years post-injury for patients with TBI, traumatic orthopaedic injury, and a control group.

**Method:** Thirty-six patients with mild to severe TBI and 91 orthopaedic trauma patients recruited during rehabilitation were followed up 10 years post-injury, together with 41 demographically similar controls followed over a similar period. Measures of functional outcome (GOSE), employment status,

quality of life (SF-36), psychological well-being (SCL-90, HADS, PTSD), self-reported cognitive difficulties, pain, and fatigue were administered.

**Results:** Of those still in the labour force, 41% of participants with TBI and 19% of those with orthopaedic trauma were unemployed or unable to work, compared with 3% of controls. Outcomes for those with TBI and those with orthopaedic injury differed significantly from controls, with these groups showing poorer outcomes on the GOSE; SF-36 physical and mental scales; SCL-90; and pain scales. Only TBI participants reported greater cognitive difficulties, anxiety and depression. Participants with TBI also showed significantly higher anxiety than those with orthopaedic trauma. Factors contributing to these findings will be explored.

**Conclusions:** Both orthopaedic trauma and TBI contribute to long-term impairments of functional, health-related, psychological and employment outcomes. Cognitive impairments and anxiety are unique long-term problems following TBI. Further understanding of outcome predictors and trajectory will contribute to improvements in rehabilitation following traumatic injury.

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## Examining employment outcomes and vocational participation for people with traumatic brain injury in NSW: A prospective multi-centre study

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**Background and Aims:** This study aimed to examine employment outcomes of clients attending the NSW Brain Injury Rehabilitation Program (BIRP), with a focus on measuring pre- and post-injury participation in employment and vocational rehabilitation (VR) programs.

**Method:** Participants included all outpatients of the BIRP attending between April 2011 and July 2012, who sustained a TBI as an adult ( $N = 721$ ). The majority of clients had a severe injury. Data were collected about pre-injury employment, post-injury employment, participation in VR services, and physical or psychosocial factors impacting upon ability to return to work.

**Results:** Pre-injury, 75% ( $n = 532$ ) of clients were in paid employment. Post-injury, 42% ( $n = 304$ ) had engaged in paid employment at some point, with 29% ( $n = 207$ ) currently working. There was a significant shift from full-time to part-time employment post injury as well as continued restrictions and reduced productivity for 50% of employed clients. Pre-injury employment and education status, length of time post-injury, severity of injury and post-injury psychosocial status all impacted significantly on clients' ability to gain and sustain employment post-injury. Forty-one percent ( $n = 294$ ) of clients had participated in VR services post-injury. Of these, 198 clients (67%) had achieved open employment, while only 24% of the remaining 419 clients achieved employment without vocational intervention.

**Conclusions:** This is the largest multi-centre study to examine employment outcomes and vocational participation for people with TBI in Australia. Employment rates were consistent with the existing literature regarding return to work rates following severe TBI. Clients participating in VR achieved better

outcomes post-injury. Results of this study will be used to inform recommendations for improved VR services for clients across NSW.

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### **Efficacy of leisure intervention groups and their impact on leisure satisfaction, self-esteem and QOL amongst people with an ABI ?**

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**Background and Aims:** To determine whether participation in a leisure intervention program called “Pushing the Boundaries” targeted for individuals who have an Acquired Brain Injury (ABI) living in rural/regional NSW, improved the leisure satisfaction, self-esteem and quality of life of participants.

**Method:** Using a pre- and post-intervention design, participants completed the Leisure Satisfaction Scale, Rosenberg Self Esteem Scale and the World Health Organisation Quality of Life scale –brief, prior to each program, immediately following, and at three months post- program. Data were analysed using a paired Wilcoxon test. Individual leisure goals generated by participants during the program were also investigated.

**Results:** Participants were eight men and four women aged between 19-49 years who were recent clients of a rural Brain Injury Rehabilitation Service. The majority (7/12) had acquired their ABI more than two years previously and for most (10/12) the cause was trauma. Program participants showed clinically important and statistically significant improvements in leisure satisfaction ( $p = 0.002$ ), self-esteem ( $p = 0.03$ ) and quality of life ( $p = 0.02$  to  $0.008$  for 4 domains of the WHO-QOL-Brief scale) at three months post-program.

**Conclusions:** The findings indicate that adults with an ABI participating in a “Pushing the Boundaries” program can experience improvements in leisure satisfaction, self-esteem and quality of life.

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### **“There’s a lot of things that I just know I can’t influence”: The experiences of adults with severe TBI and their partners in making decisions about life after injury**

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**Background and Aims:** Being supported to make decisions about one’s own life is a central tenet of disability policy and an inalienable human right. Despite a significant body of literature documenting changes in decision-making skills following severe TBI, little remains known about the experience of individuals with TBI and those around them in negotiating the process of making decisions after injury.

As part of a larger project seeking to build an understanding of the process of decision-making for individuals after severe TBI, this presentation will present a series of themes relating to the experiences of individuals with severe TBI who are in partner relationships.

**Method:** Data include sixteen semi-structured in-depth interviews with three individuals with severe TBI and their partners. In line with constructivist grounded theory methodology, data was analysed through a process of open and focussed coding, and identification of emergent categories.

**Results:** Several themes reflecting both the experiences of adults with severe TBI and their partners will be highlighted. Themes coalesce around understanding changes in decision-making after injury, being recognised as an individual, and developing strategies to manage tensions in the decision-making process.

**Conclusions:** Through in-depth qualitative evidence, this study reveals the multifaceted nature of the process of decision making following brain injury. It provides insight into strategies to maximise decision making opportunities for individuals with TBI. Further, it highlights the complexities of providing support, requiring constant balance between the needs of the individual and the maintenance of positive family functioning.

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## Coping efforts used by couples living with severe traumatic brain injury: A comparison with orthopaedic control couples

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**Background and aims:** The impact of severe traumatic brain injury (TBI) on partners and families is well recognised with an extensive literature confirming significant rates of anxiety, depression and burden, often leading to family dysfunction. The aim of this study was to investigate the coping efforts employed by couples living with the long-term consequences of TBI and to compare their coping efforts with those used by couples who experienced traumatic injury without injury to the brain.

**Method:** Participants were 25 couples in which the male partner had sustained severe TBI (post-traumatic amnesia  $\geq$  14 days) and 25 couples in which the male partner had sustained traumatic orthopaedic injury. Injured participants were  $\geq$  2.5 years post-injury and all couples were in their relationship for at least 6 months before injury. Coping efforts were measured using the Marital Coping Inventory (MCI) developed to identify the major types of coping (conflict, introspective self-blame, positive approach, self-interest and avoidance) used in recurring problems experienced by couples.

**Results:** Male partners with TBI used significantly less positive approach coping efforts than male partners with orthopaedic injury. Partners of men with TBI used significantly more avoidance coping efforts than partners of men with orthopaedic injury.

**Conclusions:** Patterns of coping characterised by avoidance and not associated with a positive approach to problem resolution signify relationship vulnerability and poor outcomes for couples living with the consequences of TBI. Support to enable couples to identify and develop coping efforts within a positive approach framework is an important step in moving towards better outcomes for those who are injured and those who love them.

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## Rehabilitation after Traumatic Brain Injury: What Determines Amount of Therapy Provided?

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**B**ackground and Aims: Although all severities of traumatic brain injury (TBI) are associated with disability, limited information exists about rehabilitation of non-hospitalised and/or mild cases. Most studies are with specialist units and include only moderate to severe TBI. The establishment of the Tasmanian Neurotrauma Register, a prospective TBI outcome study, enabled us to look at factors related to provision of community-based public rehabilitation, in a sample with injuries from mild to very severe.

**Method:** 150 TBI survivors referred for community rehabilitation participated. The effect of demographic, clinical, psychological, physical and process variables on hours of therapy—during home visits, clinic attendances and telephone contacts—was examined using *t*-tests and chi-squares.

**Results:** Participants received an average of only 7.18 hours of therapy during their rehabilitation. Injury severity was not associated with increased hours of therapy. Home visits and shorter time between referral and first contact were associated with increased engagement with the service. Younger participants received fewer hours of therapy ( $p = .003$ ). Depression was associated with more therapy in Psychology ( $p = .011$ ) and Nursing ( $p = .001$ ). Functional dependence ( $p = .005$ ) and post-concussion symptoms ( $p = .003$ ) were associated with more therapy in Psychology. In Nursing and Social Work telephone contact was a significant proportion of total therapy.

**Conclusion:** In this study age, depression, functional dependence and post-concussion symptoms were better predictors of service use than severity of injury. Both non-clinical variables, such as appointment-wait times, and clinical ones, such as mode of therapy, were related to engagement with rehabilitation.

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## Outcomes of younger people with acquired brain injury moving out of residential aged care

Winkler, Di<sup>1,2</sup>; Callaway, Libby<sup>1,2</sup>; Holgate, Nadine<sup>1</sup>; Sloan, Sue<sup>3</sup>

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<sup>3</sup>*Osborn Sloan & Associates, Melbourne, Australia*

**B**ackground and aims: The five-year national Younger People in Residential Aged Care program ended in June 2011. During this program, the service system was responsive to this group's needs, with 244 people aged under 50 avoiding residential aged care (RAC) placement. Another 250 young people moved out of RAC into largely domestic-scale group homes. The Summer Foundation was appointed by the Victorian Government to evaluate the quality of life outcomes for people who received services through the YPIRAC program. ABI was the most common disability type of participants in this evaluation. This paper examines the quality of life outcomes of 37 people with ABI included in this evaluation.

**Method:** Mixed methods study with in-depth interviews pre- and post-move. Measures included the Community Integration Questionnaire and the Resident Choice Scale.

**Results:** This study found that moving out of RAC enriched the lives of people with ABI who moved out. They went outside more often, had more opportunities to make everyday choices, had greater social interaction and spent fewer hours in bed.”

**Conclusion:** This study provides further evidence that younger people with ABI should not be forced to live in RAC because there is nowhere else for them. This paper will outline future research and the systemic change and additional housing required to resolve the issue of young people in nursing homes.

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### Prevalence of recurrent traumatic brain injury (TBI) in a New Zealand population-based incidence sample

Theadom, Alice<sup>1</sup>; Feigin, Valery<sup>1</sup>, Barker-Collo, Suzanne<sup>2</sup>; Starkey, Nicola J<sup>3</sup>; & Jones, Kelly<sup>1</sup> on behalf of the BIONIC Research Group

<sup>1</sup>National Institute for Stroke and Applied Neuroscience, Auckland University of Technology, Auckland, NZ

<sup>2</sup>Department of Psychology, University of Auckland, Auckland, NZ

<sup>3</sup>Department of Psychology, University of Waikato, Hamilton, NZ

**Background:** The effects of recurrent TBI are far in excess of what would be expected by the nature of the subsequent injury alone. However, little is known about the prevalence, risk factors and long-term consequences of sustaining more than one (recurrent) TBI in the general population.

**Methods:** All new cases of TBI were identified using prospective and retrospective surveillance methods, in the Hamilton and Waikato districts over a one-year period (2010-2011) as part of the Brain Injury Outcomes New Zealand In the Community (BIONIC) study. To facilitate complete case ascertainment, all new hospitalised and non-hospitalised TBI cases (fatal and non-fatal) were identified through multiple overlapping sources. Consenting participants were followed-up for one-year following injury to assess the occurrence of recurrent brain injuries, neuropsychological functioning, post concussive symptoms and mortality.

**Results:** Preliminary findings revealed that 35% of the total sample had sustained >1 TBI in their lifetime. There was a higher than anticipated rate of injuries prior to entry in the study (27%) and recurrent TBI within the follow up period (8%). 60% of recurrent TBIs occurred in males, with highest peaks in prevalence in the under 5's and 18-25year olds. The most frequent mechanisms of recurrent injuries were falls (47%) and assaults (16%).

**Conclusion:** This is the only known epidemiological investigation of the prevalence and impact of recurrent TBI in a population-based sample. The preliminary results suggest that greater efforts are needed to prevent recurrent TBIs that predominantly affect children and young adults.

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## Session 8: Plenary 2

Chair: Leanne Togher

**The child's changing brain: implications for recovery from early brain injury**Anderson, Vicki<sup>1,2,3</sup><sup>1</sup>Department of Paediatrics, The University of Melbourne, Melbourne, Australia<sup>2</sup>Department of Psychology, The Royal Children's Hospital, Melbourne, Australia<sup>3</sup>The Murdoch Children's Research Institute, The Royal Children's Hospital, Melbourne, Australia

The young brain has enormous potential to change in the context of environmental influences. In the context of normal development this is generally considered to be a positive characteristic. However, when brain development is 'derailed' by injury or insult, ongoing maturation of emerging neural connectivity is impacted, and functional outcome is less clear. This presentation will consider animal and human research findings which contribute to our understanding of the acute and long-term implications of early brain injury. In particular, patterns of recovery over childhood and adolescence will be described, with key risk and resilience factors discussed.

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**ASSBI Presidential address: Forgetting to do things often: What, why and how not to?**Prof David Shum<sup>1</sup><sup>1</sup>Behavioural Basis of Health, Griffith Health Institute and School of Applied Psychology, Griffith, QLD, AustraliaSATURDAY 4<sup>th</sup> MAY  
CONCURRENT SESSIONS 9-11

Session 9: Dealing with practical issues of daily life in young people surviving traumatic brain injury

Chair and Discussant: Cathy Catroppa

**Fatigue after brain injury in childhood: impact on psychosocial recovery**Crichton, Ali<sup>1,2,3</sup>; Anderson, Vicki<sup>1,3,4</sup>; Oakley, Ed<sup>1,3,4</sup>; & Babl, Franz<sup>1,3,4</sup><sup>1</sup>Child Neuropsychology, Murdoch Children's Research Institute, Melbourne, Australia<sup>2</sup>Victorian Paediatric Rehabilitation Service, Melbourne, Australia<sup>3</sup>University of Melbourne, Melbourne, Australia<sup>4</sup>The Royal Children's Hospital, Melbourne, Australia

**Background and Aims:** Fatigue is a common clinical complaint after paediatric brain injury, and presents as the most severe initial symptom after traumatic brain injury (TBI). Fatigue can be disruptive to early rehabilitation processes and return to social, educational and leisure activities. Despite the clear clinical need, fatigue outcomes after paediatric TBI are poorly described in current research. Further, clinicians have few objective tools with which to determine who is at risk from fatigue and for how long. The aim of this presentation is: (1) to overview current evidence for fatigue after TBI (2) to

review available assessment tools; (3) to describe fatigue outcome of TBI in children by presenting preliminary data from a longitudinal study; and (4) to highlight key themes from individual cases.

**Method:** Current research literature is reviewed. We present findings related to the course of recovery after paediatric brain injury. We describe preliminary data from a longitudinal study using a multidimensional assessment of fatigue at 6 weeks and 6 months after injury. Physical, cognitive and sleep symptoms of fatigue in children after TBI are examined.

**Results:** Preliminary data and case discussion highlight the importance of timely, age-appropriate and multidimensional assessment of fatigue and demonstrate the impact of fatigue on early rehabilitation processes.

**Conclusions:** There is a need for skilled assessment of fatigue in paediatric TBI. Our existing knowledge base is limited about which assessment tools to use and the course of recovery of fatigue over time. We identify areas promising directions for future research.

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### **Assessing the efficacy and feasibility of an interactive computerised therapy system for children and adolescents post traumatic brain injury (TBI): the impact on memory and quality of life (QoL)**

Cooper, Janine<sup>1</sup>; Di Battista, Ashley<sup>1</sup>; Jaimangal, Mohinder<sup>1,2</sup>; & Rugoobur, Avinash<sup>1,2</sup>;

<sup>1</sup>Murdoch Childrens Research Institute, Melbourne, Australia

<sup>2</sup>Curve Tomorrow, Melbourne, Australia

**Background and Aims:** A common outcome of traumatic brain injury (TBI) is a problem with recollecting personal memories involving the self, known as autobiographical memory (ABM). This is likely to impact on the quality of life (QoL) of the individual, their families, educators and the wider community. The methodology for identifying problems with ABM in children and adolescents is fraught with complications and treatment for such problems is limited. We have developed a computerised treatment system designed to offer rehabilitation and support to children and adolescents post TBI with ABM impairment via an interactive virtual reality friend. The aim of this pilot study is to assess the efficacy and feasibility of this intervention.

**Method:** A group of children and adolescents with TBI during childhood and ABM impairment completed standardised memory and QoL assessments pre- and post- intervention. Qualitative data on memory ability and QOL were obtained in real time by the child interacting with a virtual reality friend and compared to age matched typically developing young people.

**Results:** It is feasible to administer support and therapy for memory problems using a virtual reality friend. The system was able to provide greater detail on memory problems experienced and their effect on QOL. In the typically developing groups, benefits were found for overall wellbeing.

**Conclusion:** As no intervention for younger people with ABM impairment post-TBI exists, we believe this pilot study could have major social and economic benefits for the patients, their families and health services.

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## Does what we measure matter? Quality of life defined by adolescent brain injury survivors: Comparing what adolescents identify as relevant to their quality of life versus what our measures are designed to detect

Di Battista, Ashley<sup>1,2</sup>, Catroppa, Cathy<sup>1,3</sup>, Soo, Cheryl<sup>1</sup>; & Anderson, Vicki<sup>1,2,3</sup>

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**Background and Aims:** Traumatic brain injury (TBI) is a leading cause of morbidity and mortality in young people (Yeates, 2002). The status of quality of life (QoL) in paediatric TBI is mixed. Our recent meta-analysis of paediatric QoL (Di Battista et al., 2012) found that good QoL outcomes are contingent on milder injuries, proxy reporting and early assessment whereas poor outcomes reflect more severe injuries and later assessment. Available paediatric QoL data are largely based on the health-related quality of life (HRQoL) paradigm, where a good outcome is contingent on what one can accomplish or achieve, as assessed by proxies. Information on the subjective well-being (SWB) component of QoL is limited. The relevance of questions included in HRQoL measures for adolescents post-injury is unknown.

**Method:** This study was designed to determine: 1. the level of agreement between parent proxy and adolescent self-report on a HRQoL measure (PedsQLT) and 2. The level of importance attached to domains in HRQoL measures in adolescent TBI survivors. Using a mixed-methods approach, adolescent QoL was assessed via the Peds QLT and semi-structured interview developed by the authors. 11 adolescents and 10 parent proxies were assessed.

**Results & conclusions:** Parental proxy and self-reported QoL were not correlated ( $r_s [9] = -0.27, p = 0.49$ ). While adolescents do identify changes post-injury on the PedsQL, these changes were not always perceived as relevant to their SWB. Additionally, adolescents do not always attribute changes on the PedsQLT to their brain injury, but rather to a sense of age-appropriate maturation.

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## Adjustment in life after traumatic brain injury: The impact of cognition, employment, and perceived sense of purpose in life.

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<sup>5</sup>Eastern Neurosciences, Box Hill, VIC, Australia

**Background and Aims:** TBI affects the most wide-ranging domains of survivors' lives, markedly reducing quality of life. Employment was widely claimed in the literature as a crucial adjustment criterion with therapeutic effect, yet inconsistent findings are reported. To date, no research has explored the relationship between employment and perceived sense of purpose in life (PIL) among survivors of TBI and its interactive impact on the survivors' psychological wellbeing (PWB) and quality of life (QoL). This study examined the often overlooked but imperative role of PIL, hoping to highlight the importance of PIL as a motivating life aim. Findings obtained will contribute

to knowledge enhancement and improvement in existing TBI rehabilitation programs.

**Method:** Participants (N = 40; 10-18 months post-TBI) were grouped according to age: 18-39 years (younger group), 40-55 years (older) and injury severity (GCS score): mild TBI (n = 25), moderate-severe TBI (n = 15). **Phase 1:** Neuropsychological testing and questionnaire surveys were performed to evaluate participants' cognitive function, PWB, and QoL. Data were analysed using regression analyses aided by SPSS computer software. **Phase 2:** Twelve participants (6 from each severity group) were randomly selected for tape-recorded semi-structured interviews, predominantly concerning the impact of work and life meaningfulness on their adjustment to life post-injury. Interviews were analysed using grounded theory methodology, aided by NVivo 10 computer package.

**Results and Conclusion:** Strong sense of PIL is associated with better PWB and QoL, regardless of injury severity and employment outcome. Results underscore the importance of PIL, to strengthen survivors' PWB and to live a satisfying life.

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## Session 10: Communication and Support Needs

### Effect of communication partner training on problem-solving discourse involving people with traumatic brain injury

Hill, Lauren<sup>1</sup>; Power, Emma<sup>1</sup>; Barnes, Scott<sup>1</sup>; & Togher, Leanne<sup>1</sup>

<sup>1</sup>Speech Pathology, Faculty of Health Sciences, University of Sydney, Sydney, Australia

**Introduction and Aim:** This study aimed to explore the effect of communication partner training on interactive problem solving discourse of people with traumatic brain injury (TBI) using systemic functional linguistic (SFL) and conversational analysis-based (CA) approaches.

**Method:** Twenty-nine participants with severe TBI and their everyday communication partners (ECPs) were allocated to either a JOINT training or CONTROL group as part of a multi-centre non-randomised controlled trial. The JOINT group received a 10 week social communication training program called *TBI Express* to train ECPs to better support their partner with TBI's communication and therefore produce more effective conversations. Pre- and post-intervention problem solving discourse samples were compared using generic structure potential (GSP) analysis, and conversation analysis-based (CA) approaches.

**Results:** GSP analysis revealed a significant decrease in Unrelated discourse for the JOINT group and a decrease in Task-related discourse for the CONTROL group post-intervention during dyadic problem solving between a person with TBI and their ECP. No significant change was noted on measures of ECP responsiveness, or ECP solicitation following communication partner training.

**Discussion:** This study provides insight into the complexity of discourse using two distinct analytical approaches (SFL and CA). It explores the impact of ECP training on specific discourse behaviours during interactive problem solving and provides a platform for further investigation of discourse analyses.

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## Cognitive-communication recovery during post-traumatic amnesia (PTA): A case study

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<sup>2</sup>Speech Pathology, University of Sydney, Sydney, Australia

**Background and aims:** Formal speech pathology assessment of cognitive-communication after traumatic brain injury (TBI) generally commences once post-traumatic amnesia (PTA) has resolved. Many speech pathologists are highly involved with informal communication assessment during PTA (Steel, Ferguson, Spencer, & Togher, 2012), although the purpose of monitoring communication and the predictive value of findings are unclear. The current study sought to describe cognitive-communication impairments throughout PTA and at three months after PTA emergence. The resolution of communication impairments during PTA has not previously been systematically documented, and little is known about early recovery of cognitive-communication.

**Method:** This descriptive case study documents the resolution of communication impairments of a 47 year old male with severe TBI, with PTA duration of ten weeks. Repeated systematic sampling of communication took place on nine occasions over the course of 4 weeks during PTA, and once at three months afterwards. Measures were derived from discourse analysis, nature of performance on language and cognitive-linguistic tasks, and global ratings of social communication from the perspective of the rehabilitation team and family.

**Results:** Improvement in function was observed across all domains of communication over the course of PTA. Some communication impairments observed during PTA persisted three months later and required ongoing intervention. The relationship between the communication profile during PTA and at three months afterwards will be discussed.

**Conclusions:** Preliminary results indicate that observations of cognitive-communication recovery during PTA can make a valuable contribution to evaluation of PTA status and may provide an additional indicator of return of cognitive function. Further research is warranted into the nature of cognitive communication recovery in the early stages after injury.

Steel, J., Ferguson, A., Spencer, E., & Togher, L. (2012). Speech pathologists' current practice with cognitive-communication assessment during post-traumatic amnesia: A survey. *In press*.

**Correspondence:** Joanne Steel; Joanne.Steel@uon.edu.au

## Linguistic processing subsequent to mild traumatic brain injury: Evidence for higher-level language deficits?

Barwood, Caroline H.S.<sup>1</sup>; & Murdoch, Bruce E<sup>1</sup>

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**Background:** The exact nature of cognitive-linguistic compromise resulting from diffuse mild traumatic brain injury (MTBI) has proven difficult to capture. A growing body of evidence has illuminated both the presence of high-level linguistic deficits and the impact of frontal lobe disconnection on the linguistic profiles. The present research methods aim to provide group evidence pertaining to the influence of MTBI on language processing.

**Methods:** Sixteen (16) MTBI patients and sixteen (16) age and education matched normal control participants were assessed using a comprehensive battery of language assessments.

**Results:** The results demonstrated statistically significant differences between MTBI and normal control group performance across a number of higher-level linguistic, and general language tasks. MTBI group performance was significantly lower than normal control group on tasks requiring complex lexical semantic operations and memory demands, including: Recall, organization, making inferences, naming and perception/discrimination.

**Discussion and Conclusion:** These outcomes confer that post MTBI, cognitive, high-level language and isolated general language performance (e.g. naming) is significantly reduced in MTBI patients, compared to normal controls. Furthermore, the detailed cognitive-linguistic profile offered provides a necessary direction for the identification of areas of linguistic decline in MTBI and targets for therapeutic intervention of impaired cognitive-linguistic processing.

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## Metalinguistic ability and Quality of Life in Brain Injury (QOLIBRI) outcomes in adults 17-52 years post paediatric and adolescent TBI

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**Background:** Previous research has reported both the occasional presence of persisting higher-level language impairments resulting from early-acquired traumatic brain injury (TBI) and decreased health-related quality of life (HRQL) following such injuries. The life-long implications for both domains and the link between language competence and HRQL in chronic TBI remain yet to be fully established.

**Methods:** Performance on the Test of Language Competence-Expanded Edition (TLC-E) and the Quality of Life in Brain Injury (QOLIBRI) questionnaire was compared between a group of 20 adults with a history of paediatric or adolescent TBI aged 30-55 years ( $m(SD) = 40(7.5)$ ; mean age at injury: 8.8 years; mean time since injury: 31 years) and 20 control participants matched for age, gender, handedness, socioeconomic status and years of education using Multivariate Analysis of Variance (MANOVA). Linear Regression analyses were performed using TLC-E raw scores as predictor variables of HRQL scores.

**Results:** MANOVA results revealed significantly lower scores in the TBI group compared to the control group on the following measures: TLC-E composite raw score and subtests of Interpreting Ambiguous Sentences and Creating Sentences (raw scores for both), QOLIBRI total score, and QOLIBRI subscales of cognition, autonomy, and social, emotional and physical functioning. Performance on the TLC-E subtest of Ambiguous Sentences was the strongest predictor of long-term HRQL in the TBI group.

**Discussion and Conclusion:** Between-group findings are in line with previous research. Regression outcomes provide preliminary evidence for an association between metalinguistic skills and self-reported quality of life in adults 17-52 years post early-acquired TBI.

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## Peer support programs improve the psychosocial functioning of those with a brain injury

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**Background and Aims:** Peer support groups provide a valuable avenue for patients to increase their knowledge of brain injuries, enhance their quality of life and their ability to cope with psychosocial stressors. The present study investigated the impact of a peer support program delivered at a major metropolitan hospital in Queensland Australia on psychosocial stressors and relationships with peers.

**Method:** During 2012, the researchers undertook a group evaluation with patients who had an acquired brain injury and invited patients to complete a paper-based survey containing items investigating emotional distress levels measured on a five-point Likert scale. All members of the peer support group ( $n = 31$ ) held between September and November in 2012 were invited to participate in both the group evaluation and the survey.

**Results:** There were 11 participants in the group evaluation with an average of four people in each group. The data from the group evaluation indicates that attendance at the support group was related to a decrease in psychosocial stressors and increased positive relationships with their peers. The results of the survey indicate that of the 31 participants, 16 had attended the Peer Support Group. The majority of participants were male (65%) and had an acquired brain injury (57%) with a mean age of 41.5 at the time of participating in the study.

The number of times that these individuals attended ranged from 1 session to 15 sessions. The median attendance rate was 2.5 sessions. Examining the frequencies for those that attended Peer Support Group suggest that individuals have difficulties sharing their own stories but receive useful information and education. These results are congruent with the existing literature that supports the importance of peer support within a brain injury inpatient rehabilitation setting (Hibbard et al., 2002).

**Conclusions:** This research highlights the importance of using an empirically based peer support program for patients with an acquired brain injury. This type of program reduces the psychosocial stressors on patients by improving relationships with their peers, and may provide them with additional coping mechanisms for daily life via psycho-education.

There are three main factors which make this program an innovative initiative: 1) it was designed following research into the needs of patients with a brain injury 2) patients were consulted in regards to the structure and effectiveness of the program and 3) it is based on empirical research. As a result of these factors the peer support group is now an integral part of the inpatient rehabilitation program that is valued by the unit.

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## Session 11: Models of Care

**Experiences and needs of families living with Acquired Brain Injury in South Australia: Results from *Families4Families* Stage 1 Research**

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<sup>3</sup>*Community Re-entry Program, Adelaide, Australia*

**B**ackground and aims: *Families4Families* is an 18 month pilot peer support network for families living with acquired brain injury (ABI) in South Australia. Prior to its launch in January 2013, preliminary research (Stage 1) was conducted to identify the experiences and needs of families following ABI, in order to inform the design of the network. This paper presents findings from Stage 1.

**Method:** Information was collected through surveys and focus groups. 2502 surveys were posted to families who had received services from SA Brain Injury Rehabilitation Services (SA BIRS) between 2002 and 2012. An additional 110 surveys were distributed to SA disability and carer groups. 228 completed surveys were returned (10.6% response rate). Four focus groups were then conducted with survey respondents (n = 36) to explore identified support needs, and audio recordings transcribed for analysis.

**Results:** 194 family members (110 partners, 29 parents) and 34 people with ABI completed the 22-question survey, providing a range of demographic and diagnostic data. Thematic analysis of open-ended survey responses and focus group transcripts revealed 15 areas of support including: counselling and emotional support for all family members (29%); family support groups (including children, young carer and partner groups) (21%); ABI information (19%); family social activities; help to navigate the system; early supports (within first year of ABI); self-advocacy training; and the provision of family-centred services.

**Conclusions:** Results highlight a need for ongoing supports for the entire family following ABI which could be delivered through a family peer support model.

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**Models of supported accommodation for people with traumatic brain injury**

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**B**ackground and Aims: Many individuals who experience severe traumatic brain injury (TBI) require ongoing support or specialised accommodation, often over their lifetime. Although having diverse needs and preferences, to date in Australia, people's options for supported accommodation have been mostly limited to living with family or paid support, within traditional

shared supported accommodation, or in residential aged care. A National Disability Insurance Scheme offers the promise of individualised funding for people with disability to have greater choice regarding models of assisted community living. Given this, a systematic literature review was undertaken to: 1) Describe the body of evidence and characteristics of models of supported accommodation for people with TBI internationally; and 2) Assess the effects of models for supported accommodation on outcomes of people with TBI.

**Method:** Titles and abstracts of literature identified were examined independently by two reviewers, with full text articles sought for those that met selection criteria or those unable to be excluded based on information available. Studies were categorized based on NHMRC levels of evidence.

**Results:** A range of models of supported accommodation were identified and will be outlined. However, there was limited evidence regarding the effects of these models on outcomes of people with TBI.

**Discussion:** There is an identified need for an evaluation framework to assess the impact of models of supported accommodation. This will offer people with TBI, their family and funding bodies knowledge regarding a broader range of options, and possible outcomes, within community living. Future directions for research in this area will be discussed.

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## Rehabilitation Case Management: A new model of service delivery supporting transition from hospital to home for people with traumatic brain injury

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<sup>3</sup>Faculty of Health Sciences, University of Sydney, Sydney, Australia

**Background and Aims:** The Brain Injury Rehabilitation Service (BIRS) developed a Rehabilitation Case Management (RCM) model. The aims of the model were to:

- Streamline transition from inpatient to community services
- Enhance consistency of communication with the client and all stakeholders in the client's rehabilitation
- Enhance discharge planning and timing

This presentation describes its implementation and presents key evaluation findings. These findings may assist other services considering the utility of RCM in their setting or expanding an existing case management role.

**Method:** The evaluation framework employed a participatory evaluation approach. Semi-structured interviews were conducted with BIRS clinicians, RCMs, consumers and external stakeholders. Interviews were conducted at four time points across the 12 month evaluation period: implementation, four months, eight months and twelve months. A total of 84 interviews were conducted over the study period. The data were descriptively organised then coded and subjected to interpretative analysis to identify the key issues.

**Results:** Benefits of the new model included supporting continuity of care and navigation of procedural requirements of funding bodies. Findings highlighted the need to consider staff capacity and role overlap as well as the importance of creating a shared vision to support the model. The model's sustainability

requires careful consideration of the distribution of case management workloads at times of high inpatient and community caseloads.

**Conclusion:** The RCM model is effective at meeting clients' needs particularly those arising from complexities in funding issues and navigating systems. The benefit for non-funded clients requires further investigation.

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## **A community-based participation-focused rehabilitation model of care after extremely severe traumatic brain injury: An alternative to institutionally-based impairment-focused slow stream rehabilitation**

Simpson, Grahame K.<sup>1,2</sup>; Gertler, Paul<sup>2,3</sup>; Lane-Brown, Amanda<sup>1,2</sup>; & Hodgkinson, Adeline<sup>1</sup>

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**B**ackground and Aims: For individuals classed as 'slow-to-recover' following extremely severe traumatic brain injury (TBI), rehabilitation has traditionally been impairment-focused and provided in an institutional environment. This approach, termed "slow stream rehabilitation", is similar to that employed with less impaired individuals except it is provided over a lengthier time period. This case report evaluates an alternative model focusing on community-based participation with an ongoing rehabilitative approach to care in a community setting, aiming to improve both function and participation.

**Method:** This retrospective review considers CP, an 18 year old male classed as 'slow-to-recover' following TBI. Treatment and outcomes are compared across two sequential service delivery models: impairment-focused, institutional rehabilitation followed by participation-focused, community-based rehabilitation. Outcomes measurements include functional status, level of required support and discharge destination. Pro-social and concerning behaviour was monitored during community-based rehabilitation.

**Results:** Improvement in CP's functional independence was statistically significant after both impairment- and participation-focused phases (RCI = 3.2 and 10.9 respectively); however, clinically significant functional improvement was only observed following the participation-focused phase. No change in required support was evident across either treatment. Following participation-focused, community-based rehabilitation, CP was discharged to a supported house in his area of origin. Behaviour monitoring demonstrated increased pro-social behaviour and decreased behaviours of concern over the community-based phase.

**Conclusions:** Clinically significant improvements were seen in functional independence, decreased activity limitations, reduced participation restriction and improved discharge destination following the participation-focused, community-based phase when compared to impairment-focused, institutional-based rehabilitation. Limitations and considerations for rehabilitation are discussed for individuals who are 'slow-to-recover' following TBI.

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## Systematic review of group therapy interventions in inpatient brain injury rehabilitation

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**Background and Aims:** Groups are a part of everyday life, both in health, and when disruptions/deviations to the life course occur as a result of disease or disability. Literature identifies several advantages to the use of group therapy interventions in rehabilitation including cost-effectiveness, opportunities where participants can learn about their own capabilities compared to others, and provision of supportive feedback while practising skills/strategies in 'real world' social and physical environments. This paper aims to review the literature evaluating the use of therapy groups in inpatient brain injury rehabilitation.

**Method:** A systematic review of the research literature on group therapy interventions in brain injury rehabilitation. Databases searched include; CINAHL, PsycInfo, Cochrane, PubMed, OT Seeker, Psychbite. Search terms include brain injury and group therapy/intervention. Inclusion criteria: 1) At least some of the participants had a diagnosis of a traumatic brain injury, 2) groups were conducted in an inpatient rehabilitation setting. Papers will be excluded if the groups are social support groups without a therapy focus. Results of studies will be collated.

**Results:** Methodological quality of retrieved articles that meet the inclusion criteria will be evaluated using PEDRO Scale for randomised-control trials and results tabulated.

**Discussion:** The evidence relating to the use of groups in inpatient brain injury rehabilitation will be summarised including a discussion of benefits and limitations. Recommendations will be made for further research.

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## Assessing the effect of facilitated access to a sex worker to remediate severe inappropriate sexual behaviour using a single-case experimental design

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<sup>2</sup>*Brain Injury Rehabilitation Unit, Liverpool Hospital, Sydney, Australia*

**Background and aims:** Inappropriate sexual behaviours (ISBs) such as sexualised talk and genital touching are consistently reported sequelae of ABI. Treatment of ISBs requires finding a balance between addressing sexual needs while also managing behavioural disturbance. There are conflicting anecdotal accounts of the treatment merits of access to sex workers, with some accounts suggesting that sexual activity increases ISBs while other accounts suggest that it reduces them. This intervention aimed to evaluate the relative effectiveness of facilitated access to a sex worker and environmental controls (such as redirection, prompting, and feedback) in managing ISBs in an adult male with ABI following cardiac arrest.

**Method:** The relative effectiveness of the two treatments was evaluated using a single-case experimental design. Treatments were compared using a BCBC reversal design, with frequency of ISBs as the primary measure. The intervention took place in naturalistic settings over a period totalling almost 7 months.

**Results:** The combination of environmental controls and facilitated access to a sex worker led to the extinction of ISBs, and these improvements were maintained at 1- and 2- year follow-ups. There is evidence that access to a sex worker lowered ISBs relative to environmental controls. Regarding acceptability of treatment, the client, his mother, and staff all provided very positive feedback.

**Conclusions:** The study provided empirical evidence that sex workers can contribute to successful treatment of ISBs post ABI. The use of a single-case experimental design helped provide experimental rigour to a sensitive treatment intervention under difficult clinical conditions requiring an immediate response.

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Session 12: Symposium - Socio-emotional dysfunction after severe TBI: Behavioural, cognitive and neural mechanisms

**Chair and Discussant:** Skye McDonald

### Sexual changes following traumatic brain injury

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**Background and Aim:** Limited research has focused on sexuality following Traumatic Brain Injury (TBI). This study aimed to examine self-reported changes in sexuality following TBI and explore the factors associated with these changes.

**Method:** Participants included 865 people with TBI (PTA days  $M = 27.6$ ,  $SD = 30.6$ ) and 142 healthy controls. Participants completed the Brain Injury Questionnaire of Sexuality (BIQS), Hospital and Anxiety and Depression Scale and Rosenberg Self-Esteem Scale

**Results:** Relative to controls, participants with TBI reported significantly more negative changes in Sexual Function, Relationships and Self-Esteem, and Mood on the BIQS, with more than half reporting a decline in these aspects of sexuality post-injury. These sexual changes were attributed to various causes, most commonly fatigue, low confidence, pain, decreased mobility and feeling unattractive. Being depressed, older in age, at shorter time post-injury and less independent in ADL significantly predicted poorer overall BIQS Sexuality scores, as well as the Sexual Functioning subscale score. Poorer Relationship Quality and Self Esteem scores on the BIQS were predicted by older age at injury, shorter time post-injury, higher depression, and lower self-esteem. Lower Mood was associated with shorter PTA duration, younger age, higher depression, lower self-esteem and being on antidepressants.

**Conclusions:** Therapeutic interventions for sexuality need to focus on depression and self-esteem, and address specific barriers to social participation and opportunities for sexual contact in individuals who are less independent in daily activities.

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## Sensitivity to facial and body feedback on emotions following severe traumatic brain injury

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**Background and Aim:** Although many with severe traumatic brain injury self-report deficits in empathy, the mechanisms for this are yet to be determined. In this study we were interested to explore one possible mechanism, that is, a lack of sensitivity or awareness of emotional changes that occur in one's self, which might otherwise facilitate an empathic understanding. We evaluated whether adults with severe TBI were sensitive to cues from body and facial gestures associated with particular emotional states.

**Method:** Twenty four adults (18 male: age  $M = 46.5$ ,  $SD = 13$ ) with severe TBI (PTA:  $M = 84.1$ ,  $SD = 56.6$  days) and 28 demographically matched control participants (16 male: age  $M = 41.5$ ,  $SD = 14.3$ ) were given specific, neutral (i.e. no mention of emotion) instructions to adopt facial expressions and body postures that were consistent with either a neutral (baseline) or emotional state (anger, sadness, happiness). They were required to maintain these positions for 10 seconds. After each expression/posture manipulation, they rated their subjective emotional state, i.e. how cheerful, sad or irritated they felt.

**Results:** The TBI participants were globally less responsive to the effects of body and facial feedback than control participants. They also showed differential impairment in their responsiveness to negative expressions relative to happy. In contrast, control participants were responsive to all (happy, angry, and sad) expression/posture manipulations.

**Conclusion:** TBI appears to impair the ability to recognise both the physical configuration of a negative emotion and its associated subjective feeling.

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## Autonomic and morphological changes contribute to arousal disturbance in TBI

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**Background and Aims:** Loss of emotional responsivity, i.e., reduced facial mimicry and autonomic arousal to facial expressions, have been reported to be associated with emotional empathy following TBI. To date, however no comparisons have been made between changes in brain morphometry and loss of empathy. The current study aimed to determine whether a relationship is evident between brain regions implicated in emotion processing and changes to arousal regulation and empathic ability.

**Method:** Sixteen adults (12 males; 38 years) with severe TBI (Mean PTA = 81 days;  $\geq 5$  years post injury) and 16 matched controls (12 males; 46 years) participated. We compared grey matter volume in whole brain, bilateral amygdala and thalamus, with resting arousal (measured by mean skin conductance level (SCL)) and cognitive and emotional empathy scores derived from the Interpersonal Reactivity Index (IRI; Davis, 1980, 1983).

**Results:** Reduced grey matter volume was found in several structures in TBI, with the largest found in the right amygdala ( $p < 0.01$ ). TBI participants had lower resting arousal ( $p < 0.01$ ) and cognitive empathy ( $p < 0.01$ ), but

higher emotional empathy ( $p < 0.001$ ). Amygdala volume was correlated with SCL (right,  $p < 0.001$ ) lower cognitive empathy. It was also associated with greater self-reported emotional empathy (right,  $p < 0.01$ ). Correlations were also found between thalamus volume and cognitive empathy (left,  $p < 0.05$ ; right,  $p < 0.01$ ).

**Conclusions:** Overall, the present study shows that amygdala reduction after TBI leads to deficits in the regulation of physiological arousal and empathy.

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## The contribution of executive function to theory of mind and speech comprehension deficits following TBI

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**Background and Aims:** Theory of mind (TOM) is critical to effective communication in individuals with traumatic brain injury (TBI). TOM abilities are mediated by frontal brain structures that also mediate executive functioning. There is much debate in the research literature, however, about whether TOM is dependent on executive function or not. The issue is complicated by the fact that many TOM tasks use complex stories requiring a significant capacity to understand. This study aimed to determine whether TOM is dependent on executive function or whether these abilities are, in fact, modular.

**Method:** Twenty-four individuals with severe TBI (18 males; mean age: 47.5 ± 12.3 years), recruited from Sydney brain injury units, and 24 match controls participated in the study. Videotaped vignette segments were used across four conditions containing both low and high TOM tasks. These conditions included: (1) low cognitive load; (2) high flexibility load, (3) high working memory load, (4) high inhibition load.

**Results:** Individuals with TBI were more impaired than controls in high TOM tasks. Significant group differences remained even after controlling for working memory load. In contrast, poor performance on TOM appeared to be fully accounted for by poor inhibitory control. This indicates that whereas TOM may not be dependent on working memory demands, it may be dependent on inhibition demands. No group differences were found for the flexibility tasks.

**Conclusions:** The results indicate that TOM does not uniquely contribute to communication comprehension ability, and that TOM ability is selectively dependent on inhibition demands, in individuals with TBI.

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## Cognitive and Neural Substrates of Socially Maladaptive Behaviours in Adolescents with Traumatic Brain Injury

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**Background and Aim:** Many of the brain regions associated with social moral reasoning involve neural circuits of the frontal lobe, which are

particularly vulnerable to the effects of traumatic brain injury (TBI). Despite the potential for disruption of these circuits following TBI, little attention has focused on the presence of moral reasoning deficits in this population. In patients with such lesions, moral decision making has been described as 'concrete, erratically rule-based and formulated primarily around their own needs', reflecting a developmentally immature level of functioning. The overall objective of this project was to identify and quantify the behavioural indices of moral reasoning functions post-TBI and to investigate the neural correlates of such behaviour in adolescents.

**Method:** Adolescents who had sustained a moderate to severe paediatric TBI between 1 and 4 years ago were asked to make social decisions with and without moral content during functional magnetic resonance (fMRI) imaging. The novel event related fMRI paradigm is a modification on the Socio-Moral Reasoning Aptitude Level (So-Moral) behavioural task and consists of visual social scenes in the first person perspective. The participant responses, reaction times and functional imaging data was compared to a group of typically developing age matched controls.

**Results:** Patients with TBI made significantly more impaired moral judgments compared to controls ( $p < 0.05$ ). Imaging analyses using SPM8 revealed a network of brain areas of activation when making moral decisions that included a large prominent cluster in the superior medial prefrontal region extending just to the anterior cingulate, and significant clusters in the left orbitofrontal, the left temporoparietal junction, and left amygdala.

**Conclusions:** There is a network of brain regions involved in moral reasoning in adolescents and damage to the prefrontal cortex is especially important when deciding on personal actions within sociomoral situations.

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## Session 13: Symposium - Psychosocial outcomes for young people with childhood TBI

**Chair and Discussant:** Celia Godfrey

### Predictors of long-term social and psychological outcomes following childhood traumatic brain injury.

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**Objective:** Childhood traumatic brain injury (TBI) is one of the most common causes of mortality and impairments in children and adolescents. Since the brain is rapidly developing during childhood and adolescence, it is known that a disruption by an injury, impacts on the development of neuropsychological, social and psychological functioning. Impairments of these skills are found to be linked with long-term problems with interpersonal relationships, participation in leisure and social activities, and employment status. The aim of this study is to investigate social and psychological outcomes 15 years post injury and their predictors.

**Method:** 40 TBI participants and 20 healthy controls (mean age 21.3 years, 27 male) were recruited from a larger longitudinal study. Information about social and psychological functioning was collected via questionnaires and a structural clinical interview at 15 years post-injury.

**Results:** Participants with TBI have significantly more psychological symptoms and impaired social adjustment ( $p < 0.05$ ) than their healthy peers 15 years following injury. TBI survivors were found to score lower on social functioning, especially in communication, and higher on psychological symptoms as depression, anxiety and aggression. Cognitive and environmental factors at the time of injury were found to predict low social adjustment and high psychological symptoms.

**Conclusion:** Findings suggest that adolescents and young adults, whom survived a childhood TBI are more at risk of developing social and psychological problems following their transition into adulthood, especially those with cognitive and environmental risk factors. This may lead to a compromise in their quality of life and wellbeing as an adult.

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## Early stress and psychiatric symptomatology in young adults post-childhood TBI

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**Background and Aims:** This study investigated long-term psychiatric outcomes in young adults who sustained a traumatic brain injury (TBI) in childhood (ages 2 to 7). Due to their high prevalence in this age group, depression, anxiety and substance use were assessed.

**Method:** Fifty-two participants (36 post-TBI young adults and 17 controls) agreed to participate, having been followed prospectively since recruitment at the time of their injury. Diagnoses were made using the Structured Clinical Interview for DSM Diagnoses (SCID). Additionally, the Achenbach System of Empirically Based Assessment (ASEBA) questionnaire was administered. Pre-injury and early post-injury indices of early stress, and injury severity variables, were used to explore potential symptomatology predictors.

**Results:** analyses suggested the proportion of individuals with a diagnosis of depression, anxiety and/or substance use (subthreshold or clinical) was higher in post-TBI individuals compared to the control group. Depression and anxiety ASEBA scores were higher for the TBI group compared to the controls, while no significant differences were observed on substance use scales. No significant associations were found between the symptomatology observed and early stress, with the exception of between alcohol use and family burden of injury, measured 12 months following the TBI.

**Conclusions:** This study contributes to our understanding of the long-term sequelae of childhood TBI. However, the search continues for psychosocial predictors which may be amenable for early intervention, with the aim of improving outcomes of childhood TBI.

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## Predictors of emotion perception skills and their relationship to social communication and socio-emotional adjustment in young adult survivors of paediatric TBI.

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**B**ackground and Aims: Emotion perception skills form an integral part of social communication and are critical to attain developmentally appropriate goals.

**Method:** In a sample of 34 young adult survivors of paediatric traumatic brain injury (injury age: 1.0-7.0 years; *M* time since injury: 15.0 years), the present study aimed to investigate predictors of emotion perception skills and their relation to social communication competence and socio-emotional adjustment rated by close-other proxies.

**Results:** Children with severe TBI exhibited significantly poorer emotion perception accuracy than controls and peers with mild to moderate injuries. Further, poorer emotion perception accuracy was linked to reduced integrity of the posterior corpus callosum, lower family socio-economic status (SES) and a less intimate family environment. Compared to controls the TBI group had significantly more frequent social communication difficulties, which were associated with poorer socio-emotional adjustment. A higher frequency of social communication difficulty was also linked to poorer emotion perception accuracy, indicating that reduced social communication competence mediated the significant relationship between reduced emotion perception accuracy and socio-emotional maladjustment.

**Conclusions:** Our findings indicate that socio-cognitive impairments may indirectly increase risk for externalizing difficulties among TBI survivors and underscore the need for context-sensitive rehabilitation that optimizes early family environments to enhance recovery of emotion perception skills after child TBI.

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## The Prevalence of Subsyndromal Post-Traumatic Stress Disorder (PTSD) and its Impact on Attentional Functioning in Children Post Traumatic Brain Injury (TBI)

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**B**ackground and Aims: Taken separately, both TBI and PTSD are known to affect attentional functioning in children, but relatively little is known about what happens to attention when they co-occur. Furthermore, there is a growing body of research that indicates children exposed to trauma may manifest significant functional impairment, even if they do not meet the full diagnostic criteria for PTSD. The aims of the current study were to determine the influence of injury severity on the prevalence of subsyndromal PTSD post paediatric TBI and examine if the presence of subsyndromal PTSD increases the prevalence of attentional impairments.

**Method:** A total of 95 children between the ages of 6-14 with TBI were assessed 6 months post-injury. PTSD was measured using the CAPS-CA, whilst the digit span forward subtest of the WISC-IV, the Contingency Naming Test and subtests of the Test of Everyday Attention for Children were employed to assess domains of attentional functioning.

**Results:** Findings revealed comparable rates of subsyndromal PTSD across TBI groups. Children with dual subsyndromal PTSD/TBI performed comparably to children with TBI only on all attentional domains except shifting attention. In contrast, children who meet the re-experiencing symptom cluster performed significantly worse on a number of domains of attention and displayed greater rates of impairment when compared to children with TBI only.

**Conclusions:** Fulfilling the requirements for the re-experiencing cluster of PTSD increases the risk of functional impairment post pediatric TBI. The clinical relevance of this is an important one to consider in children exposed to trauma.

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## Session 14: Cognitive

### Assessments of disorders of consciousness: findings of a review of the literature using systematic methods

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**Background and Aims:** Responsiveness is the sensitivity of a measure to detect true changes occurring over time, beyond random fluctuations or error inherent in a test score. This review aimed to summarise available evidence for responsiveness of six key instruments used with patients with disorders of consciousness: Coma Recovery Scale-Revised (CRS-R), Disorders Of Consciousness Scale (DOCS), Sensory Stimulation Assessment Measure (SSAM), Sensory Modality Assessment and Rehabilitation Technique (SMART), West-Head Injury Matrix (WHIM), and the Western Neuro Sensory Stimulation Profile (WNSSP).

**Method:** A systematic search strategy was employed to search five electronic databases. Relevant literature was selected according to specific inclusion criteria and information about responsiveness was extracted. Where data was available in the included studies, Cohen's *d* was calculated to further establish responsiveness.

**Results:** Database searches using key terms initially yielded 132 articles. Following review for inclusion 26 articles were identified. No studies were specifically designed to investigate responsiveness of any of the measures and therefore responsiveness data was either based on statistical significance of change post treatment or descriptive analysis of change scores. The majority of studies identified used the CRS-R (*n* = 11), WHIM (*n* = 5) and WNSSP (*n* = 7) and have established high responsiveness to change. There is some preliminary evidence for the responsiveness of the other measures based on very few available studies: DOCS (*n* = 2), SSAM (*n* = 1) or SMART (*n* = 2).

**Conclusion:** Future studies should seek to include responsiveness analysis, particularly in relation to the DOCS, SSAM, and SMART.

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## Assessing the end of post-traumatic amnesia from an executive attention paradigm

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**Background and Aim:** Attention is implicated as the primary deficit of post-traumatic amnesia (PTA) by historical accounts and recent research. Paradoxically, attention is not directly assessed by the commonly used Westmead PTA Scale (WPTAS). Tentative validation was provided by Tate et al. (2006) who found few improvements in a limited subset of attention tasks by severely brain-injured patients between the first 12/12 score and the final of three consecutive 12/12 scores on the WPTAS. The aim of the current study was to examine the end stage of PTA as measured by the WPTAS against a broader array of executive attention tasks.

**Method:** Fifteen participants (M:F 8:7, aged  $34 \pm 15$  years [range: 18-63 years]) with predominately moderate-severe brain injury were assessed on information processing, verbal fluency, updating, inhibition/selective attention and switching tasks. Participants were assessed on the first 12/12 score on the WPTAS and the final of three consecutive 12/12 scores. Practice effects of testing were considered against 15 demographically matched controls assessed between equivalent intervals.

**Results:** Repeated-measures ANOVA found only speed of processing to significantly improve as PTA resolved over and above the practice effect of a control group (between-within interaction  $F(1,28) = 5.78, p = 0.023$ ). However, no significant improvement over a control group was noted for any other more complex measure of attention or executive functioning.

**Conclusion:** The lack of a broader improvement in executive attention abilities suggests that patients have likely emerged from PTA by the first 12/12 score on the WPTAS.

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## The Addenbrooke's Cognitive Examination-Revised: its utility within a traumatic brain injury rehabilitation service

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**Background and Aims:** The Addenbrooke's Cognitive Examination-Revised (ACE-R) is a popular screening tool in dementia. Its utility in traumatic brain injury (TBI) populations has had limited research, despite the location of fronto-temporal pathology. Findings of the use of the ACE-R in a rehabilitation service that treats clients with complex-mild to extremely-severe TBI are presented.

**Methods:** ACE-R scores since 2008 were extracted from a database. Mini-Mental State Examination (MMSE) scores were extracted and compared to ACE-R scores. ACE-R domain scores were examined for the effect on the variance of the total score.

**Results:** 200 working-aged TBI clients (mean age = 37.7; SD = 14.1) were administered the ACE-R. Mean score = 86.5/100 (SD = 10.9); median = 89/100 (interquartile range = 81-94). Sixteen clients (8%) scored  $\geq 98$ , while

70 (35%) scored 30 on the MMSE. ACE-R scores ranged from 75-100/100 in clients scoring  $\geq 29$  on MMSE. Ceiling effects were found in the MMSE and some domains (Attention/Orientation and Visuospatial). Total ACE-R scores correlated strongly with domains of Memory ( $r = 0.83$ ), Language ( $r = 0.81$ ), and Verbal Fluency ( $r = 0.78$ ). Time from injury to testing was weakly correlated with ACE-R score, while age showed no correlation.

**Conclusions:** The ACE-R does not suffer from ceiling effects like the MMSE, but some domains (Attention/Orientation; Visuospatial) contribute little to the total. An abbreviated version of the ACE-R using Memory and Verbal Fluency would yield similar results within this population, thereby allowing time to target other important areas of cognitive function, such as judgment, divided attention, and working memory.

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## Development of a Novel Task for Assessing Decision Making in Social Situations following Traumatic Brain Injury

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**Background:** Decision making is an important part of our everyday lives and is often impaired after a severe traumatic brain injury (TBI). A novel task was developed to allow the assessment of decision making within a social context.

**Methods:** Participants with a TBI ( $N = 26$ ) were compared to healthy control participants ( $N = 25$ ) on the Social Decision Making Task (SDMT) which required the participant to learn who the 'friendly' players were in a game of toss. Participants also completed a non-social decision making task, the Iowa Gambling Task (IGT) as well as a battery of neuropsychological and social cognition tasks. Current social functioning was also examined.

**Results:** Consistent with predictions, the TBI group made poorer decisions on the SDMT when compared with the control group; however, group differences were not evident on the IGT. A significant relationship was observed between the SDMT and 'drive' and 'reversal learning', as well as a trend for an association with 'theory of mind'. Performance on the SDMT and the IGT were *not* associated, suggesting that the two tasks measure different constructs.

**Conclusions:** The SDMT offers a promising new way of examining decision making within a social context following TBI. Drive and reversal learning, that is, initiating responses and appropriately redirecting behaviour appear important for performance on the SDMT. Findings here suggest that the IGT is not measuring the same construct as the SDMT, and indeed, we were not able to support previous studies suggesting group differences on the IGT.

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## Measurement of strategy use following memory group intervention for people with mild cognitive impairment

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**Background and Aims:** Older people demonstrating mild memory difficulties (mild cognitive impairment or MCI) seek guidance about how to manage everyday memory challenges. As an alternative approach to ‘brain training’, we evaluated a six-week intervention (the LaTCH Memory Group Program) which provides knowledge about memory strategies and how to use such strategies in everyday activities. This presentation will focus on the measurement of self-report of strategy use outcomes.

**Method:** 219 older adults, diagnosed with MCI or age-matched healthy older adults (HOA), were randomly allocated to early or late intervention in a randomized trial. Trained neuropsychologists delivered the program via 40 memory groups through Victoria. The Multifactorial Memory Questionnaire (MMQ) assessed use of external and internal strategies.

**Results:** Following intervention, and co-varying for pre-intervention performance, both groups significantly improved in internal strategies (HOA  $\eta^2 = .21$ , MCI  $\eta^2 = .09$ ) but only the HOA significantly improved in external strategies (HOA  $\eta^2 = .09$ , MCI  $\eta^2 = .02$ ). This was surprising, and a further item-by-item scale analysis identified specific strategies that were responsive to intervention.

**Conclusions:** Measurement of strategy use in everyday situations may not easily be represented as an internal or external strategy.

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## Re-picturing Brain Injury: Multimodal Neuroimaging Narrows the Gap between Functional and Organic Amnesia

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**Background:** Stress and traumatic experiences could lead to various memory disturbances, including amnesia. Functional amnesia has traditionally been regarded as the opposite of “organic” amnesia. The interchangeable use of the terms psychogenic, dissociative and functional amnesia has implicitly acknowledged that a substantial number of functional amnesias have a psychological basis.

**Methods:** We analysed data from over a dozen patients (age range 23 to 54 years) with functional (dissociative) amnesia, whom we investigated with neuropsychological methods, structural brain imaging (computer tomography, magnetic resonance imaging, diffusion tensor imaging [DTI]) and functional neuroimaging (glucose positron emission tomography, single photon emission computed tomography, functional magnetic resonance imaging). We compared their data with findings from well matched healthy controls.

**Results:** We evidenced in a substantial sample of patients with functional (dissociative) amnesia with preponderant retrograde memory impairments a hypometabolism during resting state in the right temporo-frontal region, with a decrease in the infero-lateral prefrontal cortex. Standard conventional

structural neuroimaging (MRI, CT) yielded no significant abnormalities. In patients with functional (dissociative) anterograde amnesia we found functional changes (decreased glucose metabolism) in the medial temporal lobe/hippocampal formation. Additional preliminary data from DTI have suggested a decreased integrity of long distance fiber tracts important for conscious mnemonic processing.

**Discussion:** The hypometabolism in the right infero-lateral prefrontal cortex observed in patients with functional (dissociative) amnesia with pronounced retrograde memory impairments in episodic-autobiographical domain suggests that a malfunction of this area (that might be stress hormones mediated) contributes to the retrieval deficit in these patients. Findings from patients with overt brain damage as well as from normal individuals point to the fact that this area might be crucially involved in triggering episodic-autobiographical memory retrieval, by synchronizing emotional and factual components of the personal past linked to the self. The functional changes seen in patients with anterograde functional (dissociative) amnesia are in conformity with data emphasizing the role of hippocampal formation in the acquisition of memories for long term storage. Preliminary data from DTI suggest that the abnormalities of functional connectivity observed in patients with functional amnesia might be underlain by microstructural alterations of fiber tracts involved in mnemonic processing (amnesia as disconnection syndrome). Functional and organic amnesia might therefore be two sides of the same coin and the gap that we still perceive between them might just be the reflection of technological limitations. This gap will likely be reduced by conducting larger scale studies that use combined neuroimaging techniques and increased methodological rigor.

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## The use of Statistical Process Control (SPC) for describing patterns of improvement at an early stage after Acquired Brain Injury (ABI). A Pilot Study

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**Background and Aims:** There is a scientific and clinical gap of knowledge in how to evaluate and streamline the process of cognitive rehabilitation at the early stage after ABI due to variability of individual recovery. SPC is used for its susceptibility to variations in a process. The main objective is to evaluate the feasibility of SPC as a proactive method for describing patterns of improvement.

**Method:** The study is methodological, analysing the process of recovery after ABI (n = 18) within four months post-injury. The patients received 20 hours of attention training, either intensive area specific or general activity based. They submitted assessment with Paced Auditory Serial Addition Test (PASAT), slow and fast version, pre-, post-, and continuously during intervention program, in all 8 measuring points. SPC control charts, Sigma Zone SPC XL, were used to explore statistical control limits and variability in improvement.

**Results:** Line graphs on a personal level showed patterns of improvement variability between measuring points in time. Intensive area specific training showed steady improvement on PASAT, both versions. General activity based training showed improvement though more variable. SPC methodology

enabled correction for inter-group differences, allowing for a more transparent comparison of progress data, including the influence of external factors.

**Conclusions:** This clinical trial is part of efforts to intensify research of specific evidence-based cognitive rehabilitation already at an early stage after ABI. SPC allows a closer insight in the intervention process thus enabling a more calibrated individual rehabilitation program and aiming at healthcare quality improvement.

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## Limitations in the Clinical Application of the Reliable Change Index (RCI)

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**Background and Aims:** Determining if cognitive function in an individual with acquired brain injury (ABI) has either deteriorated as a result of disease progression or improved as a consequence of recovery or therapeutic intervention is a crucial aspect of clinical practice. The Reliable Change Index (RCI) provides an empirical means of establishing if changes in test scores reflect true change or merely measurement error. Limitations of the RCI that constrain its applicability in clinical practice will be examined in this presentation.

**Method:** Shortcomings of the RCI are discussed first in terms of inherent limitations in its formulation, second in terms of characteristics of the natural recovery/disease progression in ABI.

**Results:** First, there are several formulations of the RCI, each reflecting different theoretical underpinnings. Second, many RCI calculations require parameters that are not readily available (if at all) for many standardised tests. Third, RCI is generally not sensitive to small, but nonetheless real changes in test scores, such as when severity of cognitive impairment associated with ABI is relatively mild. Fourth, when rate of recovery or progression of disease is indolent, real changes in performance over prolonged time periods may be deemed to be unreliable according to the RCI. The limitations of the RCI outlined above will be discussed and demonstrated with actual clinical data.

**Conclusions:** Although a valuable tool for determining the authenticity change in cognitive function, clinicians should not rely on the RCI as the sole means of determining how their patients are progressing over time.

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Session 15: Plenary 3

## Evidence on measurement in neurological rehabilitation

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**T**here are hundreds, or even thousands, of published tools that purport to measure something that is or might be of relevant clinically and/or in research within the field of neurological rehabilitation. In part this arises because there are hundreds of disorders and clinicians and researchers always

want tools that are specific to the disease they are concerned with. In part it arises because people are unaware of existing tools, and so devise a new one to meet their need. In part it arises because individual clinicians or researchers are convinced that their measure will inevitably be better.

However the novice researcher or clinician is faced with a huge challenge: how do they find and choose the tools most appropriate for their circumstances?

This talk will consider both from first principles and from published evidence (where it exists) how to find and choose a measure. Questions that may be considered (this abstract is written 6 months before the talk!) include:

- Is there evidence to suggest when disease specific measures must be used in preference to generic measures?
- Is there evidence to suggest that longer, more detailed measures actually add sufficient information to warrant their expense in terms of time and effort?
- Is their evidence that concerns about the weighting of items (e.g. Rasch analysis) is actually justified?

I specifically am likely to consider the evidence for the proposition that the Functional Independence Measure (FIM) is 'better than' the Barthel ADL index, and to conclude that there is considerable evidence that the FIM is actually no better than the Barthel, and hence should not be used routinely, either in clinical practice or in research (where it is not used much).

I hope to challenge other widely accepted assumptions and beliefs, using evidence where it is available. This talk will not give you a series of specific measures, but it should allow you to consider critically what is being measured and how well.

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## Assessing clinical change: the ideographic approach meets evidence-based medicine

Tate, Robyn L.<sup>1</sup>

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**K**evin Walsh, the founding father of the Australasian Society for the Study of Brain Impairment, described similarities between the individualised, hypothesis-testing approach to neuropsychology and the tradition of the experimental investigation of the single case, as exemplified in Shapiro's (1951) early work. The latter methodology has endured as a means to evaluate clinical change in patients in response to treatment. Yet, in the field of neurorehabilitation, it is questionable whether evaluation of clinical change in response to treatment is routinely conducted. This address explores the role of goal setting within the context of evaluating clinical change and presents a model to assess treatment effect (MATE) as a way to enhance delivery of clinical services within an evidence-based framework.

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## POSTER PRESENTATIONS

**1. External contexts that support productive engagement of people with dual diagnosis: spinal cord injury and traumatic brain injury**

Boyle, Claire L<sup>1,2,3</sup>; Nott, Melissa T.<sup>1,4</sup>; Ranka, Judy<sup>3</sup>; Heriseanu, Roxana<sup>2</sup>; Weber, Gerard<sup>2</sup>; Middleton, James W.<sup>5,6</sup>; & Baguley, Ian J.<sup>1,5</sup>

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<sup>6</sup>NSW Statewide Spinal Cord Injury Service

**Background and Aims:** To identify the critical external contexts for supporting the productive engagement of people with a dual diagnosis (DDx) of spinal cord injury (SCI) and traumatic brain injury (TBI).

**Method:** Structured interviews were conducted with 30 participants who had a DDx. Productive engagement was determined using the Vocational Questionnaire. The physical, sensory, social and cultural contexts as experienced by participants were measured using the Craig Hospital Inventory of Environmental Factors and the Sydney Psychosocial Reintegration Survey. Correlation analysis was conducted to identify relationships between the four external contexts and productive engagement.

**Results:** At the time of interview 19 participants were productively engaged, either in work, volunteering, study or home-making. There were no statistically significant differences between the participants who were/weren't productively engaged in terms of injury or rehabilitation variables. A positive correlation was found between the social context and productive engagement. No correlation was found between the physical, sensory or cultural contexts and productive engagement. Participants who were productively engaged identified their own personal motivation as the primary facilitator of that engagement.

**Conclusion:** The results of this study suggest that strengthening the social supports and community integration (i.e. the social context) of a person with a DDx and/or the use of motivational interviewing techniques may enhance their ability to engage in productive occupations and subsequently report more skills and abilities in this area.

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**2. Interpreting the Negative Impression Management Index of the Personality Assessment Inventory in a case of acquired brain injury**

Cashion, Larry<sup>1</sup>

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**Background and Aims:** The Personality Assessment Inventory (PAI) is an instrument to measure constructs related to psychopathology. As with many psychometric measures of personality dysfunction and psychopathology, the PAI contains scales for detecting inconsistent and extreme reporting of presenting features. The current case is an adult female with an acquired brain injury, who scored in the clinically significant range for the PAI response indices of Negative Impression Management and Rogers Discriminant Function during psychological assessment. She also recorded clinically significant scores on multiple psychopathology scales of the PAI.

**Method:** The PAI was administered in conjunction with the Peabody Picture Vocabulary Test – 3rd Edition as part of a forensic assessment of parenting capacity.

**Results:** High elevations across scales were observed. The elevations in impression management could prima facie be considered as rendering the PAI results unreliable.

**Conclusions:** While the PAI manual cautions that the response index scores were likely to invalidate the PAI scales, a review of the client's presentation demonstrated that she indeed genuinely experienced the problems reported in the assessment. Given that little research has been conducted into the effect of acquired brain injury on PAI response index scores, it is argued that clinicians need to be careful not to blindly accept such indices are representative of impression management in cases of brain injury.

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### **3. The interaction between self awareness and time since injury on motivation and emotional distress.**

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Cotter, Rachel<sup>1</sup>; & Kangas, Maria<sup>1</sup>

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**Background and Aims:** Impaired self-awareness, emotional distress and motivational deficits are commonly reported following traumatic brain injury (TBI), providing ongoing challenges to patients, family and clinicians in the context of rehabilitation. There is increasing interest of the influence of impaired awareness on emotional distress and motivation and the interaction between these; however, there is a paucity of research examining the interaction between these factors. The main objective of this study was to explore the relationship between self-awareness and time since injury on emotional distress and motivation levels in individuals following TBI.

**Method:** Self-awareness was assessed by comparing the reports of persons with brain injury to the reports of their treating clinicians and significant others. Thirty five participants with TBI were administered a self-report survey which included measures indexing participants' self-awareness, depression, anxiety, stress, motivation and perceived quality of life.

**Results:** Participants were divided into two self-awareness (i.e., impaired and good awareness) and recovery groups (i.e., acute:  $\leq 12$  months; and post-acute:  $> 12$  months). Analyses of variance indicated that individuals who were in the good awareness group (irrespective of time since injury) were two times as likely to report lower general motivation and higher anxiety and depression levels. Further, individuals in the 'impaired awareness' group reported lower levels of anger and depression than individuals in the 'good awareness' group.

**Conclusions:** These results indicate the importance of assessing an individual's self-awareness, emotional distress and motivation levels to assist in treatment planning. By applying a more holistic assessment, clinicians will be better placed to undertake a formulation of the client's presentation.

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#### 4. Bounded Friendship: The paid carers' experience of working with individuals with severe aphasia

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<sup>2</sup>School of Human Communication Sciences, Faculty of Health Sciences, La Trobe University, Melbourne, Australia

**Background and Aims:** Increasingly healthcare delivery in Australia for individuals with chronic disabilities following acquired brain injury is conducted via paid carers under the guidance of allied health professionals. Yet, there is limited understanding of the paid carer's perspective of working with individuals with severe communication impairment as it is not represented in the literature. The purpose of this inquiry was to understand the process of working with an individual with severe aphasia from the perspective of the paid carer.

**Methods:** A Constructivist Grounded Theory approach was adopted for the inquiry. Multiple, intensive, unstructured interviews were conducted with eleven paid carers over a period of prolonged engagement.

**Results:** Establishing and maintaining a bounded friendship was the fundamental social process identified by paid carers as their greatest concern when working with an individual with severe aphasia. Bounded friendship contained the key experiences of getting set-up, getting in, getting to know you, knowing you inside and out, going downhill, getting back, and going away. Critical to the bounded friendship was the influence of particular carer characteristics, mediated via nonverbal communication, on the relationship process over time.

**Conclusions:** The framework that emerged from the inquiry suggested numerous clinical implications for supporting paid carers in their work with individuals with severe communication impairment

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#### 5. Measuring change in the community. What's relevant, and for whom?

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**Background and Aims:** Community based speech therapy with a client who has chronic Wernicke's Aphasia and severe cognitive impairments can legitimately target a range of areas and expect a degree of change. The question remains however what therapy stream/s lead to change that the client and/or family deem functional/significant. In an attempt to answer this, and in an attempt to deliver efficacious service within a resource-restricted setting, a concurrent therapy stream approach was trialled. This approach focused therapy at the body-structure and functions, activity, and participation components as per the ICF. Analysis of the changes measured and critical observations within each of the different streams of therapy will be discussed both in isolation and in relation to each other within the context of what denotes functional change to the client and/or his family (primary carers).

**Method:** Over a six month period three concurrent therapy streams consisting of communication partner training, impairment based language therapy, and supported community participation were measured using The Adapted Kagan Scales, quantitative and qualitative measures, and goal based achievements.

**Results:** Currently ongoing. Due for completion April 2013.

**Conclusions:** As this study is currently in progress it is hypothesised that all three therapy streams will assist the client and his family to live with his communication impairment. It is however expected that communication partner training and participation based therapy that focuses on increasing the client's independence in key community activities will lead to the greatest functional change as deemed by the family and client.

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## 6. Evaluating efficacy and client perceptions of a Concussion Clinic

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**Introduction:** Mild head injuries represent 80% of all sustained head injuries. 20% of these report persisting symptoms at 6 months post injury and beyond. The South Australian Brain Injury Rehabilitation Service (SA BIRS) Concussion Clinic aims to provide early reassurance, education and screening to prevent or manage ongoing issues.

**Methods:** This research was undertaken in two stages. Firstly, demographic data related to age, gender, initial diagnosis, mechanism of injury, and the involvement of alcohol in the injury of all those referred to the Concussion Clinic was analysed. The second part of the research investigated efficacy of interventions provided by Concussion Clinic staff. The usefulness of the education and strategies provided as part of the intervention was evaluated by using Goal Attainment Scaling to set client specific goals, which were reviewed after 4 weeks to measure improvement. These same participants completed a service satisfaction questionnaire to determine their perceptions concerning the outpatient facility and the overall performance of treating clinicians.

**Results:** Demographic data indicated that people referred to the Concussion Clinic were predominately young males who sustained their injury while intoxicated. Client specific goals as measured by GAS demonstrated positive outcomes for most participants and satisfaction with the service was high.

**Discussion:** Early evaluation of the SA BIRS Concussion Clinic has indicated that it is feasible to provide intervention to individuals who have sustained mild TBI and that the outcomes support ongoing provision of this new service.

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## 7. The pretend play ability of children with an acquired brain injury: functional implications

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**Background and Aims:** Playing is one way that young children engage with their peers and participate in daily life within and without the home. When young children suffer an acquired brain injury they experience changes in their motor and social-cognitive skills but little is known about the pretend play ability of children with an acquired brain injury. This study aimed to investigate pretend play ability in children aged 3 to 7 years who had an acquired brain injury.

**Method:** 26 children aged between 3 and 7 years who had an acquired brain injury were assessed in the pretend play ability using the Child-Initiated Pretend Play Assessment.

**Results:** A wide range of pretend play ability was found from above normal range to significantly delayed. Over half of the children in the sample had most difficulty with more abstract, symbolic play than conventional imaginative play. Children who could not complete the assessment showed repetitive play at a younger level of play than their age. Children had most difficulty finishing the time of the assessment.

**Conclusions:** A pretend play assessment is a functional assessment of a child's skills. Engaging in pretend play uses many areas of the brain and is a complex skill. While there was a wide variety of play ability found, ability to play symbolically and for an extended period of time suggest difficulty with abstract thought and cognitive fatigue for this paediatric sample.

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## 8. The Self-Perceptions in Rehabilitation Questionnaire: Monitoring Clients' Self-Perceptions, Motivation, and Emotional Reactions Related to Therapy

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<sup>5</sup>Royal Rehabilitation Centre, Sydney, Australia.

**Background and Aims:** Following a traumatic brain injury a person's motivation for therapy and emotional adjustment to their new circumstances can be influenced by their self-perceptions of the everyday consequences of their injury. The Self-Perceptions in Rehabilitation Questionnaire (SPIRQ) is a brief measure that was developed to monitor emotional reactions, motivation, and self-perception throughout rehabilitation. The aim of this study was to describe the development and preliminary psychometric evaluation of the SPIRQ.

**Method:** 105 adults with traumatic brain injury (79% male) attending occupational therapy sessions at one of two brain injury rehabilitation units completed the SPIRQ. The SPIRQ was completed twice over a 5-7 day interval by a subset ( $n = 33$ ) to examine test-retest reliability.

**Results:** Three factors, Changes in Self and Life Plans, Self in Rehabilitation, and Emotional Reactions were yielded by exploratory factor analysis. Internal consistency of the three factor derived SPIRQ scales was sound ( $\alpha = .72-.83$ ). Test-retest reliability was generally acceptable ( $r = .67-.81$ ) and scores did not significantly change between testing occasions ( $p > .05$ ).

**Conclusions:** Preliminary support for the reliability and construct validity of three scales of the SPIRQ has been provided. Further empirical evaluation and potential clinical applications of the SPIRQ in occupational therapy are discussed.

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## 9. Understanding and assessing positive mental health and consumer-defined recovery after traumatic brain injury

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**Background:** When considering the assessment of mental health outcomes following traumatic brain injury, there is a tendency to view these from a traditional medical model that monitors levels of symptom distress and the occurrence of psychopathology. This review contends that the assessment of outcome following a traumatic brain injury needs to be reconsidered using a dual factor model of mental health that includes both mental illness and mental well-being. Research has not investigated mental well-being to any significant degree following traumatic brain injury. Keyes' three elements of mental well-being (emotional, psychological and social) could have an important contribution to the development and integration of research in this area. Previous research post-TBI has identified concerns with emotional well-being (depression, anxiousness, lower life satisfaction), psychological well-being (difficulties maintaining close personal relationships), and social well-being (lower community integration). However, limited research exists for positive affect (emotional); self-acceptance, personal growth, purpose in life, environmental mastery, and autonomy (psychological), and elements of social acceptance, actualization, contribution, and coherence.

**Conclusion:** The capacity of a dual factor model of mental health to distinguish between mental well-being and mental illness has the potential to revolutionize how we think about recovery following a TBI. It provides an evidence-based framework to support the development of novel systems of health care that incorporate positive indicators of well-being along with traditional measures of mental illness, and consumer-defined recovery, to more fully understand mental health outcomes following TBI.

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## 10. Preliminary Validation of the Abbreviated Westmead Post Traumatic Amnesia Scale (A- WPTAS) in children

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**Background and Aim:** Head injuries are a common reason for children to present to an emergency department (ED). Identification of those children in post-traumatic amnesia (PTA) is useful not only in determining the severity of traumatic brain injury (TBI) but identifying children more likely to have ongoing symptoms.

The Westmead PTA (WPTAS) is used to identify PTA in children aged over 7 years (Marosszeky et al, 1992), but is not useful as a screening tool as it requires four consecutive days of testing. The Abbreviated Westmead PTA Scale (A-WPTAS), designed for use in EDs has been validated in adults (Meares et al, 2011). The validity of A-WPTAS in children has not been established; this study investigated the validity of A-WPTAS in children by examining the effect of age upon children's ability to pass the test.

**Method:** The A- WPTAS was performed on a convenience sample (n = 70) of typically-developing children, aged 6 years and over, presenting to ED.

Children with head injuries, intoxication and/or developmental disabilities were excluded.

**Results:** All children aged 7 years and over examined, passed the assessment at 60 minutes. In the 6 year old children 75% passed the A-WPTAS. Qualitative differences were noted, with 47% of those aged 6-7 years requiring prompting with the picture cards component compared to 20% of older children.

**Conclusions:** This initial research shows that the A-WPTAS is a valid assessment of PTA in head injured children aged 7 years and over. Further work is required to examine the performance of children with mild TBI, and correlation with existing measures of orientation and memory in this group.

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## 11. Implementation of an Indigenous Focused Educational Resource for Mild Head Injury in the Top End

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**Background and Aims:** The incidence of head injury in the Australian Indigenous population is 21 times higher than non-Indigenous population (Jamieson, *et al*, 2008). Indigenous people constitute 30% of the population of the Top End of the Northern Territory, many of whom speak English as a second language. It is known that education for patients with mild head injury contributes to reduced reporting of post-concussive symptoms (Ponsford, *et al*, 2002; Initial management of closed head injury in adults, 2<sup>nd</sup> edition summary report, NSW Health, 2011); however, currently available media are inappropriate for many Indigenous people. To address this, a culturally and linguistically appropriate post-head injury educational resource has been developed.

**Method:** After consultation with Indigenous Interpreters and Linguists a culturally appropriate script was written then translated into 7 Top End Indigenous languages, the translations were independently verified. A DVD was chosen as the medium due to its reproducibility and ease of use and distribution.

**Results:** The DVD is shown to Indigenous patients who present to Royal Darwin Hospital following a mild head injury and is given to the patient on discharge. It covers the function of the brain, mild head injury symptomatology and management, and post discharge advice.

**Conclusions:** Use of a DVD resource to educate Indigenous patients post head injury is novel and culturally appropriate. It will allow sharing of the information amongst Indigenous families and communities and there is scope to reproduce the resource in other Indigenous languages across Australia.

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## 12. Evaluating the training and support needs of a volunteer peer-professional workforce to support the delivery of a community rehabilitation program following acquired brain injury

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**Background and Aims:** The Skills To Enable People and Communities (STEPS) Program utilises a peer-professional workforce model in the

delivery of a group based community rehabilitation program for adults with Acquired Brain Injury (ABI) and their families across Queensland. The rapid expansion of the program in recent years has highlighted the need to further evaluate the measures employed to train, supervise and support the STEPS Program's peer-professional workforce, which is the primary aim of this research.

**Methods:** The study included two phases: First, active peer and professional leaders of the STEPS Program ( $n = 21$ ) completed in-depth semi-structured interviews concerning perceptions of their ongoing training and support needs. All interviews were transcribed verbatim and thematically analysed. Phase two involved leaders ( $n = 40$ ) participating in a 2-day training forum in Brisbane in late 2011. A pre-post design incorporating qualitative and quantitative methods was employed to evaluate the forum's effectiveness.

**Results:** Thematic analysis of the qualitative findings yielded 31 main categories/themes for the pre-forum interviews and 22 main categories/themes for the post-forum interviews. Leaders expressed feeling well supported and highlighted the benefits of the forum for leader networking and skill development. With respect to the quantitative findings, a significant increase in scores on the General Self-Efficacy Scale ( $p = 0.047$ ) was recorded between the pre- and post-forum assessments. Furthermore, the training forum was found to increase leaders sense of community involvement ( $p = 0.036$ ).

**Conclusion:** This study highlights the importance of clinical education and training to support of the use of innovative workforce approaches in the delivery of community rehabilitation following ABI.

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### 13. An intensive program of passive stretch and motor training to manage severe knee contractures after traumatic brain injury: a case report

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**Background and Aim:** Contractures are a common secondary problem of acquired brain injury and can be difficult to treat. Contemporary management includes passive stretch. However, recent evidence indicates that passive stretch may not be effective. The apparent ineffectiveness of stretch may be because clinical trials have not provided a sufficient dose of passive stretch or have not combined passive stretch with other treatments. The aim of this case report is to describe a program of intensive passive stretch combined with motor training administered over a 1.5 year period for the treatment of severe knee contractures.

**Method:** This study presents an adolescent 5 months after traumatic brain injury with severe contractures in multiple joints. He underwent an intensive stretch program for his knee contractures, including serial casting and splinting, which was administered for 10 months in conjunction with a motor training program administered for 1.5 years.

**Results:** The adolescent regained full extension in both knees. He progressed from being totally dependent to walking short distances with assistance. The effects were maintained at follow-up 5.5 years post-injury.

**Conclusion:** This case study illustrates the resolution of severe and chronic contractures following an intensive program of stretch provided in conjunction

with a motor training program. This approach may provide the answer to contracture management but requires further scrutiny within a clinical trial. However, until this time, this approach may be an option to consider for the correction of severe contractures following acquired brain injury.

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#### 14. Being SMART with GAS; Providing a goal-directed brain injury rehabilitation service

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**Background and Aims:** Oats St provides an interdisciplinary rehabilitation program for adults with an Acquired Brain Injury (ABI) and uses standardised outcome measures (FIMFAM and MPAI-4) with all clients. These tools, however, have a number of limitations for the client in the areas of individual meaningfulness and motivation outcomes. Therefore, individualised goal setting in rehabilitation is recognised as facilitating a client-directed, collaborative approach which is not limited by floor or ceiling effects.

**Method:** Oats St developed the 'My Rehabilitation Goal Tree' 18 months ago to facilitate formal goal setting. The tool ensures that clients are invested as part of the team in working towards personally meaningful outcomes. It also enables a framework for setting SMART (specific, measurable, achievable, realistic & time-framed) goals. 'My Goal Tree' is developed by the client and their team at ongoing 3 monthly reviews. A simplified version of Goal Attainment Scaling (GAS) was recently implemented alongside 'My Goal Tree' in order to measure the achievement of goals.

**Results:** Initial results from implementing the GAS with eight clients demonstrate that overall goal achievement is the desired '*as expected*' outcome. Further results will be available for presentation in May 2013.

**Conclusions:** A formal goal setting tool enhances a collaborative rehabilitation process. It enables increased client investment in their rehabilitation process and thus embeds meaning into their rehabilitation. Initial results indicate that the use of the GAS together with the 'My Rehabilitation Goal Tree' has enhanced the team's development of SMART goals through highlighting their significance in measuring clinical change and an achievable goal setting.

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#### 15. Evaluating a Student-Led Group Occupational Therapy Program in Inpatient Brain Injury Rehabilitation

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**Background and Aims:** Groups are commonly used in brain injury rehabilitation to increase the intensity of intervention, and provide opportunities for social interaction and peer feedback and support amongst clients. Limited research, however, has demonstrated the effectiveness of using groups in an inpatient rehabilitation setting. This study aims to evaluate a student-led group therapy program in occupational therapy in an inpatient brain injury rehabilitation context.

**Method:** The student-led group therapy program was implemented over a two year period and involved patients in meal preparation groups (breakfast and lunch), upper limb, community access and cognition focused groups. All groups involved clients working towards individualised therapy goals and followed structured group formats. A mixed methods study design incorporating surveys and focus groups with clinician, student, patient and university stakeholders was used to formally evaluate the groups program. Survey data were collated and focus group data were transcribed and analysed thematically.

**Results:** Results indicate the benefits of the program include autonomy and variety of learning opportunities for students leading the therapy groups. Benefits to patients included increased occasions of service and intensity of rehabilitation. From an organisational perspective, positive outcomes included increased numbers of clinical placements offered to students with reduced ongoing planning for clinical educators.

**Discussion:** Findings have indicated this is a successful model of clinical placement within an inpatient brain injury rehabilitation setting. Further research investigating the effectiveness of groups in terms of patient outcomes is recommended.

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## 16. The structure of the Community Integration Questionnaire (CIQ) in a representative sample of the Australian TBI population

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**Introduction and Aim:** Community integration is an important outcome following traumatic brain injury (TBI), which is linked to the ICF construct of Participation. One measure that is widely used to assess these outcomes is the Community Integration Questionnaire (CIQ, Willer et al., 1993). This scale has 15 items tapping independence of functioning across various aspects of Participation. In its original form, it was suggested the CIQ had three factors. However, subsequent research has challenged the original structure in overseas samples (Sander et al., 1999). As such, there is a need to clarify the structure of this scale in the local clinical context. The aim of this study was to investigate the factor structure of the CIQ in a representative sample of Australian adults with TBI.

**Method:** Adults with TBI were recruited by the Neurotrauma Register of Tasmania between 2004 and 2007. As part of a larger battery of medical, cognitive and psychosocial measures, they returned responses to the CIQ. The NTR followed this cohort up initially after injury, then at 1 month, 3 Months, 6 Months, 12 months and then annually to 5 years post injury. CIQ data from initial and 1 month data points were factor analysed using both exploratory and confirmatory techniques. Additionally, comparison of fit was made with the existing structures from the literature.

**Results:** Confirmatory factor analyses indicated the best factor model for the CIQ in the Australian TBI. Comparison of fit indices was made with existing factor structures and the relationships between the factors in the preferred model and demographic and injury variables were explored. The preferred structure and other results are explained.

**Conclusion:** The CIQ is a widely used measure of community reintegration. This study provides reassurance as to the appropriate factor structure for use in the local TBI context.

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## 17. Investigating Quality of Life Measures Amongst Persons with an Acquired Neurological Disability Involved in a Social Skills Program; WHOQOL-BREF and QOLIBRI

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**Background and Aim:** The Oats Street Brain Injury Rehabilitation Service has a strong focus on “learning for living” working with clients holistically on a comprehensive range of physical, mental, emotional, social and cognitive skills. To increase opportunities for social integration the Service has commenced a HACC funded ‘Social Skills Program’.

Funding was obtained to assess the extent to which the Oats Street community and social skills programs facilitated clients ability to achieve their individual goals, improve functionality and achieve optimal quality of life (QOL). As part of this project two QOL tools were compared to identify which was the most appropriate tool for this specific population.

**Method:** There are currently 18 participants recruited to the project cohort for a 12 month period commencing in July 2012. Participants at 0, 3, 6, 9 & 12 months either self complete (or with assistance from a researcher) both the Quality of Life after Brian Injury (QOLIBRI) and the World Health Organisation Quality of Life – BREF (WHOQOL-BREF).

Data analysis will be carried out in STATA [version 12] to examine the relationship between the two measures.

**Results:** Preliminary results indicate that the QOLIBRI seems to be more tailored to our population base. A comparison of the QOL survey results from both measures will establish if the results are similar. Final results and outcome will be provided at the conference.

**Conclusion:** The incorporation of a QOL tool will provide greater insight and is a valuable tool to guide rehabilitation and the Social Skills Program.

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## 18. An Integrated Cognitive-Behavioural/Compassion-Focussed Therapy Intervention for Anxiety and Self-Criticism Following Stroke: A Case Study

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**Background and Aims:** Many individuals with stroke experience difficulties resuming their pre-injury lifestyle, which may lead to feelings of discouragement, anxiety and self-criticism. Self-criticism has been associated with a range of mental health disorders. Therefore, managing self-criticism may be a key component in psychotherapy; however, this is yet to be evaluated in the context of stroke. We describe the case of a 48 year old woman (Pamela) who experienced an aneurysm 18 months prior to therapy. She was initially

referred for assessment and rehabilitation. However, it became apparent that her emotional distress was exacerbating her functional impairments.

**Method:** We describe the initial comprehensive assessment of cognitive functioning and subsequent psychotherapy. Therapy adopted an integrated cognitive behavioural/compassion-focussed framework aimed at enhancing her levels of self-acceptance and compassion, based upon the work of Gilbert and colleagues (2006). The efficacy of the intervention was assessed quantitatively through a comparison between Pamela's pre- and post-therapy scores, as well as three month follow-up using Reliable Change Indices.

**Results:** After 10 sessions of psychotherapy, Pamela reported a clinically significant reduction in emotional distress, fewer avoidance behaviours and an increase in self-compassion. At the 3-month follow-up Pamela's improved emotional status was maintained, despite an increase in avoidance behaviours.

**Conclusion:** Few studies have provided adequate evidence for an efficacious approach to psychotherapy post-stroke. The current case study provides preliminary support for the use of compassion-focused therapy within this population, whilst also highlighting some of the challenges to this framework (e.g., the inner self-critic being considered a motivator).

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## 19. Measuring participation in childhood acquired brain injury: A normative study of the Sydney Psychosocial Reintegration Scale for Children (SPRS-C)

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**Background and Aims:** The Sydney Psychosocial Reintegration Scale (SPRS) was developed to assess psychosocial functioning and participation in adults with acquired brain injury (ABI). The scale measures 3 domains: occupational activity (school/leisure), interpersonal relationships, and everyday living skills. The scale was recently adapted for use with children, referred to as SPRS-for children (SPRS-C). This paper aims to describe the development of SPRS-C and present SPRS-C data from a normative sample.

**Method:** Participants were parents/caregivers of typically developing children aged 5-14 years (N = 200) recruited from a diverse range of schools in metropolitan Melbourne, Australia. Children with ABI, diagnosis of a neurological/developmental disorder, or significant medical condition were excluded. Efforts were made to recruit a sample with an equal sex ratio across 10 age-bands.

**Results:** Mean SPRS-C domain scores across the 10 age bands ranged from 14.1 to 15.8 (highest score 16), indicating participation levels in the higher ranges. No significant differences were found between males and females for all domain and total SPRS-C scores ( $p < .05$ ). Correlation coefficients between SPRS-C scores and child's age as well as occupational skill level of the primary caregiver were low and not statistically significant ( $r_s = 0.01$  to  $0.14$ , NS).

**Conclusions:** This study presents normative data for the SPRS-C based on a sample of 200 children stratified by age and sex. The data will provide

a benchmark to guide clinical interpretation of the SPRS-C for measuring participation in children with ABI. A validation study of the SPRS-C using a sample of children with ABI is currently underway.

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## 20. Does social isolation improve for Vietnamese people with a brain injury (BI) when they participate in client led culturally sensitive peer groups?

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**Background and Aims:** People who sustain a BI experience significant social isolation (Conneely, 2002; Hpay, 1971). Further to this, people from culturally and linguistically diverse populations are more likely to experience poorer outcomes post BI, including quality of life and community reintegration (Gary et al 2009). Peer mentoring groups have been used to assist with overcoming social isolation. Varying outcomes have been achieved using this model. There is little to no evidence surrounding the use of socialisation groups within the Vietnamese population. Often the groups discussed in the research have been staff driven. The aim of this study is to investigate whether people of a Vietnamese background would also benefit from socialisation groups. Additionally, the study sought to determine whether client led groups improved socialisation measures.

**Method:** Socialisation will be measured using a survey. Participants will complete the survey before the initial group session and again between 6 and 12 months post-participation.

**Results:** At this point initial surveys have been completed. Post group surveys will be completed shortly.

**Conclusions:** It is hypothesised that participants will have more meaningful social experiences while participating in the group

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## 21. Perceptions, needs and future directions of Speech Pathology services in BIRUs

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**Background and Aims:** Speech Pathologists provide specialised sub-acute rehabilitation within Brain Injury Rehabilitation Units (BIRUs), however there is limited information regarding Speech Pathology clinical practice within these services. Our study aimed to investigate Speech Pathology practice in BIRUs, including Speech Pathologists' perceptions of their current service and future service needs.

**Method:** Ten facilities were identified in Australia that provided specialised sub-acute brain injury rehabilitation. Speech Pathologists from these facilities were invited to report how they would enhance their existing service and identify their "ideal" Speech Pathology BIRU service. Speech Pathologists from eight services participated in the survey, with surveys recording the Speech Pathology 'team' response within each BIRU. Responses to questions were free text, and were analysed descriptively.

**Results:** 37.5% of respondents identified service gaps or ideas for service enhancement, including improving service delivery, therapy services, family based services and education. 87.5% of respondents reported they would benefit from increased speech pathology staffing; including for therapy services (87.5%) and for changing service delivery (50%). The majority (87.5%) of respondents identified a diverse range of additional activities that should be provided by Speech Pathologists in an “ideal setting”, involving therapy services (25%), team and clinic services (37.5%), education (25%), research (25%), professional issues (12.5%) and advocacy (12.5%). Additional results will be presented on the poster.

**Conclusions:** This study provides important evidence about the perspectives of BIRU Speech Pathologists regarding their service development needs within an early intervention timeframe, and may inform directions for future clinical research in the area.

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## 22. A 6-month longitudinal study of psychosocial outcomes of patients with acquired brain injury (ABI) discharged home from acute care

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**Background and Aims:** Inpatient rehabilitation is a limited resource that is not accessible to all patients with acquired brain injury. In the absence of physical disabilities, a large proportion of patients are discharged home directly from acute care once they are medically stable. These individuals may however be at risk of reduced participation and psychosocial adjustment issues due to subtle cognitive and behavioural changes. This study aimed to profile and compare changes in psychosocial functioning in individuals with TBI and ABI from other causes in the first 6 months after discharge home from acute hospital care without a period of inpatient rehabilitation.

**Method:** Prospective longitudinal study with data collected at four time points; before discharge, and at 1, 3 and 6 months post-discharge. A total of 103 participants with ABI (68% male, mean age 42 years, 55.3% with TBI) were recruited from the acute neurosciences unit of a metropolitan hospital. Participants completed self-report questionnaires at each time point including measures of participation, general functioning, emotional distress, quality of life, and sentinel events.

**Results:** The sample showed improvements on all measures over the 6-month period and the majority demonstrated good psychosocial outcomes. No significant differences between participants with TBI and other ABI were found on any of the measures. Approximately 20% of participants reported elevated symptoms of depression, anxiety and stress which persisted at 6-months post-discharge. Ongoing problems with pain/discomfort and usual activities were reported by 38.8% and 28.1% respectively. Over the 6 month period, 73.8% returned to work/study, 62.1% returned to driving, but 38.8% reported emotional strain and 26.2% a relationship breakdown.

**Discussion:** The results suggest a subgroup of patients discharged home from acute care without rehabilitation have compromised psychosocial outcomes.

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### 23. The Translation of Research into Policy & Practice Change

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**Background and Aims:** Since 2006, the Summer Foundation has published research to provide an evidence base for policy change related to the issue of young people in nursing homes. The aim of this paper is to describe the range of strategies utilised and outcomes of our knowledge translation strategy.

**Method:** In 2009 the Summer Foundation launched Building Better Lives, a collaborative campaign that aims to keep the issue of young people in nursing homes on the political and public agenda. One core element of this campaign is the Tell Your Story program, which supports young people in nursing homes to tell their story and engage in systemic advocacy. The combination of research conducted by the Summer Foundation and the Building Better Lives campaign is a powerful synergy that has recently been used to full effect.

**Results:** The extensive dissemination and media coverage of Summer Foundation research has been used as leverage to build relationships key decision makers, influence the implementation of the National Disability Insurance Scheme and secure funding for demonstration projects and further research into the systemic change required to prevent new admissions.

**Conclusion:** Given the slow rate of policy change and the range of factors and stakeholders that influence policy, the direct impact of this research on policy is hard to measure. However the engagement of government and other stakeholders in the research design and a comprehensive translation strategy has significantly increased the impact of this research on policy and practice related to young people in nursing homes.

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### 24. Voluntary postural control training with visual feedback promotes decreases in motor and mental deficits in traumatic brain injury patients

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**Background and Aim:** Diffuse axonal damage with functional disconnection is considered to be a major contribution to the deficit of multiple functions in patients with severe traumatic brain injury (TBI) (Bigler et. al., 2010). The aim of the study was to understand brain mechanisms underlying changes of motor and mental (memory) deficits during rehabilitation with training including voluntary postural control.

**Method:** Thirty TBI patients ( $26.8 \pm 2.8$ ) at six months after TBI and 40 healthy age-matched volunteers were investigated. Healthy controls participated once in an EEG and stabilography session. The stabilotraining (ST) with visual feedback was used as voluntary postural control training for patients.

It consisted of 8–15 sessions (over 4–6 weeks). Data analysis was focused on outcome estimated by clinical scales measures (MPAI, FIM, MMSE and Berg scale), stabilographic and EEG parameters including coherence analysis.

**Results:** Before the rehabilitation course TBI patients were divided into 2 groups: a group with predominant motor deficit (MD) that consisted of 20 patients, and a group of post-traumatic Korsakov syndrome (KS) with memory and mental deficit that was formed by 10 patients. Stabilographic data of patients from both groups demonstrated significantly greater values of length, area and range of center of pressure in comparison to norms. This divergence was larger for MD patients. EEG coherence analysis revealed maximal decrease for alpha-band at interhemispheric pairs for central and parietal areas in MD group compared to norms. Decrease of EEG coherence was maximal for long diagonal pairs, i.e., between the left frontal and right parietal areas in KS patients. At the first term of ST an increase of EEG coherence was observed for interhemispheric pairs and it was maximal for intrahemispheric pairs of the right hemisphere, firstly in the right parietal-central-frontal and then in the left frontal areas. Stabilographic data demonstrated a tendency to normalization after ST. The use of complex assessment showed that ST promotes decreases in motor as well as mental (memory) deficits in patients with TBI for both groups.

**Conclusions:** Described clinical, stabilographic and EEG coherence data as measures of brain connectivity can be markers of integrative role of voluntary postural control training (through primary activation of the right hemisphere). ST can play an important role in rehabilitation of TBI patients.

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