TRAUMATIC BRAIN INJURY ADAPTED COGNITIVE BEHAVIOUR THERAPY: ROLE OF THERAPY PROCESS VARIABLES

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BPSYCH (HONS)

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE DEGREE:

DOCTOR OF PSYCHOLOGY
(CLINICAL PSYCHOLOGY)

SCHOOL OF PSYCHOLOGICAL SCIENCES

FACULTY OF MEDICINE, NURSING AND HEALTH SCIENCES

MONASH UNIVERSITY

CLAYTON, VICTORIA, AUSTRALIA

FEBRUARY 2019

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ABSTRACT

Background: The common cognitive, behavioural and emotional sequelae experienced by people following Traumatic Brain Injury (TBI), contribute to the development of psychological disorders. Depression and anxiety are the most common and have significant impact on quality of life. Findings from randomised controlled trials examining the efficacy of CBT adapted for brain injury for the treatment of these disorders are mixed. However there have been no studies examining the processes and factors associated with response to psychological therapy in individuals with TBI. This doctoral thesis aimed to undertake Cognitive Behaviour Therapy (CBT) process research in people with TBI. There were two overarching research questions: 1) How do therapists tailor CBT to people with TBI? 2) What are the factors that impact capacity to engage in and benefit from CBT?

Method: Data were collected from 177 therapy session audio recordings, representing 31 therapist-client dyads, from a completed RCT (parent RCT) of TBI adapted CBT (CBT-ABI). CBT-ABI sessions 1 to 9 were coded from the observer perspective with measures of therapist CBT intervention use (e.g., relaxation, behavioural activation etc.), therapist cognitive deficit compensatory strategy use (e.g., visual resources, repetition, concrete examples etc.), therapist-client working alliance, client homework engagement and therapist competence in using homework. Demographic (i.e., age, gender, education and premorbid IQ) and injury related variables (i.e., years since injury, post traumatic amnesia duration and cognitive functioning) collected at pre-intervention in the parent RCT were also utilised.

Results: Therapist intervention use was found to be associated with cognitive functioning. Specifically, better memory functioning was associated with more use of mindfulness, and poorer executive functioning was associated with less use of behavioral activation. A comprehensive checklist of cognitive deficit compensatory strategies was created. Pilot testing of the checklist showed that ability of raters to identify strategies reliably was mixed. Therapist cognitive deficit compensatory strategy use was not significantly associated with injury related variables. A stronger working alliance was associated with a greater number of years since injury. Higher levels of

homework engagement were associated with the following variables: Older client age, greater number of years since injury, stronger working alliance and higher levels of therapist competence in the review of homework. Greater anxiety and/or depression symptom improvement by post CBT-ABI was associated with the following: Older client age, greater number of years since injury, better executive functioning, higher levels of client homework engagement and higher levels of therapist competence in reviewing homework.

Conclusion: These findings provide empirical support for the notion that people with varying TBI severities are capable of engaging in integral CBT processes. They also indicate that with increased time post-injury, clients may have greater opportunity to benefit from CBT. These findings reinforce the importance of therapists developing and maintaining a solid alliance, and ensuring comprehensive facilitation of homework engagement including the review process. The impact of poorer executive functioning on treatment outcome means therapists may need to increase use of cognitive deficit compensatory strategies to address executive dysfunction. Such strategies have now been operationalised based on direct observation of therapist behavior. This body of research represents the first step in empowering therapists to increase the effectiveness of TBI adapted CBT.

GENERAL DECLARATION

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

This thesis includes three submitted papers (under review). The core theme of the thesis is the role of therapy process variables in Traumatic Brain Injury adapted Cognitive Behaviour Therapy. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the student, working within the School of Psychological Sciences under the supervision of Professor Jennie Ponsford and associate supervision of Associate Professor Dr Nikolaos Kazantzis and Dr Dana Wong. The inclusion of co-authors reflects the fact that the work came from active collaboration between researchers and acknowledges input into team-based research.

In the case of chapters four, five and six my contribution to the work involved the following:

Thesis Chapter	Publication Title	Publication Status	Nature and % of student contribution	Co-author name(s) Nature and % of Co-author's contribution*	Co-author(s), Monash student
4	Predictors of working alliance in Cognitive Behaviour Therapy adapted for traumatic brain injury	Revised and re-submitted for publication	70% contribution. This included formulation of study design, data collection, data analyses and writing of the manuscript.	2. Nikolaos Kazantzis, study design and manuscript, 8% 3. Dana Wong, study design and manuscript, 8% 4. Dean McKenzie, data analyses and manuscript, 3% 5. Marina Downing, data analyses and manuscript, 3% 6. Jennie Ponsford, study design and manuscript, 8%	No
5	Predictors of homework engagement in CBT adapted for traumatic brain injury: Pre/post-injury and therapy process factors	Submitted for publication	70% contribution. This included formulation of study design, data collection, data analyses and writing of the manuscript.	2. Nikolaos Kazantzis, study design and manuscript, 8% 3. Dana Wong, study design and manuscript, 8% 4. Dean McKenzie, data analyses and manuscript, 3% 5. Marina Downing, data analyses and manuscript, 3% 6. Jennie Ponsford, study design and manuscript, 8%	No
6	Predictors of anxiety and depression symptom	Submitted for publication	70% contribution. This included formulation of	2. Dana Wong, study design and manuscript, 8% 3. Nikolaos Kazantzis, study design and manuscript, 8%	No

	improvement in CBT adapted for traumatic brain injury: Pre/post injury and therapy process factors		study design, data collection, data analyses and writing of the manuscript.	4. Dean McKenzie, data analyses and manuscript, 3% 5. Marina Downing, data analyses and manuscript, 3% 6. Jennie Ponsford, study design and manuscript, 8%	

I have renumbered sections of submitted or published papers in order to generate a consistent presentation within the thesis.

Student signature: **Date: 04/02/2019**

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the student's and co-authors' contributions to this work. In instances where I am not the responsible author I have consulted with the responsible author to agree on the respective contributions of the authors.

Main Supervisor signature: ███████ **Date: 04/02/2019**

ACKNOWLEDGEMENTS

CHAPTER ONE

STUDY BACKGROUND, LITERATURE REVIEW AND PARENT RCT

Traumatic brain injury (TBI) results in high rates of anxiety and depression, which are associated with poorer quality of life. Treatment studies highlight the potential impact of injury-related cognitive impairments on capacity to benefit from psychological therapy. However there have been no studies examining the processes and factors associated with response to psychological therapy in individuals with TBI. This is the overarching aim of this thesis.

1.1 CHAPTER OUTLINE AND AIMS

This chapter aims to provide a review of the literature examining Cognitive Behaviour Therapy (CBT) for the treatment of anxiety and depression following TBI. I describe the wide-ranging motor-sensory, behavioural and cognitive TBI sequelae, and associated impact on psychological function. An overview of psychological disorder rates in the TBI population is provided and the rationale for positioning CBT as the most suitable treatment for anxiety and depression. The potential for TBI associated cognitive deficits to hinder client engagement with CBT is discussed, underscoring the need for TBI adapted CBT protocols. Randomised controlled trials (RCT) examining the effectiveness of CBT adapted for brain-injury are reviewed and methodological limitations identified. The parent RCT from which data was collected for the current research project is then described. RCT findings, methodological issues and research gaps are synthesised, highlighting the need to further investigate ways to optimise the effectiveness of brain-injury adapted CBT. Guided by psychotherapy process research in non-TBI populations, variables of interest are identified and reviewed. Finally, I describe the aims and rationale of each of the five studies comprising this doctoral thesis.

1.2 TRAUMATIC BRAIN INJURY

1.2.1 Definition and epidemiology.

"Traumatic Brain Injury (TBI) is defined as an alteration in brain function, or other evidence of brain pathology, caused by an external force" (Menon, Schwab, Wright, & Mass, 2010, p. 1638). Considerable variability exists in the studies of TBI incidence around the world,

reflecting variability in individual study methodologies. Different countries report rates of hospital admissions after a TBI between 56 and 300 per 100 000 (Bruns & Hauser, 2003). In Australia the incidence has been reported to be 107 per 100 000 (Helps, Henley, & Harrison, 2008). Those most likely to be impacted by a TBI are the elderly or males aged 15-24 years (Bruns & Hauser, 2003; O'Rance & Fortune, 2007). Individuals who have sustained a TBI are also more likely to have lower socioeconomic status and education level, higher levels of unemployment and pre-injury psychopathology (Ashman et al., 2004; Fann et al., 2002; Kraus & McArthur, 1999; Parry-Jones, Vaughan, & Cox, 2006; Rimel & Jane, 1984). The most common causes of TBI are motor vehicle accidents, in addition to falls, assault, sporting injuries, bicycle accidents and war-related injuries (Kraus & McArthur, 1999; Taber, Warden, & Hurley, 2006). Advances in TBI treatment have resulted in significant decreases in mortality, even for those who sustain severe injury. However, the mortality rate has remained at approximately 35% since 1990 (Stein, Georgoff, Meghan, Mizra, & Sonnad, 2010).

1.2.2   Pathophysiology.

The most common type of TBI is closed head injury (CHI), caused by any non-penetrating force to the head resulting in damage to the brain. Sudden acceleration, deceleration or rotation of the head results in the soft and fragile brain coming into forceful contact with the hard and inflexible skull. Therefore focal damage to certain brain areas is often collocated with the bony protrusions of the interior skull, which results in high frequency of damage to the frontal and temporal lobes. This damage occurs in two stages, termed the 'primary' and 'secondary' injury. The primary injury characterises the initial and irreversible physical damage to the brain sustained upon impact. The 'secondary injury' refers to those mechanisms for which intervention may be possible in order to limit or prevent further damage. Causes of secondary injury include brain swelling, haematomas, increased intracranial pressure and hypoxia, causing ischaemia, and infection. Many CHIs result in a combination of both focal and diffuse injuries, resulting in damage to specific locations as well as over widespread areas of the brain (Gaetz, 2004).

Focal damage occurs directly under and opposite the site of impact, known as a coup and contre-coup injury respectively (Le & Gean, 2009). These injuries are characterised by contusions (small blood vessel hemorrhages into the brain) and haematomas (large collections of blood outside the blood vessels). This results in further compression of the brain and neuronal glucose and oxygen deprivation. The stretching and even tearing of axons due to brain tissue moving and sliding over itself is termed diffuse axonal injury (DAI), which impacts the brain globally. Injuries that result in sudden acceleration or deceleration of the head, for example motor vehicle accidents, are more likely to result in DAI. Areas in which grey and white matter interface are commonly impacted, including the basal ganglia. Other areas commonly affected by DAI include the corpus callosum, frontal and temporal lobes, brain stem and hypothalamus (Ponsford, Sloan, & Snow, 2012).

1.2.3 Injury severity.

TBI severity is classified into mild, moderate and severe categories. Typically 80% of TBIs are classified as mild, while 10% are classified as moderate, and the remaining 10% classified as severe (Bruns & Hauser, 2003; Kraus, McArthur, Silverman, & Jayaraman, 1996). Brain injury severity can be measured using the Glasgow Coma Scale (GCS) (Teasdale & Jennett, 1974, 1976), duration of post-trauma amnesia (PTA) (Cattelani, Tanzi, Lombardi, & Mazzucchi, 2002; Sherer et al., 2002) and duration of loss of consciousness (LOC) (Sherer, Struchen, Yablon, Wang, & Nick, 2008). A score of 3 - 8 on the GCS indicates severe injury, 9 - 12 a moderate injury and 13 - 15 a mild injury (Jennett & Teasdale, 1981). PTA refers to the duration of time between injury onset and return of the capacity to form new memories. PTA of < 24 hours indicates a mild injury, 1 to 7 days a moderate injury, 1 to 4 weeks a severe injury, and > 4 weeks a very severe injury (Arlinghaus, Shoaib, & Trevor, 2005). LOC of < 30 minutes indicates mild severity while > 30 minutes indicates moderate - severe severity (Carroll, Cassidy, Coronado, Holm, & Kraus, 2004; Malec, Brown, et al., 2007).

The validity of the measures described has been demonstrated in several studies showing significant associations between GCS scores, PTA duration, LOC duration and outcome

(Hawthorne, Gruen, & Kaye, 2009; Schönberger, Ponsford, Reutens, Beare, & O'Sullivan, 2009; Tate et al., 2006). Recent studies suggest PTA duration is the strongest predictor of long-term outcome in survivors of TBI (Brown et al., 2005). Neuroimaging, including Computed Tomography and Magnetic Resonance Imaging scans, may also be used to determine severity, but early scan findings may not show the full extent of injury (Bigler, 2005). Moderate to severe TBI in particular results in a broad range of motor-sensory, cognitive and behavioural changes.

1.2.4 Motor-sensory changes.

TBI can result in loss of fine and gross motor coordination control, paralysis, reduced physical endurance and poor balance (Ponsford et al., 2014). If the nerves responsible for speech are damaged the capacity to produce sounds and articulation may be impaired. Such injury can also result in swallowing disorders, loss of taste and paralysis of the pharyngeal muscles. Damage to the optic nerve, frontal, temporal, parietal or occipital lobe and/or basal ganglia may result in blindness, blurriness, double vision and visual field defects (e.g., blind spots). Although less frequent, hearing loss can also occur. Tinnitus on the other hand is common, especially following mild TBI. The ability to sense pain, temperature and texture, as well as the ability to sense one's own body position in space, may also be impaired (Ponsford, Sloan, & Snow, 2012).

1.3 COGNITIVE AND BEHAVIOURAL CHANGES

While the majority of individuals with TBI make a good physical recovery, a large proportion experience persisting cognitive and behavioural impairments (Ponsford et al., 2014). Essentially any type of cognitive impairment can result from a TBI, due to the heterogeneity and diffuse nature of mechanisms of injury. However common injury patterns do emerge due to the high frequency of fronto-temporal damage. The most common cognitive impairments are attentional difficulties, memory impairment and executive dysfunction.

1.3.1 Attention.

Key components of attention have been described as arousal, selection, strategic control and processing speed (Whyte, Ponsford, Watanabe, & Hart, 2010). 'Arousal' refers to a state of readiness to respond to stimuli and 'selection' is the ability to focus one's attention on specific stimuli. 'Strategic control' refers to working memory and the ability to sustain, inhibit, divide and shift attention. Finally, 'processing speed' refers to the rate at which cognitive processing occurs. Studies examining attentional difficulties following TBI support the presence of impairments in speed of information processing, affecting attentional capacity (Draper & Ponsford, 2008), sustained attention (Robertson, Manly, Andrade, Baddeley, & Yiend, 1997), difficulty dividing attention (Azouvi, Vallat-Azouvi, & Belmont, 2009), behavioural distraction (Whyte, Fleming, Polansky, Cavallucci, & Coslett, 1998) and problems with goal-directed attention and mental flexibility (Renison, Ponsford, Testa, Richardson, & Brownfield, 2012).

Attentional difficulties following TBI are less likely to be linked to basic arousal and selection, but rather to strategic control and processing speed. Difficulties with maintaining, inhibiting and shifting attention can manifest in the person being unable to follow conversations, becoming easily distracted, not following through on tasks, perseverative responses to environmental stimuli and developing rigid routines (Olver, Ponsford, & Curran, 1996). Prompting from others may be necessary in order to guide the person's attention more efficiently. Attentional deficits have also been associated with fatigue (Ziino & Ponsford, 2006), suggesting that maintaining a stable level of attention may involve expending more mental energy for an individual with TBI. Fatigue is one of the most common issues post-TBI and may also be related to other factors such as sleep disturbance and pain (Ponsford et al., 2014; Ponsford, Ziino, et al., 2012). Therefore, engagement in activities demanding sustained attention may be limited.

1.3.2 Memory and learning.

Attentional deficits also have the consequence of interfering with the learning of new information. Stimuli initially attended to poorly, are significantly more difficult to retrieve from

memory, if at all. However even in the absence of attentional problems, the temporal, frontal and hippocampal damage likely to have been sustained may impair capacity for information storage, consolidation, prospective memory and working memory. Recall of memories from the past may also be impaired. Specific types of information may be affected depending on the hemisphere that has been damaged. In the case of bilateral damage the person may present with a general amnesic syndrome (Ponsford, Sloan, & Snow, 2012). Individuals with TBI have been shown to perform better on recognition tasks compared to free recall tasks, suggesting that more is stored in memory than can be retrieved. Contextual memory may also be affected, for example a person may have the ability to recall events but not when they occurred (Shimamura, Janowsky, & Squire, 1991). However long-term memory and procedural memory are generally relatively preserved following TBI (McCullagh & Feinstein, 2005).

This impaired learning process is more likely to be inefficient and unreliable. For example people with TBI are less likely to learn from mistakes or modify their behaviour despite feedback or direction (Walsh, 1991). Therefore adapting to new situations is challenging due to difficulty applying previously learned knowledge. Even once information has been learnt the person may have difficulty retrieving it, therefore significantly more repetition is needed to consolidate new knowledge and skills. Problems with recall can impact retrieval of information stored pre-injury, for example word-finding difficulties in general conversation (Snow, Douglas, & Ponsford, 1998, 1999). This means that others may need to be relied on to structure the person's learning process to maximise opportunities for success. Memory cues and prompts (e.g., calendars, physical/electronic reminders etc.) may also need to be integrated to assist everyday functioning. Many aspects of memory and learning are underpinned by the executive functioning system, also impacted due to damage to the frontal lobe (Ponsford, Sloan, & Snow, 2012).

1.3.3   Executive function.

Planning, monitoring and activating, dealing with abstract concepts and generalising from a single instance ('executive cognitive functions'), emotional regulation ('behavioural self-regulatory functions'), initiating and sustaining goal-directed behaviours ('energisation regulatory

functions'), and awareness of one's own cognitive and emotional functions ('metacognitive functions') are commonly impacted by TBI (Stuss, 2007). It is common for individuals to have deficits in several of these areas, especially injuries resulting in DAI and/or focal lesions in the frontal systems (Krpan, Levine, Stuss, & Dawson, 2007).

Difficulties with activation and engaging in goal-directed behaviour may manifest as an overall lack of initiative and passivity. This may require significant prompting from others to initiate simple tasks or move onto sequential steps within a task (Ponsford, Olver, & Curran, 1995). Once an activity has been initiated, impairments in planning and problem solving means a person may have difficulty engaging with complex tasks and thinking ahead (Busch, McBride, Curtiss, & Vanderploeg, 2005; Lezak, Howieson, Loring, Hannay, & Fischer, 2004). This is partly due to difficulty understanding abstract concepts. Consequently a person with TBI may miss the underlying meaning of conversations or humour, and have a tendency to focus on what is concrete. Difficulties with idea generation and abstract reasoning result in problems generalising information and skills to different contexts. Therefore the person with TBI may work more effectively with information and situations that are concretised, simplified, structured and reduce the need for free recall.

TBI can also result in impulsivity and disinhibition. Therefore responses to situations may be premature and ill informed (Busch et al., 2005). People with TBI can also demonstrate a low frustration tolerance resulting in irritability and loss of temper, which can include physical aggression (Olver et al., 1996; Ponsford et al., 1995). On the other hand emotional expression can also be flattened or incongruent to the corresponding situation (e.g., inappropriate laughter or crying) (Lezak et al., 2004). Persons with TBI can also exhibit socially inappropriate behaviour such as swearing and sexual disinhibition (G. Kelly, Brown, Todd, & Kremer, 2008). Difficulty regulating emotions and urges has the potential to negatively impact relationships. A person with TBI may require a greater level of external intervention (e.g., re-direction/instruction from close others) to assist in effective self-soothing, inhibition of impulses and informed problem solving.

1.3.4   Self-awareness and insight.

Problematic behavioural changes post-TBI may also be driven by a lack of self-awareness and insight (Ham et al., 2012). This can be in regards to new limitations to former capabilities, changes in behaviour and the impact of behaviour on others (J. Schmidt, Lannin, Fleming, & Ownsworth, 2011). Cognitive inflexibility can be associated with perspective taking difficulties which may cause the person with TBI to appear more egocentric and less empathetic (Ponsford, Sloan, & Snow, 2012). Poor self-monitoring can also manifest in changes to a person's communication style, including a tendency to be verbose, tangential and lack turn taking skills (Togher et al., 2014). Lack of insight and self-awareness may result in the person with TBI engaging in tasks beyond their capabilities or lack of motivation to engage with rehabilitation services (Fleming & Ownsworth, 2006). Once again this is likely to have a negative influence on interpersonal interactions and relationships. The person with TBI may require more specific external direction/feedback and reality testing opportunities to enhance motivation for treatment engagement.

A person's recovery from the effects of a TBI is dependent on numerous factors including rehabilitation treatment quality, available support networks, premorbid IQ, age and personal motivation levels (Wilson, 2010). While recovery course is unique to each individual, considerable gains generally occur in the initial weeks and months following a TBI, but may continue years after (Millis et al., 2001). However certain difficulties tend to persist well past this time, especially cognitive impairment. This can have a significant impact on a person's capacity to re-integrate back into the community and their pre-injury life roles.

1.3.5   Community reintegration.

The meaning of community reintegration is possibly as individual as the needs of each person with TBI, however it generally encompasses three main areas: independent living, social and leisure activity, and occupation (Sander, Clark, & Pappadis, 2010). Sudden changes in a person's cognition and behaviour consequently impact their capacity to participate in these life

roles in the same way they did pre-injury. A review by Temkin, Corrigan, Dikmen, and Machamer (2009) found that functional status was worse for those with TBI compared to those who had injuries that spared the head, or no injury at all. The authors also concluded that TBI decreases the probability of employment post-injury, lengthens the timing of return to work, and decreases the likelihood of returning to the same position. Furthermore psychosocial problems appeared to be greater than problems in basic activities of daily living by 1 year post-injury.

Ponsford et al. (2014) conducted a longitudinal study examining function in 141 people with moderate-to-very severe TBI at two, five, and 10 years post-injury. At 10 years post-injury approximately 30% required some assistance in heavy domestic activities. About 30% also needed assistance with financial activities and had not returned to driving without restrictions. Forty-five percent reported being unable to return to previous leisure interests. Nearly half reported becoming more socially isolated and approximately 40% required more support from others than before the injury. At 10 years post-TBI, 11.8% reported a return to full-time pre-injury employment, and 11.8% also reported return to full-time work with alternative duties and/or a different employer. Of those studying or employed prior to injury 49.9% were studying or employed at 10 years post-injury.

The person with TBI is faced with losses and changes to their independence, relationships, study and employment potential, and activities of personal meaning and enjoyment. This combination of factors can significantly impact the person's sense of identity and connectedness to others (Levack, Kayes, & Fadyl, 2010). The effects of TBI on the person's pre-injury attachment with others, ability to develop new relationships, capacity to find meaning in post-injury life roles and overall sense of control, unsurprisingly forms the foundation for development of psychopathology (Hames, Hagan, & Joiner, 2013; Nolte, Guiney, Fonagy, Mayes, & Luyten, 2011; Weems, Costa, Dehon, & Berman, 2004).

1.4 PSYCHOPATHOLOGY POST-TBI

Several prospective studies, utilising structured clinical interviews, have examined psychiatric disorder rates post-TBI (Alway, Gould, Johnston, McKenzie, & Ponsford, 2016; Gould, Ponsford, Johnston, & Schönberger, 2011a; Koponen, Taiminen, Hiekkanen, & Tenovuo, 2011). Alway et al. (2016) was the first to examine the frequency and trajectory of Axis I psychiatric disorders over a 5 year period in moderate to severe TBI (*n* = 161). Gould et al. (2011a) and Koponen et al. (2011) conducted 12-month prospective follow-up studies. Several retrospective studies have also examined psychopathology post-TBI (Koponen et al., 2002; Van Reekum, Boiago, Finlayson, Garner, & Links, 1996; Whelan-Goodinson, Ponsford, Johnston, & Grant, 2009) with follow-up periods of two to 30 years.

The Alway et al. (2016) study found that during the first 5 years post-injury 75.2% of their sample were diagnosed with one or more Axis I disorders. Whelan-Goodinson et al. (2009) found that 65% met criteria for at least one psychiatric disorder 0.5 – 5.5 years post-injury. The prospective 12-month follow-up study by Koponen et al. (2011) found a lower rate of 47.4%. Alway et al. (2016) found statistically significant elevations compared to the general population.

The Alway et al. (2016) study found mood and anxiety disorders were the most common diagnostic classes post-injury. When compared to the general population (5.3%; Australian Bureau of Statistics, 2009) statistically significant elevations were found for mood disorders across all five years post-injury: Year 1 - 30.3%; Year 2 - 22.2%; Year 3 - 23.5%; Year 4 - 18.7% and Year 5 - 20.8%. However for anxiety disorders a statistically significant elevation was only found in the first year post-injury (18.4%), compared to the general population (10.6%; Australian Bureau of Statistics, 2009).

Over the 5 year period, Alway et al. (2016) found that Major Depressive Disorder was the single most common diagnosis (18.7–28.3%), and Depressive Disorder-Not Otherwise Specified (i.e., subsyndromal variant) was the next most common (6.5–15.8%). Over 1 year follow-up, Gould et al. (2011a) found rates of Major Depressive Disorder to be 29.4% and Depressive Disorder-Not Otherwise Specified to be 19.6%. Overall post-TBI depression has received the most empirical

attention. A meta-analysis by Osborn, Mathias, and Fairweather-Schmidt (2014) found a steady, albeit non-significant, increase in clinically significant cases of depression post-TBI. Estimates ranged from: 33% at < 6 months; 35% ≥ 6 months to < 2 years; 41% ≥ 2 years to < 5 years, and; 42% ≥ 5 years. On average 27% were diagnosed with Major Depressive Disorder/Dysthymia post-TBI.

Overall anxiety disorder prevalence has received less empirical attention relative to depressive disorders and estimations have been variable due to methodological differences across studies. A review by Mallya, Sutherland, Pongracic, Mainland, and Ornstein (2015) reported the following post-injury anxiety disorder estimates: Post Traumatic Stress Disorder, 13–24%; Generalised Anxiety Disorder, 3–28%; Obsessive-Compulsive Disorder, 2–15%; Panic Disorder, 4–13%; and Phobic Disorders, 1%-10%. Similar to the review, Alway et al. (2016) found Anxiety Disorder-Not Otherwise Specified was the most common anxiety diagnosis (10.3–34.2%), frequently characterised by subthreshold Post Traumatic Stress Disorder and/or Generalised Anxiety Disorder symptoms.

Alway et al. (2016) found that co-morbidity of two diagnostic classes occurred in 30.1% - 47.1% of the sample across the 5-year period, with highest co-morbidity rates at 3 years post-injury. Between 7.8% and 18.4% were diagnosed with 3 or more diagnostic classes. Specifically, of those diagnosed with a mood disorder, 42.9% – 75.4% had a co-morbid anxiety disorder, with highest co-morbidity rates in the first year. Of those diagnosed with an anxiety disorder, 63.6% - 81.3% had a co-morbid mood disorder diagnosis, with highest co-morbidity rates at three years post-injury. First year co-morbidity rates were in keeping with previous studies (Bombardier et al., 2010; Gould et al., 2011a).

The Alway et al. (2016) study found that of those with a post-injury mood disorder, 35.8% were novel diagnoses and 31.6% were present pre-injury. Similar rates were found for anxiety disorders: 31.8% novel diagnoses, and 34.1% present pre-injury. Post-injury disorders were statistically more common amongst those with a pre-injury history (83.2%) than those without (63.6%). A retrospective 30 year follow-up study of 60 participants by Koponen et al. (2002) found

that disorders continued to develop even > 10 years post TBI. Therefore while disorder rates have the potential to return to those consistent with the general population over a 5-year period, disorders may still develop even decades post-TBI.

Alway et al. (2016), Gould, Ponsford, Johnston, and Schönberger (2011b) and Koponen et al. (2002) found no evidence to suggest that TBI severity influenced risk for a psychiatric disorder post-injury, among those with mild, moderate, severe and very severe TBI. In a prospective cohort study, Fann et al. (2004) found the following psychiatric disorder rates for those with mild and moderate/severe TBI respectively: Year 1 - 25.5% and 38%; Year 2 - 24% and 27.3%, and; Year 3 - 25.6% and 26.3%. Therefore those with mild TBI had relatively persistent rates, whereas those with moderate/severe TBI had highest rates during the first year post-injury.

In summary anxiety and mood disorders are the most common diagnoses post-TBI, and present at rates typically higher than the general population. Major Depressive Disorder, Anxiety/Depressive Disorder-Not Otherwise Specified, and Post Traumatic Stress Disorder are the most common diagnoses and co-morbidity is common. Those who have experienced clinically significant psychiatric symptoms prior to sustaining a TBI are at increased risk of having a psychiatric disorder post-injury. The potential to develop psychiatric disorders exists even > 10 years post-TBI, although overall rates appear to decline over time. Finally people with moderate/severe TBI may have higher rates of psychiatric disorder initially, however ultimately all injury severities are affected.

1.4.1 Treatment of psychological disorders post-TBI.

The presence of a TBI already has a profound impact on a person's life, and the presence of any psychiatric symptomatology has the potential to further confound cognitive and behavioural problems. Gould et al. (2011b) found that having a psychiatric disorder at 12 months post-TBI was significantly associated with unemployment, poor quality of life and use of unproductive coping skills. Whelan-Goodinson, Ponsford, and Schonberger (2008) found the presence of post-injury depression and anxiety was strongly related to poor outcome in terms of vocational status,

relationship status and independence. Although further research is needed to clarify the direction of these relationships, this suggests that psychological disorders negatively impact quality of life, above and beyond the effect of new physical and cognitive deficits. Furthermore such symptoms have the potential to hinder engagement with rehabilitation treatments.

TBI associated increased risk of depression, impulsivity and substance abuse is a potentially dangerous clinical combination. Several reviews (Goldstein & Diaz-Arrastia, 2018; Reeves & Laizer, 2012; Wasserman et al., 2008) have highlighted a concerning link between TBI and suicide risk. Indeed a recent retrospective cohort study of people living in Denmark (1980-2014) found that of the 34,529 individuals who died by suicide, the rate was 41 per 100 000 person-years among those with TBI and 20 per 100 000 person-years among those without TBI (Madsen et al., 2018). The reviews conclude that effective treatment of associated mental health issues is imperative in the prevention of suicide in this population.

The negative impact of depression and anxiety disorders on TBI recovery, in addition to, emotional, social and occupational functioning, means effective treatment both in the early and late stages of TBI is essential. Strong evidence currently exists for the use of psychotherapy in the treatment of depression and anxiety in the general population (Cuijpers, Sijbrandij, et al., 2014; Cuijpers, Turner, et al., 2014). However research in psychotherapy for the TBI population has been a somewhat neglected area. This may be attributed to an initial perception that associated cognitive impairments may limit the person's capacity to benefit from psychotherapy. This poses a challenge for practitioners who are left without treatment recommendations and guidelines for the most common psychological issues following TBI. A systematic review conducted by Fann, Hart, and Schomer (2009) found Cognitive Behaviour Therapy (CBT) to have the strongest preliminary evidence for the treatment of depression following TBI. Experts (Khan-Bourne & Brown, 2003; Manchester & Wood, 2001; Ponsford, Sloan, & Snow, 2012) also identify CBT as an approach most appropriate for accommodating the special needs of the TBI population.

1.4.2   Cognitive Behaviour Therapy.

Cognitive Behaviour Therapy, or CBT, was created by Aaron T. Beck in the 1970s (A. T. Beck, Rush, Shaw, & Emery, 1979). Now a large number of approaches can be identified as cognitive-behavioural in nature (e.g. rational emotive behaviour therapy, schema therapy, problem solving therapy, mindfulness and acceptance interventions) (Dobson, 2010). Support for Beck's model has been found in meta-analytic reviews (Butler, Chapman, Forman, & Beck, 2006; Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). Furthermore, neuroimaging studies also show that CBT is associated with measureable changes in brain function, including functional connectivity (Franklin, Carson, & Welch, 2016; Mason, Peters, & Kumari, 2016). Modern CBT's wide evidence base (see NICE Guidelines, 2007 and APA Practice Guidelines, 2010) makes it both an ethical and economical treatment approach.

Specifically, Beck's model posits that maladaptive cognitive content and mechanisms, rather than events, give rise to the emotions, behaviour and bodily sensations that ultimately result in psychological disorders. Cognitive structures described by Beck include core beliefs, assumptions and automatic thoughts. Underlying core beliefs (e.g., "I'm unlovable") and assumptions (e.g., "If I get close to someone, they will hurt me") develop through early learning experiences (e.g., maltreatment) and are activated in response to stressful situations in later life. Cognitive mechanisms on the other hand refer to the way in which information is processed, which may serve to maintain maladaptive beliefs, assumptions and thoughts. A person may also develop negative beliefs and thoughts about the way they process information (J. S. Beck, 2011).

CBT is underpinned by 10 basic principles, specifically CBT: 1) *"Is based on an ever-evolving formulation and conceptualisation of each patient's problems in cognitive terms"*; 2) *"Requires a sound therapeutic alliance"*; 3) *"Emphasises collaboration and active participation"*; 4) *"Is goal oriented and problem focused"*; 5) *"Initially emphasises the present"*; 6) *"Aims to teach the patient to be their own therapist, and emphasises relapse prevention"*; 7) *"Aims to be time limited and 8) structured";* 9) *"Teaches patients to identify, evaluate, and respond to their dysfunctional thoughts and beliefs"*; 10) *"Uses a variety of techniques to change thinking, mood,*

and behaviour" (J. S. Beck, 2011, pp. 7-10). A typical CBT session involves assessing the client's mood, setting an agenda, reviewing the client's week, reviewing therapy homework, prioritising the agenda, discussing agenda items, designing and assigning new or revised therapy homework, summarising the session and eliciting client feedback. A course of CBT treatment typically involves 6 – 15 one-hour sessions (J. S. Beck, 2011).

Therefore in the case of a client with depression and anxiety symptoms following a TBI, the CBT therapist focuses on the relationship that exists between the client's mental processes, emotions, behaviour and bodily sensations. They aim to modify the client's unhelpful appraisals of life events into those that are more adaptive, in the context of cognitive deficits. The basic principles of CBT, and session structure, present as both obstacles and advantages for a brain-injured client experiencing impairments in attention, memory, learning and executive function. Firstly, goals and problems (principle 4) are stated in behavioural terms with tangible data gathered for the purposes of experimentation, accommodating client difficulty processing abstract concepts. Secondly, as highlighted by principle 8, CBT is highly structured. This refers both to facilitating sessions with a prioritised agenda and sequencing of techniques across sessions, which assists clients with executive functioning difficulties. Thirdly, while the basic principles of CBT apply to all patients, it is expected that therapy will vary according to individual needs, including the nature of the client's difficulties, cultural background and cognitive ability. Therefore while CBT is highly structured, it is also adaptable enough to maintain client autonomy. This flexibility is further emphasised by principle 10, in that it is expected techniques chosen in and between sessions will be influenced by the conceptualisation of the patient, their problems and the aim of the session. Finally, CBT already involves the use of written aids which, when extended, serve as a compensatory strategy for memory deficits. Therapy tasks are often practised in-session or in-vivo, which allows clients to acquire information procedurally and builds in repetition.

On the other hand, the requirement for a sound therapeutic alliance (principle 2) may be challenged by interpersonal difficulties that may develop following brain injury. Principle 3 highlights the collaborative nature of CBT and the importance of the client taking an active role. However executive functioning and memory difficulties may reduce the client's participation in

structuring session content, and in choosing and organising between-session interventions. An integral aim of CBT is to teach the client to be their own therapist (principle 6). The ability to acquire new information and skills is often impaired in brain-injured clients and may hinder the attainment of this objective. Clients are likely to have difficulty applying therapist feedback and may repeat the same "mistakes". Once new information and skills have been acquired, brain-injured clients may be less able to generalise these skills to different situations due to cognitive inflexibility. Finally, CBT also requires the client to understand abstract concepts and their capacity to do this may also be impaired.

1.5 RCTs of CBT Adapted for Brain Injury

While aspects of CBT are well-suited for a brain-injured client, modifications are arguably required in order to assist the client to effectively progress in therapy. These modifications would aim to compensate for the client's cognitive deficits, which ultimately support the retention and application of therapy content. For example, shortening the time spent on individual therapy tasks and incorporating frequent repetition of key concepts may address attentional deficits. Use of a therapy notebook, verbal cues from the therapist and electronic reminders may ease burden on clients' memory. Incorporation of visual aids may help to accommodate problems with language. Therapists concretising abstract content and delivering instructions in a structured, directive and clear way can bypass impairments in executive functioning. Provision of feedback and encouraging consideration of pros/cons of client decisions can help develop self-awareness, insight and motivation (Block & West, 2013; Khan-Bourne & Brown, 2003; Klonoff, 2010; Ponsford, Sloan, & Snow, 2012). Although research into the effectiveness of CBT adapted for brain injury has made important advances, there are currently only a small number of RCTs examining its effectiveness in TBI samples. The following describes findings from RCTs that have compared CBT to usual care, wait-list and active control groups, in clinical and non-clinical acquired brain injury (ABI) samples, including TBI.

1.5.1 CBT vs usual care/wait-list control for clinical samples post-TBI.

Fann et al. (2015) tested the efficacy of CBT for post-TBI Major Depressive Disorder (n = 100). Thirty-one percent of the sample had a severe TBI. Using a choice-stratified randomisation, participants were distributed to three groups: telephone-administered CBT, in-person CBT or usual care. The CBT intervention was adapted from Simon and Ludman's (Ludman, Simon, Tutty, & Von Korff, 2007; Simon, Ludman, Tutty, & Operskalski, 2004) structured telephone care management and CBT protocol. Therapist treatment protocol adherence was considered 'excellent' based on fidelity testing. CBT treatment was reportedly adapted for TBI in several ways. For example, a close other was invited to attend sessions and motivational interviewing was used to increase engagement. The protocol was extended from an eight to 12-session structure so that material could be presented in smaller portions, more slowly and with greater repetition. There was no statistically significant difference between the combined CBT and usual care groups on clinician or patient-rated depression measures. However completers of eight or more CBT sessions reported significantly greater improvement in patient-reported depressive symptoms compared with those receiving usual care.

Hsieh, Ponsford, Wong, et al. (2012a) developed a CBT-based anxiety treatment manual designed to accommodate TBI-related cognitive deficits. Two case studies were utilised to illustrate the implementation of the treatment for individuals with moderate-severe TBI. Adaptations included repetition, therapist prompting/guidance, concretising content, use of personalised analogies/metaphors, simplified checklists, visual aids and a therapy folder. Following participant and therapist feedback, the manual was modified to incorporate depression-related materials and a wider selection of handouts with more concrete visual cues (e.g., cartoons). Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012) pilot-tested this enhanced treatment manual in an RCT of pre-CBT Motivational Interviewing for the treatment of anxiety.

Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012) recruited 27 participants with a diagnosed anxiety disorder. Thirty-six percent were classified as having a severe injury and 28% very severe. Participants were randomised into three groups: Motivational Interviewing + CBT,

Non-Directive Counselling + CBT, and usual care. Therapist Motivational Interviewing and CBT treatment protocol adherence was considered 'adequate' to 'high' based on fidelity testing. Both the Non-Directive Counselling + CBT and Motivational Interviewing + CBT groups separately demonstrated greater anxiety reduction upon treatment completion compared to usual care. The same significant difference was not found for a second anxiety measure. The Motivational Interviewing + CBT group showed a greater reduction in anxiety levels from pre-CBT to post-CBT, compared to the Non-Directive Counselling + CBT group. No differences were found for changes in depression levels, which were in the mild to moderate range at baseline. Unlike Fann et al. (2015) the CBT groups were not combined and compared to the usual care group.

Tiersky et al. (2005) tested the effectiveness of a program combining cognitive remediation and CBT for the treatment of affective and neuropsychological sequelae post-TBI. Twenty participants with clinically significant levels of emotional distress were recruited into the study. Ninety percent had a mild TBI, and the remainder a moderate TBI. Participants were randomised to treatment or a wait-list control group. The cognitive remediation included exercises designed to improve compensatory skills primarily focused on attention, information processing and memory. The CBT treatment was reportedly adapted to each person's level of cognitive functioning, however specific modifications were not reported. All treatment manual components were reportedly administered according to its specifications, however fidelity-testing processes were not described. A significant treatment effect was found for anxiety and depression symptoms compared to wait-list control at 1 and 3 month follow-up.

Bédard et al. (2014) compared Mindfulness-Based Cognitive Therapy (MBCT) to wait-list control group for the treatment of post-TBI depression. The study represented an extension of two pilot studies, one of which tested the combination of CBT and mindfulness-based stress reduction (Bédard et al., 2012; Bédard et al., 2003). Participants were 76 people with depression symptomatology in the moderate range. Brain injury severity was not reported. The treatment condition used elements from a mindfulness-based stress reduction program and MBCT manual (Kabat-Zinn, 2009; Segal, Williams, & Teasdale, 2002). The MBCT was customised to address TBI associate cognitive deficits. For example treatment duration was extended from eight to 10

weeks, delivered with simplified language, repetition, handouts and visual aids to help reinforce concepts. Reduction in depression symptoms was found to be greater for the MBCT group than wait-list control at post-treatment, however significant group differences were not found for a second depression measure.

1.5.2   CBT vs active control for clinical samples post-TBI.

D'Antonio, Tsaousides, Spielman, and Gordon (2013) compared CBT to supportive psychotherapy in the treatment of post-TBI Major Depressive Disorder ($n = 44$). Injury severity reporting was incomplete, however 14% of the sample reported a severe TBI, 9.3% moderate and 9% mild. Participants were included only if they were willing to abstain from seeking psychotherapy during study enrolment. The CBT intervention was reportedly modified to address TBI associated cognitive deficits. For example, compensatory strategies to address memory problems and executive dysfunction were utilised (e.g., tape recording sessions). The Supportive Psychotherapy focused on providing an empathetic environment and psycho-education. Treatment was administered according to a manualised protocol. Treatment fidelity assessment was described, however results were not reported. While depression symptoms improved in both groups, there were no significant group differences at post-treatment. The sample was drawn from a larger study (not referenced), therefore analyses were post hoc and interpretations are limited.

Ashman, Cantor, Tsaousides, Spielman, and Gordon (2014) conducted a prospective study comparing CBT to Supportive Psychotherapy in the treatment of diagnosed and/or clinically significant depression ($n = 54$) following TBI. A third of the participants in each condition also met diagnosis for an anxiety disorder at baseline. Majority of participants had a moderate to severe TBI. The CBT intervention was reportedly adapted to address TBI associated cognitive impairments. Strategies included the use of memory supports and organisational strategies (e.g., written handouts). Supportive psychotherapy included interventions and techniques such as forming/maintaining a therapeutic alliance, normalising, psycho-education and relapse prevention (Pinsker, Rosenthal, & McCullough, 1991; Winston, Pinsker, & McCullough, 1986). Therapist treatment fidelity was reportedly not violated based on independent-evaluator testing. At the end of

treatment, 35% of participants in the CBT group no longer met criteria for depression compared with 17% of participants in the Supportive Psychotherapy group. However there were no statistically significant differences in remission or symptom improvement rates between the two groups overall.

R. A. Bryant, Moulds, Guthrie, and Nixon (2003) compared CBT to supportive counselling for prevention of Post Traumatic Stress Disorder in those diagnosed with Acute Stress Disorder post-TBI (*n* = 24). Participants had sustained a mild TBI two weeks prior to study entry. The CBT included trauma psycho-education and imaginal exposure. The supportive counselling also included trauma psycho-education and general problem-solving skills. On average therapist manual adherence was 5.1 (0 = "unacceptable," 6 = "superior") based on fidelity-testing by two independent raters. Specific treatment adaptations for accommodation of TBI associated cognitive impairments were not reported. At post-treatment and 6-month follow-up, fewer patients met criteria for Post Traumatic Stress Disorder in the CBT group than in the supportive counselling group. Participants entered the study with anxiety and depression levels in the moderate range. At post-treatment the CBT group also had comparatively lower anxiety levels, but not at 6 month follow-up. No differences were found for depression symptoms.

1.5.3   CBT vs usual care/wait-list control for non-clinical samples post-TBI.

Anson and Ponsford (2006a) compared a CBT based group intervention (i.e., coping skills group) with wait-list control. The coping skills group aimed to enhance coping strategy use and emotional adjustment post-TBI. Thirty-one participants received the coping skills group intervention and also served as their own wait-list control. Forty-five percent of participants had a severe brain injury. The presence of emotional issues was not a pre-requisite for participation in the study, and anxiety and depression symptoms were in the mild range at baseline (Anson & Ponsford, 2006b). The study did not report specific adaptations to content delivery for the purposes of accommodating TBI associated cognitive impairments. Adaptive coping increased significantly immediately following the coping skills group, declined 5 weeks following intervention and then

significantly increased at 6–24 months following intervention. The coping skills group had no effect on anxiety and depression symptoms.

1.5.4   CBT vs usual care/wait-list control for clinical samples post-ABI.

Medd and Tate (2000) compared a cognitive–behavioural intervention to wait-list control for anger management. The study recruited 16 participants, 13 of which had closed head injuries. Most participants had a moderate to severe brain injury. Anxiety levels were in the moderate range at pre-intervention and depression levels were in the normal to mild range. Treatment was based on the Stress Inoculation Training principles (Novaco, 1975), but modified to impart information relevant to the ABI population (e.g., common difficulties following ABI). The treatment included handouts summarising topics covered in each session and a simplified model of anger. However specific adaptations to accommodate ABI associated cognitive deficits were not explicitly reported. A significant decrease in anger for the treatment group was found compared to a wait-list control group and improvements in anger management were maintained at 2-month follow-up. A treatment effect was not found for anxiety or depression symptoms.

Hodgson, McDonald, Tate, and Gertler (2005) compared CBT with a wait-list control group for the treatment of social anxiety post-ABI. Twelve participants were recruited into the study, nine had suffered a closed head injury. Six participants (50%) demonstrated social anxiety in the clinical range and five participants (42%) were above average but not clinically diagnostic. Pre-intervention depression levels were in the mild range and pre-intervention general anxiety levels were in the mild to moderate range. The intervention was adapted for ABI associated cognitive deficits. This reportedly included shorter sessions, more frequent breaks, the use of visual aids, cue-cards, session summaries, audiotapes (i.e., relaxation tapes and taped session summaries), prompts to complete homework and simplified monitoring forms. Specific treatment effects for social anxiety were not significant. However significant improvements in general anxiety and depression at post-treatment and 1 month follow-up were found when compared to the wait-list control group.

1.5.5   CBT vs active control for clinical samples post-ABI.

Bradbury et al. (2008) compared CBT with an education control group for the treatment of emotional distress ($n = 20$). Half of the participants had a brain injury caused by trauma; all severities were in the moderate to severe range. Participants were assigned to four groups: 1) telephone-administered CBT, 2) face-to-face, group format CBT, 3) telephone-administered education control, and 4) face-to-face group-administered education control. The CBT was reportedly tailored to meet the cognitive needs of people with ABI. For each patient, their ability to benefit from repetition, capacity to learn and retain information, and speed of information processing was identified through neuropsychological assessment, and guided the process of treatment delivery. Participants in the education control groups were provided wide-ranging information regarding brain injury and ABI sequelae. Depression and anxiety symptoms were not examined individually; rather global emotional distress scores were utilised. Significantly greater improvement in emotional distress for the CBT groups, compared with the education control groups, was found from pre-treatment to post-treatment and at 1-month follow-up.

1.5.6   CBT vs usual care/wait-list control for non-clinical samples post-ABI.

Backhaus, Ibarra, Klyce, Trexler, and Malec (2010) compared a cognitive-behavioural group intervention (i.e., Brain Injury Coping Skills Group), to wait-list control. The group intervention aimed to enhance emotional functioning and self-efficacy post-ABI. Forty participants underwent treatment, including 20 people with ABI and 20 caregivers. Nine of the participants had a TBI. Participant injury severity information was not reported. Anxiety and depression levels were not in the pathological range at pre-intervention. Facilitators followed a therapist manual; however there was no reference to the framework on which the treatment was based, or fidelity testing. The intervention description indicated that adaptations might have been made to accommodate cognitive deficits, but these were not explicitly identified as such. There were no significant differences between groups on levels of psychological distress at post-treatment or follow-up. However wait-list control group participants became significantly more emotionally distressed at

the 3-month follow-up, whereas the treatment group remained stable in emotional functioning over time.

1.5.6.1 *Summary of RCTs of CBT adapted for brain injury.*

Of the 12 studies described, 10 were conducted in a sample diagnosed with a psychiatric disorder or experiencing clinically significant psychological symptomatology after brain injury. Of those 10 studies, seven specifically targeted or examined anxiety and/or depression symptoms.

Three of these studies did not find a CBT treatment effect for their primary anxiety/depression outcome measure/s: Ashman et al. (2014) - CBT vs. Supportive Psychotherapy for depressive disorder remission rates/self-reported symptoms; Hodgson et al. (2005) - CBT vs. wait-list control for self-reported social anxiety symptoms, and; D'Antonio et al. (2013) - CBT vs Supportive Psychotherapy for self-reported depression symptoms. Three studies did find a CBT treatment effect for their primary anxiety/depression outcome measure: Fann et al. (2015) – CBT (participants who completed ≥ 8 sessions only) vs. usual care for patient-rated depression measure; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012) - Motivational Interviewing + CBT vs. wait-list control and Non-Directive Counselling + CBT vs. wait-list control for self-reported anxiety symptoms, and; Bédard et al. (2014) – MBCT vs. wait-list control for depression symptoms. In the study by Tiersky et al. (2005) primary outcome was overall emotional distress for which a treatment effect (i.e., Cognitive Remediation + CBT vs. wait-list control) was found.

Three studies did not find a CBT treatment effect for their secondary anxiety/depression outcome measure/s: Ashman et al. (2014) - CBT vs Supportive Psychotherapy for anxiety disorder remission rates/self-reported symptoms; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012) - Motivational Interviewing + CBT vs. wait-list control and Non-Directive Counselling + CBT vs. wait-list control for corroboratory anxiety measure and self-reported depression symptoms, and; Bédard et al. (2014) - MBCT vs. wait-list control for a secondary depression measure. Two studies did find a CBT treatment effect for their secondary anxiety/depression outcome measure/s: Hodgson et al. (2005) - CBT vs. wait-list control for self-reported anxiety and depression

symptoms, and; Tiersky et al. (2005) - CR + CBT vs. wait-list control for self-reported anxiety and depression symptoms. Fann et al. (2015) and D'Antonio et al. (2013) did not examine secondary measures of anxiety and/or depression.

Therefore four of the seven studies found a treatment effect for primary and/or secondary anxiety and/or depression outcome measures (Bédard et al., 2014; Hodgson et al., 2005; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Tiersky et al., 2005). In this already small number of studies, comparisons are limited due to several methodological factors described in the following section.

1.5.7   Methodological considerations.

1.5.7.1   *Treatment comparability and fidelity.*

While all seven studies delivered cognitive-behaviourally based interventions, there were important differences in the treatment delivered. Two studies (Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Tiersky et al., 2005) involved a pre-intervention or combination treatment (i.e., Motivational Interviewing/Non-Directive Counselling + CBT or Cognitive Remediation + CBT). The study by Bédard et al. (2014) involved a treatment (i.e. Mindfulness Based Cognitive Therapy) emphasising thought decentering (i.e., restructuring relationship with thoughts), rather than thought content challenging, as in the remaining studies (Ashman et al., 2014; D'Antonio et al., 2013; Fann et al., 2015; Hodgson et al., 2005). Furthermore, in the pilot RCT by Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012) the CBT groups (i.e., Motivational Interviewing + CBT and Non-Directive Counselling + CBT) were not combined and compared to usual care.

Therefore, it is difficult to determine the impact of the CBT framework and associated cognitive model guiding treatment. Three of the four RCTs delivering stand-alone CBT consistent with Beckian theory (A. T. Beck et al., 1979) did not find a statistically significant CBT treatment effect for primary anxiety and/or depression measures (i.e., Ashman et al., 2014; D'Antonio et al., 2013; Hodgson et al., 2005). However the study by Hodgson et al. (2005) found a statistically

significant CBT treatment effect for secondary measures of anxiety and depression. Specifically average anxiety and depression scores for the treatment group dropped from indicating a probable diagnosis to scores in the nonclinical range.

Intervention duration also differed between studies: 16 sessions over 3 months (Ashman et al., 2014; D'Antonio et al., 2013); 12 weekly sessions (Fann et al., 2015; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012); 9 – 14 weekly sessions (Hodgson et al., 2005), and; 10 weekly sessions (Bédard et al., 2014). Tiersky et al. (2005) delivered two sessions, 3 days per week, for an 11-week period, with both sessions completed in the same day. Notably follow-up treatment sessions were not offered in any of the studies. Only three of the studies reported fidelity-testing results (Ashman et al., 2014; Fann et al., 2015; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012).

Finally, variability in RCT reporting means it is also unclear exactly which CBT components were delivered and whether they were delivered to all participants. In the context of brain injury this is important because placing emphasis on behavioural interventions is a recommended adaptation to CBT treatment delivery (Gallagher, McLeod, & McMillan, 2016). RCTs by Ashman et al. (2014), Fann et al. (2015) and Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012) provided relatively more detailed session-to-session or module outlines, which were accompanied by acceptable fidelity assessment results. However the actual delivery and timing of specific CBT interventions is not empirically supported across RCTs of CBT post brain injury.

1.5.7.2   *Control group management.*

Reporting of control group management indicated differing levels of potentially therapeutic input during study enrolment. Five of the seven studies utilised a wait-list control or usual care group. Fann et al. (2015) reported that 14% of usual care participants received > 4 sessions of counselling while enrolled in the study. Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012) reported that three usual care participants received non-directive counselling while enrolled in the study. The remaining studies did not report on wait-list control group potential external therapeutic

input (Bédard et al., 2014; Hodgson et al., 2005; Tiersky et al., 2005). Fann et al. (2015) speculated that involvement in a control group, in which participants were welcome to seek external therapeutic intervention, may have contributed to non-significant findings by prompting treatment that otherwise would not have occurred.

1.5.7.3   *Brain injury and clinical severity.*

Three of the seven studies included a large percentage of participants with moderate to severe brain injury. Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012) was the only study to find a primary outcome treatment effect for anxiety in a TBI sample of moderate to severe severity. The two remaining studies to show an effect on either primary or secondary measures were in the context of mild TBI (Hodgson et al., 2005; Tiersky et al., 2005). Bédard et al. (2014) did not report on participant injury severity. Fann et al. (2015) included participants with high levels of medical and psychiatric co-morbidity, and considered non-significant findings to be attributed to the potential for such patients to be treatment resistant. Tiersky et al. (2005) targeted overall emotional distress, including anxiety and depression symptoms. However in the remaining studies, depression and anxiety were not targeted simultaneously, despite high comorbidity in the TBI population.

1.5.7.4   *Sample size.*

Small sample size is a common methodological issue impacting psychotherapy studies of people with ABI. Across the entire 12 studies reviewed, the majority had small sample sizes. Sample sizes utilised in final analyses for the seven studies specifically examining anxiety and/or depression were as follows: Fann et al. (2015), $n = 100$; Bédard et al. (2014), $n = 76$; Ashman et al (2014), $n = 54$; D'Antonio et al. (2013), $n = 44$ Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012), $n = 27$; Tiersky et al. (2005), $n = 20$, and; Hodgson et al. (2005), $n = 12$. Therefore of the three studies with the largest sample sizes, two did not find a CBT treatment effect, despite having enough statistical power to detect one. The study with one of the largest sample sizes that did find an effect (Bédard et al., 2014) involved a treatment approach (i.e., Mindfulness Based Cognitive Therapy) not directly comparable to the remaining studies.

1.5.7.5   Anxiety and depression measure sensitivity.

Measurement of anxiety and depression symptoms in people with TBI is challenging due to symptom overlap with the sensory-motor, cognitive and behavioural symptom of brain injury (e.g., fatigue, shaking etc.). Indeed Fann et al. (2015) and Hodgson et al. (2005) found scales including a higher proportion of somatic symptoms (i.e., 17-item Hamilton Depression Rating Scale and Social Phobia and Anxiety Inventory respectively), showed a lower treatment effect, or no treatment effect, compared to those minimising somatic symptoms (i.e., Symptom Checklist-20 and Hospital Anxiety and Depression scale-Anxiety subscale respectively). Factor structure examination of the Hospital Anxiety and Depression scale by Schönberger and Ponsford (2010) has demonstrated support for the validity of the anxiety and depression subscales in a TBI sample. Studies have also validated the sensitivity of the Depression, Anxiety and Stress Scales in TBI samples (Dahm, Wong, & Ponsford, 2013; Wong, Dahm, & Ponsford, 2013).

Hodgson et al. (2005) reported that participants appeared to become distracted and respond impulsively due to the Social Phobia and Anxiety Inventory length. Similarly a study by Hsieh, Ponsford, Wong, and McKay (2012) reported that some participants declined to respond to items on a working alliance measure, due to confusion and discomfort with item wording, possibly attributable to concrete thinking style. Taken together this highlights the need to choose instruments that minimise somatic symptoms associated with injury and that are not unreasonably taxing for the cognitive impairments of a person with brain injury (e.g., lengthy measures, abstract wording etc.).

1.5.7.6   Treatment adaptations for brain injury associated cognitive deficits.

The mixed and non-significant findings across RCTs could also reflect the variability in the manner in which interventions were reportedly modified to accommodate brain-injury associated cognitive deficits. The majority of the studies reported adaptations specific to brain injury associated cognitive impairments, albeit with varying levels of detail. Those studies providing the most detail were that of Ashman et al. (2014), Fann et al. (2015) and Hsieh, Ponsford, Wong,

Schönberger, Taffe, et al. (2012). These studies provided comprehensive adaptation lists, access to supplemental documentation outlining session-by-session content, and referred to previously tested treatment manuals. However several studies did not explicitly refer to brain-injury specific CBT adaptations (Anson & Ponsford, 2006a; Backhaus et al., 2010; R. A. Bryant et al., 2003; Medd & Tate, 2000; Tiersky et al., 2005).

This variability in adaptation reporting procedure is in keeping with a recent review by Gallagher et al. (2016), the first to examine how recommended adaptations are reportedly being implemented in CBT for psychological issues post brain injury. The review found that all studies (n = 16) provided a description of the general components of CBT covered in their interventions. Yet considerable variability was found on all other levels of reporting quality (i.e., precise details of the experimental treatment; description of procedures for tailoring intervention to individual participants; details of how the intervention was, or could be, standardised, and; details of how adherence to protocol was assessed or enhanced). Five studies indicated that a treatment manual was available, however none were provided in response to the authors' request. The authors concluded that inconsistent reporting of adaptations posed a barrier to developing effective and replicable therapies for people with brain injury.

Remarkably there is currently no evidence to support the implementation of these reported adaptations. Treatment fidelity testing was aimed at confirming adherence to a specific therapeutic framework, rather than ensuring treatment delivery adequately accommodated cognitive deficits. Therefore, whether the reported strategies were actually implemented, and how they were implemented, is unknown. Furthermore, lack of appropriate measures currently precludes adaptation assessment. Taken together with the lack of clarity regarding which CBT components are actually delivered to people with brain injury, this highlights a significant research gap. Exactly how therapists tailor CBT to people with TBI is yet to be empirically examined.

In summary there is sufficient empirical support to warrant further investigation of adapted CBT in the treatment of anxiety and depression post-TBI. However, methodological issues and the small number of studies have limited interpretation of current findings. The most recent RCT of

TBI adapted CBT by Ponsford et al. (2016) has addressed some of the limitations described above. This study serves as the parent RCT for the current study and will now be described.

1.6   PARENT RCT

An RCT by Ponsford et al. (2016), which represents an extension of the Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012) pilot study, evaluated the efficacy of pre-intervention Motivational Interviewing for TBI adapted CBT (CBT-ABI; Wong et al., in press). Participants with TBI were recruited via referral from rehabilitation centres or neuropsychologists between May 2008 and June 2013. To be eligible individuals were required to be currently experiencing symptoms consistent with depressive and/or anxiety disorders according to the Structured Clinical Interview for DSM-IV (First, Spitzer, Gibbon, & Williams, 2007). Ponsford et al. (2016) recruited enough participants to detect a moderate effect size ($n = 75$). The majority of participants had an anxiety disorder co-morbid with a depressive disorder (60%), and the CBT-ABI treatment targeted both. On average participants were male, aged 42.24 years old and 3.73 years post-TBI. The sample primarily consisted of people with moderate (30.8%), severe (36.9%) and very severe (26.2%) TBI.

Participants were randomly allocated to three groups: 1) Motivational Interviewing + CBT-ABI, 2) non-directive counselling (Non-Directive Counselling) + CBT-ABI, or 3) wait-list control. Participants in the treatment groups received three sessions of Motivational Interviewing/Non-Directive Counselling, 12 sessions of CBT-ABI, and three CBT-ABI booster sessions. Wait-list control participants were discouraged from having external psychological therapy and none reported receiving psychological therapy during study enrolment. CBT-ABI was delivered in accordance with the therapist manual (Wong et al., in press) that had previously been pilot tested by Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012). The CBT-ABI intervention was based on Beck's CBT model (A. T. Beck et al., 1979), consisting of eight modules: 1) assessment feedback and psycho-education, 2) anxiety management (relaxation), 3) behavioural activation, 4) modification of unhelpful thinking styles, 5) graded exposure, 6) structured problem solving, 7) self-soothing strategies and 8) relapse prevention.

In order to systematically evaluate treatment effectiveness, a treatment decision-making tree in the therapist manual guided therapist intervention selection. This accommodated a flexible approach while preserving therapy structure. The decision making tree was set up to address the key symptom groups within depression and anxiety. For example, if a patient's primary presenting problem was depression, the therapist would identify from a clinical assessment which symptom groups were most problematic (e.g., inactivity and unhelpful thinking). Each symptom group had a treatment component attached to it (e.g., Behavioral Activation and Thinking Strategies). The relevant components chosen by the therapist comprised the client's treatment plan. Therefore modules could be combined and repeated if necessary, or excluded if appropriate. Majority of the modules were relevant to most participants, as 60% of the sample had co-morbid depression and anxiety.

Clinical psychologists and clinical neuropsychologists, with an average of 7 years post-degree experience, delivered the CBT-ABI intervention. All therapists received advanced CBT training, including training in implementation of the specialised CBT-ABI manual. Therapists attended regular group and individual supervision meetings with four highly experienced clinicians, to discuss case formulations and ensure CBT-ABI manual adherence. An expert CBT assessor undertook treatment integrity monitoring every 6-12 months. In total 10% of the sessions were assessed and given three ratings (0 = unacceptable/not present to 7 = excellent/high occurrence): (1) adherence to CBT-ABI, and (2) adherence and (3) competency in delivery of the specific treatment module(s). Overall adherence ratings were an average 5.71, treatment module specific adherence was 5.79 and competency 5.74.

Treatment adaptations, designed to accommodate participants' TBI associated cognitive impairments, were also outlined in the therapist manual (Wong et al., in press). As previously described (Hsieh, Ponsford, Wong, et al., 2012a; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012) adaptations reportedly included incorporating shorter sessions, frequent breaks, external memory aids (e.g., handouts, note-taking and audiotapes), simplified cognitive strategies, visual aids and increased therapist guidance. Therapists were expected to incorporate them flexibly,

guided by participants' cognitive deficit needs. Treatment included three CBT-ABI booster sessions, increasing opportunity to further consolidate, practice and generalise new skills.

The authors chose primary outcome measures that had demonstrated adequate sensitivity to anxiety and depression symptoms in individuals with TBI (i.e., Hospital Anxiety and Depression Scale-Anxiety subscale and Depression Anxiety Stress Scales-Depression subscale) (Dahm et al., 2013; Schönberger & Ponsford, 2010; Wong et al., 2013). The study found that the group receiving Motivational Interviewing did not show greater gains than the group receiving Non-Directive Counselling. However, the combined CBT-ABI groups showed significantly greater reduction in anxiety and depression over 30 weeks post-baseline relative to wait-list control. Fifty-five percent of the CBT-ABI group had moved to a lower Hospital Anxiety and Depression Scale-Anxiety symptom severity category by 30 weeks, compared to 33% in the wait-list control group. On the DASS-Depression scale 65.5% of the CBT group had moved to a lower symptom severity category by 30 weeks, compared to 20% of the wait-list control group.

For all studies comprising this thesis, data were collected from the audio-recorded CBT-ABI sessions from the Ponsford et al. (2016) RCT, therefore it will be referred to as the parent RCT henceforth.

1.7   PREDICTORS OF TREATMENT OUTCOME IN CBT ADAPTED FOR TBI

The findings from Ponsford et al. (2016) reinforce that adapted CBT holds promise for people with brain injury, especially in the treatment of anxiety and depression. However mixed findings indicate that this treatment is not effective for everyone. It is necessary to better understand the modifiable factors that contribute to treatment outcome so adapted CBT effectiveness can potentially be enhanced. Very few studies have examined predictor-outcome relations in the context of TBI adapted CBT (Anson & Ponsford, 2006b; Bombardier et al., 2017; Hsieh, Ponsford, Wong, & McKay, 2012; Ponsford et al., 2016).

Anson and Ponsford (2006b) investigated the variables associated with positive psychological outcome following their CBT based group intervention described earlier. The

predictor variables examined were age at injury, time since injury, injury severity, self-awareness, premorbid intellectual function, memory function, executive function and level of depression and anxiety prior to intervention. They found a greater percentage decrease in depression was associated with greater injury-related deficit self-awareness, lower injury severity, higher pre-morbid intellectual function and greater pre-intervention anxiety. In contrast, a greater percentage increase in depression following intervention was associated with better memory functioning and greater pre-intervention depression. Age at injury, time since injury and executive function did not make a unique contribution to outcome following intervention. Furthermore, the authors found that none of the predictor variables contributed significantly to change in anxiety or participant coping style.

Bombardier et al. (2017) investigated predictors of depression symptom change following the CBT intervention reported by Fann et al., 2015. The authors examined the extent to which baseline cognitive, behavioral, or physical activity variables predicted change in depression severity from baseline to 16 weeks. They found no consistent predictors of change in depression severity across both clinician and patient-rated depression measures. However more time spent engaging in exercise at baseline was associated with a greater decrease in clinician-rated depression scores. The authors also examined the extent to which change in predictor variables was related to change in depression severity. They found a greater increase in satisfying experiences/events in the participant's everyday life to be related to a greater decrease in depression severity on both measures. There was also a non-significant trend for a decrease in sitting time to be related to decreased depression severity on both measures.

Hsieh, Ponsford, Wong, and McKay (2012) explored the variables associated with treatment response in their pilot RCT (Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012). Predictor variables examined included age at study entry, time since injury, injury severity, education, premorbid IQ, memory functioning, executive functioning and self-awareness. Baseline anxiety severity, premorbid IQ and executive functioning did not demonstrate a significant association with change in anxiety symptoms. However injury severity and memory showed a moderate association that approached significance. Ponsford et al. (2016) found higher anxiety and

depression levels at baseline to be significantly associated with a better treatment response. This shows that more research is needed to clarify the role of client demographic and brain-injury specific variables on treatment outcome, while accounting for the impact of pre-intervention symptom severity.

1.8   CBT PROCESS VARIABLES

Effective CBT is dependent upon several processes, the most researched of which are the working alliance, homework compliance and therapist competence. There is currently no research that has examined the impact of TBI on these processes in the context of adapted CBT.

1.8.1   Working alliance.

The concept of the working alliance was initially introduced in the psychodynamic framework (Freud, 1957; Greenson, 2008). Since this time it has evolved within multiple theoretical orientations, including CBT (J. S. Beck, 2011). Bordin (1979) defined the alliance to comprise the following: 1) mutual agreement between client and therapist regarding therapy goals; 2) mutual agreement on tasks that facilitate reaching therapy goals; and 3) the bond between client and therapist, including their mutual liking, trust, respect and appreciation for one another.

Alliance-outcome research findings have been mixed when studies have controlled for prior symptom change (Barber, Connolly, Crits-Christoph, Gladis, & Siqueland, 2000; De Bolle et al., 2010; Falkenström, Granström, & Holmqvist, 2014; Klein, Schwartz, Santiago, & Vivian, 2003; Puschner, Wolf, & Kraft, 2008). In an attempt to determine causality, research has extended to examination of session-to-session symptom and alliance change. For example, Crits-Christoph, Gibbons, Hamilton, Ring-Kurtz, and Gallop (2011) found that increase in alliance scores from the previous session was related to symptomatic improvement in the next session. Falkenström, Granström, and Holmqvist (2013) were able to show that the effect of the working alliance on symptom change to the next session held even when the effect of the immediately preceding session's symptom change was controlled for.

Furthermore, a recent meta-analytic synthesis by Flückiger, Del Re, Wampold, and Horvath (2018) found alliance accounted for approximately 8% of psychotherapy treatment response, including CBT. This relationship has been consistent across meta-analyses for many years (Fluckiger, Del Re, Wampold, Symonds, & Horvath, 2012; Horvath, Del Re, Fluckiger, & Symonds, 2011; Martin, Garske, & Davis, 2000). Therefore despite some initial uncertainty regarding the exact nature of the alliance-outcome relationship, a strong alliance undoubtedly maximises the opportunity for clients to benefit from CBT.

Moderator analysis in the meta-analytic synthesis by Flückiger et al. (2018) found that the substance use and eating disorder population produced smaller alliance-outcome associations compared to other diagnoses. Borderline Personality Disorder also showed very large, between-study differences. In a study of interpersonal psychotherapy for depression, Constantino et al. (2017) found that patients with higher levels of education who reported good early alliances had faster depression reduction, whereas patients with higher levels of education who reported poorer early alliances had slower depression reduction.

Therefore it appears diagnoses with primary features of emotional dysregulation, impulsivity, and possible substance related cognitive impairment might impact the alliance-outcome relationship in different ways. Behavioural disinhibition and emotional lability commonly develop as a result of TBI. Furthermore, pre-morbid intellectual functioning (e.g., education level) is often overlaid with post-injury cognitive impairment. Theoretically TBI related characteristics have the potential to influence the CBT alliance-outcome relationship. In order to explore this possibility, the first empirical step requires examination of the factors associated with alliance strength in the TBI population.

1.8.1.1 *Predictors of the working alliance.*

Several reviews have identified therapist and client characteristics found to influence alliance strength in psychotherapy (Ackerman & Hilsenroth, 2001, 2003; Castonguay, Constantino, & Holtforth, 2006). Therapist attributes such as flexibility, warmth and confidence, and techniques

such as accurate interpretations, facilitation of affect expression and reference to past therapy success, have been cited as positively impacting the alliance (Ackerman & Hilsenroth, 2003). Being critical, over-structuring of the therapy session and inappropriate use of silence have been cited as therapist behaviours negatively impacting the alliance (Ackerman & Hilsenroth, 2001). Client characteristics such as expectation for change, pre-treatment symptom severity, age, income, marital status and interpersonal difficulties have also been identified as influencing alliance strength (Castonguay et al., 2006; Constantino, Arnow, Blasey, & Agras, 2005; Taft, Murphy, Musser, & Remington, 2004). More recent alliance-predictor research has continued to examine a range of therapist and client factors.

In a study of substance use/abuse treatment in African American women, Davis, Ancis, and Ashby (2015) found that higher levels of therapist multicultural competence, egalitarianism, and client empowerment significantly predicted stronger alliance, after controlling for general therapist characteristics such as empathy, positive regard, and genuineness. In a naturalistic outpatient psychotherapy study, Nissen-Lie, Havik, Høglend, Rønnestad, and Monsen (2015) found that therapist self-reported difficulties in practice, (e.g., negative reactions to patients) and in-session anxiety, both negatively impacted the alliance. The same study found therapist experience of in-session 'flow' (e.g., feeling stimulated, engrossed, inspired etc.) had a positive impact on the alliance. In a study of short and long term solution focused, psychodynamic and psychoanalytic therapies, Heinonen et al. (2014) found therapist engaging and encouraging relational style fostered working alliance improvement in short-term therapy. However, the same interpersonal skills led to patient alliance deterioration in long-term therapies, where constructive coping techniques were more beneficial. Additionally, greater therapist professional self-confidence and work enjoyment also predicted stronger alliance.

In trans-diagnostic CBT treatment for anxiety and/or depression in adolescents, Levin, Henderson, and Ehrenreich-May (2012) found weaker alliance to be associated with presence of a comorbid depressive disorder, whereas a stronger alliance was associated with higher symptom levels, greater perceived security in patient primary caregiver relationships and higher levels of social support. In Cognitive Therapy for Major Depressive Disorder in adults, Renner et al. (2012)

found weaker alliance was associated with higher levels of client self-reported agency (e.g., values of dominance and achievement) and elevated pre-treatment distress, whereas stronger alliance was associated with higher levels of self-reported communion (e.g., values of interpersonal relatedness and caring). In CBT for intimate partner violence perpetrators, Walling, Suvak, Howard, Taft, and Murphy (2012) found Caucasian participants reported a significant increase in working alliance over time, whereas members of racial/ethnic minority groups did not report a consistent pattern of change. In DBT treatment for Borderline Personality Disorder, Hirsh, Quilty, Bagby, and McMain (2012) found higher levels of the 'Agreeableness' personality trait were associated with greater increases in working alliance. A meta-analysis of the attachment-alliance relationship by Bernecker, Levy, and Ellison (2014) found both higher avoidance and anxiety attachment predicted worse alliance.

The earlier reviews described do not include reference to client cognitive ability, suggesting this was not examined in alliance-predictor research at the time of publication (i.e., > 10 years ago). However since then several studies have investigated factors associated with the alliance in the context of schizophrenia spectrum disorders. In Motivational Interviewing and CBT treatment for psychosis and substance misuse, Barrowclough, Meier, Beardmore, and Emsley (2010) found the following variables to be associated with a stronger alliance: white race, client living with family, positive attitudes toward medication, higher levels of insight and higher level of depression symptoms. Johnson, Penn, Bauer, Meyer, and Evans (2008) found the same relationship with insight in their study of group CBT for psychosis. Lower levels of cognitive disorganisation (i.e., autistic preoccupation) were also associated with a stronger group alliance. Dunn, Morrison, and Bentall (2006) found that patients with lower insight and a lower level of suitability for CBT (e.g., accessibility to automatic thoughts, acceptance of personal responsibility for change etc.) developed a weaker alliance. Lysaker, Davis, Buck, Outcalt, and Ringer (2011) found that therapist and client general ratings were more disparate when clients had fewer negative symptoms and better insight. Stronger alliance was associated with lower levels of positive, negative, and disorganised schizophrenia symptoms, and better awareness of need for treatment.

1.8.1.2   The working alliance in TBI.

The working alliance incorporates therapist and client ability to engage in the tasks of therapy and to agree on the targets of therapy, in the context of an effective attachment (Constantino, Castonguay, & Schut, 2002). The abilities of a person with TBI are undermined in this regard, due to associated cognitive deficits and behavioural issues (Fleming & Ownsworth, 2006; G. Kelly et al., 2008; Togher et al., 2014). A study by Judd and Wilson (2005) elicited practitioners' views and experiences of the challenges to forming a therapeutic alliance with TBI clients. Respondents identified the following barriers: lack of insight, impaired memory, inflexible thinking, poor attention/concentration, language difficulties, disinhibition and emotional lability. Nonetheless, the alliance has been described as the key instrument that allows the psychotherapist to facilitate individuals and families through the post-injury journey (Klonoff, 2010, pp. 18-19). Yet there are currently no studies of alliance with a TBI sample in the context of psychotherapy. The studies that do exist have been solely undertaken within holistic neuropsychological outpatient rehabilitation programmes (Schönberger, Humle, & Teasdale, 2006a, 2006b; Schönberger, Humle, Zeeman, & Teasdale, 2006; Sherer et al., 2007).

Schönberger, Humle, et al. (2006a) found a significant association between younger age and stronger alliance. Bi-frontal or right hemisphere injury location was found to be associated with weaker alliance. Time since injury was also examined, however its relationship to working alliance was not reported. Schönberger, Humle, et al. (2006b) found a relationship between brain injury related deficits and alliance at program commencement, which disappeared after controlling for clients' self-awareness. Sherer et al. (2007) found depression symptoms were not associated with working alliance ratings, whereas stronger alliance was associated with higher level of education. Therefore research suggests that a variety of client demographic and cognitive (e.g., level of insight) variables have the potential to influence the alliance in people with TBI. Further examination is required to determine whether this extends to the psychotherapeutic context. Considering the integral role of working alliance in therapy outcome, the impact of TBI associated

cognitive deficits on its development is important to understand in order to increase therapy effectiveness.

1.8.2   Homework.

Like the working alliance, homework plays an integral role in progress within CBT. The client's ability to generalise in session learning to everyday situations is the primary objective, and this is achieved through homework. Indeed homework is considered to be the main process by which clients generalise behavioural and cognitive change (A. T. Beck, 1979). Homework assignments may be defined as "activities the client carries out between sessions, selected together with the therapist, in order to aid progress towards therapy goals" (Kazantzis, Petrik, & Cummins, 2012, para. 1). A meta-analysis by Kazantzis, Whittington, and Dattilio (2010) concluded that 62% of patients would be expected to improve when receiving therapy with homework, while 38% would be expected to improve when receiving therapy without homework ($d = 0.48$).

A review of psychotherapy engagement assessment by Holdsworth, Bowen, Brown, and Howat (2014), found homework quantity was emphasized when utilising homework as a measure of client engagement. Meta-analyses by Kazantzis, Deane, and Ronan (2000) and Mausbach, Moore, Roesch, Cardenas, and Patterson (2010) found a significant relationship between homework compliance and treatment outcome, indicating that non-compliance may prevent clients from receiving the full potential benefits of CBT.

However the Holdsworth et al. (2014) review also noted the de-emphasis of client homework quality and homework beliefs (e.g., client confidence and perceived capability) as an important oversight in the research, due to the potential of these constructs to better reflect client change (i.e., skill acquisition and application, short and long term). Indeed a recent meta-analysis by Kazantzis et al. (2016) found a larger effect for homework quality ($g = 1.07$) compared to quantity ($g = 0.51$) in relation to CBT outcome assessed at follow-up. Therefore the construct of treatment engagement via homework requires broadening to ensure more meaningful assessment of client homework behaviour and beliefs.

1.8.2.1   *Predictors of homework compliance.*

Scheel, Hanson, and Razzhavaikina (2004) conducted a systematic review of factors promoting client acceptability of homework and homework compliance. The review identified higher client symptom severity as both a potential motivator and obstacle to homework compliance, which was reflected in mixed findings amongst the studies reviewed. Only one study explored the association with client demographic variables. However a much stronger association between therapist homework delivery and homework compliance was identified.

For example M. Bryant, Simons, and Thase (1999) found homework compliance to be most strongly predicted by therapist reviewing of homework and general therapist skills (e.g., agenda setting, interpersonal effectiveness, collaboration, session pacing) in Cognitive Therapy for major depression. Client age, education, depression severity, and learned resourcefulness (e.g., use of helpful self-talk, application of problem-solving strategies, perceived self-efficacy) were unrelated to homework compliance. However, participants with a higher number of previous depressive episodes tended to be less compliant with homework. N. Schmidt and Woolaway-Bickel (2000) found older and unemployed individuals showed higher quality homework in CBT for panic disorder. Taft, Murphy, King, Musser, and DeDeyn (2003) found stronger therapist alliance ratings early in therapy predicted subsequent higher levels of homework compliance in a cognitive–behavioural group treatment program for partner violent men.

More recent studies have reinforced these previous findings. For example, Gonzalez, Schmitz, and DeLaune (2006) also found no association of education with homework compliance in CBT for cocaine dependence. Unlike findings from alliance studies, the authors found readiness to change was not related to homework compliance. Fehm and Mrose (2008) found homework completion did not differ between genders or diagnostic subgroups and was not correlated with age. This study was conducted in a sample of 80 outpatients with a range of psychiatric disorders (45.2% anxiety disorders). The authors found that better understanding of what to do (i.e., homework task "concreteness") was associated with higher levels of homework compliance. Neither the perceived task difficulty, importance, relevance to therapy goals, or overall attitude

towards homework, was significantly associated with homework completion. All participants had attended at least seven CBT sessions, however data was based on a single time-point only. Furthermore homework task characteristics and completion were not assessed with a formalised and psychometrically evaluated measure.

In a study of maintenance Cognitive Therapy for recurrent depressive disorder, Weck, Richtberg, Esch, Hofling, and Stangier (2013) found no association between homework compliance and the following patient characteristics: gender, age, number of previous depressive episodes, educational level, use of antidepressant medication, previous psychotherapeutic treatment, and presence of a comorbid Axis I or II disorder. Surprisingly alliance was also unrelated to homework compliance. In keeping with the study by M. Bryant et al. (1999) higher level of therapist competency in the reviewing of homework was related to higher homework quality. However therapist competency in setting homework and general competency (i.e., non-homework related) were not associated with homework compliance.

Consistent with the alliance literature, the role of client cognitive ability was simply not referenced in the review by Scheel et al. (2004). However studies have also investigated homework compliance in the context of schizophrenia spectrum disorders (e.g., Dunn, Morrison, and Bentall, 2002, 2006). Additionally, the role of client executive functioning has been explicitly examined in older people (e.g., Mohlman and Gorman, 2005).

Dunn et al. (2002) used a grounded theory approach to understand and generate theories relating to the homework completion/non-completion of 10 patients undertaking CBT for psychosis. The factors cited as affecting homework compliance were motivation, recall of the assignment, difficulty, putting off, understanding of the rationale, perceived benefits, insight, effort and relevance. Participants were divided into high and low homework compliance groups. The high compliance group gained insight into problem development, maintenance and the use of effective strategies to realise goals, whereas the low compliance group gained only an identification of their problems and an understanding of their development. Three participants in the low compliance

group believed that their assignments were sometimes irrelevant to their needs but this was true of only one out of the six in the high compliance group.

Dunn et al. (2006) found stronger patient/therapist-rated alliance early in treatment (i.e., CBT for psychosis) showed a significant association with higher levels of patient/therapist-rated homework compliance. Later in treatment, stronger patient-rated alliance was significantly associated with higher levels of patient-rated homework compliance, but not therapist-rated. However, stronger therapist-rated alliance was significantly associated with patient ratings of homework compliance.

Mohlman and Gorman (2005) examined the role of executive functioning in CBT for Generalised Anxiety Disorder in elderly participants. The authors compared homework compliance amongst three different groups based on level of executive functioning: 1) executive dysfunction, 2) intact executive function and 3) improved executive function throughout treatment. Groups did not differ on the number of homework assignments completed, but did differ significantly on homework quality. Interestingly the executive dysfunction group completed the highest number of assignments, however assignments were of a significantly lower quality compared to the other groups. Mohlman (2013) conducted additional analyses in the same population and found that higher levels of depression were associated with less homework and stronger executive skills were associated with more homework. In this study homework score was comprised of both homework quantity and quality.

1.8.2.2   *Therapy homework in TBI.*

Design, completion and review of homework involve numerous complex cognitive processes (Leathem & Christianson, 2007). Therefore it is understandable that homework compliance may be especially challenged in this population. For example attentional difficulties are likely to impact the client's ability to follow the therapist's explanation of the homework during in-session discussion. Remembering the specifics of the task, for example when it should be completed and how many times, may be problematic due to memory deficits. Impairments in

learning may hinder the client's ability to develop the skill of identifying emotions, thoughts and behaviours and the links that exist between them. Executive dysfunction may prevent the client from planning and organising a way for the homework to be incorporated into their everyday life, or generalising strategies to new scenarios. Finally, lack of insight or self-awareness may result in the client being unable to recognise the need or situations in which to apply homework, or not being adequately motivated to complete the homework.

While numerous studies have reported the *use* of homework in the TBI population (Archer et al., 2015; Ashman et al., 2014; Ponsford et al., 2016), only two have actually measured homework compliance (Tsaousides, D'Antonio, Varbanova, & Spielman, 2014; Zencius, Wesolowski, Krankowski, & Burke, 1991). Only one of these studies was conducted in the psychotherapeutic context, a feasibility study by Tsaousides, D'Antonio, Varbanova and Spielman (2014). This study provided a CBT-based group treatment via web-based videoconferencing to seven individuals with TBI. The treatment aimed to improve participant emotional regulation skills. Homework compliance assessment was sourced from the therapists using a checklist developed for the study. The authors reported that homework was completed 93% of the time, with a total of 12 potential homework assignments per participant. However factors associated with homework compliance were not examined in this small sample.

1.8.3 Therapist competence.

Several studies have shown a significant relationship between therapist competence and therapy outcome. For example Strunk, Brotman, DeRubeis, and Hollon (2010) found therapist competence ratings predicted session-to-session symptom change early in Cognitive Therapy treatment for severe depression. Kuyken and Tsivrikos (2008) also found greater therapist competence was associated with improved outcomes, regardless of clients' comorbidity, in CBT for depression. However overall findings are inconsistent as demonstrated by a meta-analytic review by Webb, DeRubeis, and Barber (2010) which showed therapist competence (as measured by trained observer raters) was not related to patient psychotherapy outcome. The role of therapist homework competency has been primarily examined in relation to homework compliance as

described above. However a study by Detweiler-Bedell and Whisman (2005) found the more a client was involved in the assignment of Cognitive Therapy homework, the lower their depression levels at mid-therapy. Concrete goal setting for the homework and provision of written reminders was also associated with lower depression levels and better functioning at post-treatment and follow up.

In summary, the working alliance and homework compliance are both integral CBT processes that contribute significantly to treatment outcome. In order to engage effectively with both processes, a certain level of client social cognition and overall cognitive functioning is required. Therefore the cognitive deficits associated with TBI are likely to hinder these processes and reduce opportunity for therapy gains. Expert recommendations and predictor-working alliance/homework research indicates that therapist behaviour plays a vital role in accommodating cognitive deficits, enhancing the alliance and facilitating homework compliance. However lack of research means there is little understanding of how to positively influence these processes in order to improve the effectiveness of TBI adapted CBT.

1.9 CBT PROCESS ASSESSMENT

In beginning to address this research gap, two important methodological factors need to be considered, namely the source and timing of CBT process assessment. It is not uncommon for therapy process ratings to differ according to source (Hartmann, Joos, Orlinsky, & Zeeck, 2015; Markin, Kivlighan, Gelso, Hummel, & Spiegel, 2014). This has been demonstrated in populations with cognitive impairment (Lysaker et al., 2011), including TBI. For example Barrowclough et al. (2010), Schönberger, Humle, et al. (2006a) and Sherer et al. (2007) found clients rated the working alliance as stronger compared to therapists. This highlights the importance of considering all perspectives. Notably, the impartial (Webb et al., 2011) independent observer perspective is yet to be utilised in therapy process assessment in TBI patients. In the context of TBI, an objective rater may arguably be important, given the potential impact of memory and executive functioning deficits on client ratings. As already described, both Hodgson et al. (2005) and Hsieh, Ponsford, Wong, and McKay (2012) anecdotally observed that cognitive impairments may have influenced

participant responses to scale wording and length. Furthermore, studies have shown that the observer perspective may potentially be more predictive of outcome (Cecero, Fenton, Nich, Frankforter, & Carroll, 2001; Horvath & Symonds, 1991).

Research shows that homework compliance and working alliance development is not necessarily linear over the course of therapy (Conklin & Strunk, 2015; Piper, Ogrodniczuk, Lamarche, Hilscher, & Joyce, 2005). For example, ruptures in the alliance are expected and hold great potential for therapeutic growth (Cash, Hardy, Kellett, & Parry, 2014). Therefore aggregated or single time-point ratings are limited in their ability to capture this variability (Zilcha-Mano, 2017). Retrospective ratings may be biased by therapy outcome, and are less reliable due to dependence on memory. Therefore, therapy process ratings at each session across therapy would ideally capture their dynamic nature (Norton & Kazantzis, 2016).

1.10   THESIS OUTLINE AND AIMS

This chapter has outlined the common cognitive, behavioural and emotional sequelae experienced by people following TBI. Changes to pre-injury identity and social connections contribute to the development of psychological disorders. Depression and anxiety are the most common and have potentially tragic consequences, including increased risk of suicide. Adapted CBT has been identified as a treatment modality that can adequately meet the needs of those with TBI experiencing depression and/or anxiety. A client's ability to engage in therapy will be partly facilitated by the therapist's ability to compensate for their cognitive deficits (i.e., attentional, memory, learning and executive functioning difficulties).

The current literature review highlights several research gaps. Firstly, how therapists actually tailor CBT to accommodate the effects of TBI is unknown, both in regard to the interventions delivered and adaptations to delivery. Furthermore there are no currently existing measures that can capture this aspect of therapist behaviour. Secondly, very little is known about how TBI associated cognitive deficits impact the working alliance, client homework behaviour and treatment outcome in the context of psychotherapy. Finally, more research is needed to determine

whether the established working alliance/homework-CBT outcome relationship extends to people with TBI cognitive deficits. Furthermore, there exists a need to incorporate quantity, quality and beliefs into assessment of client homework behaviour (i.e., "homework engagement"), utilise the independent observer perspective, and assess process variables across all therapy sessions as they are occurring in-session. Such research would help to guide the treatment of anxiety and depression post-TBI into the future, by identifying ways in which the effectiveness of CBT can be enhanced.

The body of work described in this thesis aimed to address the above research gaps by being the first to undertake adapted CBT process research within a TBI sample. There were two overarching research questions: 1) How do therapists tailor CBT to people with TBI? 2) What are the factors that impact capacity to engage in and benefit from CBT? The following variables were examined: 1) demographic (i.e., gender, age, education level, premorbid IQ); 2) injury-related (i.e., years since injury, PTA duration, memory/executive functioning); and 3) CBT process variables (i.e., working alliance, homework engagement and therapist homework competence). In order to achieve these aims, data was collected from the CBT-ABI audio recorded sessions from the parent RCT described earlier.

This doctoral thesis comprises five studies. In view of the need for CBT adaptation assessment, Study 1 (Chapter 2) and 2 (Chapter 3) aimed to develop reliable measures of therapist adaptation behaviour. Study 1 focused on therapist use of CBT-ABI interventions (i.e., module use) and Study 2 focused on therapist use of modifications to maximise client engagement with the interventions. Intervention use and modification use was then described and explored in relation to client characteristics.

The question of which factors impact capacity to engage with CBT-ABI was addressed through Studies 3 (Chapter 4) and 4 (Chapter 5), which sought to identify the demographic, injury-related and CBT process variables related to working alliance strength (Study 3) and level of client homework engagement (Study 4) respectively. In Study 3 it was hypothesised that stronger working alliance would be associated with 1) younger age and higher education, and 2) greater time since injury, lower injury severity and better cognitive functioning. In Study 4 it was

hypothesised that homework engagement would *not* be significantly associated with 1) gender, age or education level, but higher levels of homework engagement would be associated with 2) more years since injury and better cognitive functioning, and 3) stronger working alliance and higher levels of therapist homework competency.

The associated question of which factors impact capacity to benefit from CBT-ABI was addressed through Study 5 (Chapter 6), which sought to identify how the same demographic, injury-related and CBT process variables related to treatment outcome, specifically the amount of change in anxiety and depression symptoms from pre to post CBT-ABI. It was hypothesised that greater symptom improvement would be significantly associated with 1) higher pre-morbid IQ; 2) more years since injury, lower injury severity and better cognitive functioning; and 3) stronger working alliance and higher levels of homework engagement. The examination of gender, age, education and therapist homework competency was exploratory. The thesis concludes with a general discussion (Chapter 7) synthesising individual study results and discussing implications for clinical practice.

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CHAPTER TWO

MODULE IDENTIFICATION CHECKLIST DEVELOPMENT AND MODULE USE

2.1   CHAPTER OUTLINE AND AIMS

This chapter introduces the Module Identification Checklist, and describes its development. The Module Identification Checklist was designed in the context of Cognitive Behaviour Therapy (CBT) adapted for Traumatic Brain Injury (CBT-ABI; Wong et al., in press). Through independent observer coding of therapist-client dialogue, the checklist assesses therapist use of particular components of the CBT-ABI program (i.e., module use) at each session. The aim of this chapter is to 1) describe development and pilot testing of the checklist, 2) describe the CBT-ABI modules that were delivered in the parent RCT, and 3) explore whether module use was related to client clinical (i.e., anxiety and/or depression symptoms) and injury-related (i.e., years since injury, injury severity, cognitive functioning) characteristics.

2.2   INTRODUCTION

CBT is a structured yet flexible treatment that is primarily guided by a client's individual formulation. Therefore CBT has the potential to be delivered in various ways, despite being driven by the same underlying principles (described in Chapter 1). CBT can be adapted for individual client clinical and cognitive needs, without compromising treatment integrity. This is one reason why this treatment is well suited to people with brain injury. Randomised controlled trials (RCTs) have demonstrated the efficacy of adapted CBT in the treatment of post brain injury anxiety and depression (Hodgson et al., 2005; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Ponsford et al., 2016).

How CBT is delivered to people with brain injury is reported by RCTs in varying detail. Most provide at least a brief description of the CBT interventions and techniques utilised (e.g., R. A. Bryant et al., 2003; Hodgson et al., 2005). Others (e.g., Medd & Tate, 2000; Tiersky et al., 2005) also outline overall timing of interventions (e.g., treatment phases). RCTs by Fann et al. (2015) and Ashman et al. (2014) took this a step further by providing session-to-session outlines of interventions and techniques. A pilot RCT by Hsieh, Ponsford, Wong, Schönberger, Taffe, et al.

(2012) provided outlines of 'core' and 'optional' CBT modules, independent from session numbers (described in Hsieh, Ponsford, Wong, Schönberger, McKay, et al., 2012).

Treatment overviews are necessarily concise in published research articles. However Consolidated Standards of Reporting Trials (CONSORT) guidelines identify the inclusion of precise treatment details as a contributer to higher quality reporting (Boutron, Moher, Altman, Schulz, & Ravaud, 2008). Therefore providing access to the specific treatment manual utilised in an RCT improves reporting quality. Furthermore empirically supported treatment manuals are integral to the standardisation, evaluation and dissemination of treatments (Addis, 1997; Chambless et al., 1998; Dobson & Beshai, 2013).

Available therapist manuals for CBT post brain injury are significantly lacking. RCTs most commonly describe using elements from pre-existing treatment manuals or basing treatment on the principles of a certain orientation (e.g., Ashman et al., 2014; Bédard et al., 2014; Fann et al., 2015; Hodgson et al., 2005). Only a few refer to a manual followed by the therapists that was specific to the RCT (Backhaus et al., 2010; R. A. Bryant et al., 2003; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Tiersky et al., 2005). However even when cited as accessible, this does not necessarily result in manuals being provided upon request, as found in a systematic review by Gallagher et al. (2016). Therefore the parent RCT of the current study is one of the only trials to make accessible an accompanying treatment manual that has been pilot tested (Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Wong et al., in press).

Provision of details regarding treatment protocol adherence assessment is also associated with higher reporting quality (Boutron et al., 2008). Of the 13 RCTs described in Chapter 1, five provided results of treatment fidelity assessment (Ashman et al., 2014; R. A. Bryant et al., 2003; Fann et al., 2015; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Ponsford et al., 2016). These studies reported that therapist adherence to theoretical orientation, and competence in the delivery of associated interventions and techniques, was acceptable. However reporting of fidelity testing has often lacked sufficient detail, with utilisation of measures that are not fully described or referenced (e.g., R. A. Bryant et al., 2003; Fann et al., 2015; Hsieh et al., 2012).

Overall CBT program descriptions are brief and rarely accompanied by a specific therapist manual. Taken together, this highlights an overall lack of clarity regarding the treatment content that is delivered in RCTs testing the effectiveness of CBT post brain injury. Furthermore treatment fidelity testing is not as common as one might expect. Acceptable fidelity assessment results promote confidence that the treatment was delivered in accordance with underlying CBT principles. However, this process does not identify exactly which interventions were delivered and when. Furthermore fidelity assessments do not establish whether or how interventions were tailored to client individual needs.

The RCTs that have reported the most detail regarding use and timing of CBT interventions (Ashman et al., 2014; Fann et al., 2015) appear to have utilised an *integral* treatment design. That is, treatment was a cumulative narrative with highly interdependent parts constituting a whole (Chorpita, Daleiden, & Weisz, 2005). For example the first phase of treatment must come before the second and the content of session two must be delivered before session three. Therefore exclusion of a phase or session could potentially compromise protocol integrity.

The exception to this is the parent RCT therapist manual, which was pilot tested in the study by Hsieh, Ponsford, Wong, Schönberger, Taffe, et al. (2012). This manual utilises a modular design (Chorpita et al., 2005). Specifically, the manual comprises a number of CBT skills considered to be highly relevant to people with TBI. The skills are organised into eight components, with the expectation that they are utilised *flexibly*. Modules can be combined and repeated if necessary, or excluded if appropriate. While modules are set out in a sequential order that relates to session timing (e.g., Module 1: Assessment Feedback & Education at the beginning, and Module 8: Relapse Prevention at the end), deviation from this sequence does not compromise protocol integrity.

The importance of tailoring interventions to the individual client is an important concept across treatment efficacy research. Providing a description of the tailoring process (when applicable), promotes higher reporting quality (Boutron et al., 2008). Treatment manuals have received criticism for their potential to be rigidly applied and cause problems within the therapeutic

relationship (Addis & Krasnow, 2000; Dobson & Beshai, 2013), although comparison of manualised and non-manualised treatment has also disputed this concern (Langer, McLeod, & Weisz, 2011). To address this, the synthesis of "flexibility within fidelity" (Kendall & Beidas, 2007; Kendall, Gosch, Furr, & Sood, 2008) has been proposed.

In the case of people with TBI, implementing treatments flexibly is especially important. In fact, a person with TBI may not have the cognitive capacity to engage with a program of CBT without adaptations to 1) which components are delivered, 2) how often they are delivered and 3) when they are delivered. For example difficulty engaging with abstract concepts may interfere with cognitive restructuring. Indeed a systematic review of CBT adaptations for brain injury (Gallagher et al., 2016) identified 'placing emphasis on behavioural techniques (such as behavioural activation)' as a recommended adaptation reported in four intervention studies. Associated memory deficits may mean interventions need to be repeated and revisited at multiple sessions. For example it may be necessary to introduce relapse prevention earlier in treatment, so related interventions can be built upon and consolidated over time.

Therefore in the case of people with TBI, CBT treatment fidelity is comprised of both flexibility (e.g., deviating from the manual to attend to crises/address alliance ruptures, emphasising graded exposure for anxiety etc.), and adaptations aimed at accommodating TBI-specific cognitive deficits (e.g., de-emphasising cognitive restructuring, repeating the same interventions at each session etc.). Previously, adaptation has been seen as a potential threat to fidelity in intervention program implementation (Elliott & Mihalic, 2004). However due to the likely mismatch between the cognitive abilities of a person with TBI and the cognitive demands of a CBT session, it is probable that non-adaptation would undermine treatment effectiveness. Several authors take the view that adaptation and fidelity are not mutually exclusive, and the former has the potential to preserve the latter (Berkel, Mauricio, Schoenfelder, & Sandler, 2011; Ferrer-Wreder, Sundell, & Mansoory, 2012).

In the parent RCT of the current study, a positive effect of CBT-ABI was found. This treatment was based on a specific therapist manual, which fidelity assessment results indicated was

delivered competently and with adherence to the CBT orientation. Access to this treatment manual and CBT-ABI session audio recordings provided the opportunity for examination of CBT intervention use (i.e., module use). The following describes each CBT-ABI module from the parent RCT in more detail.

2.2.1   The parent RCT CBT-ABI therapist manual.

The CBT-ABI manual was based on Beck's CBT model (A. T. Beck et al., 1979) and modified to accommodate TBI associated cognitive deficits (e.g., visual resources, concrete examples, note-taking, repetition, increased therapist guidance/direction etc.). Module selection was guided by a treatment decision-making flowchart provided in the therapist manual. The flowchart addresses the key symptom groups within depression and anxiety. The therapist was guided to identify the client's most problematic symptom groups, which were attached to corresponding modules. The client's overall treatment plan then comprised the selected modules based on symptom group. This way only modules relevant to the client's presenting problems were utilised. Each module description included an explanation of objectives, materials and content outline.

2.2.1.1   *Module 1: Assessment feedback and psycho-education.*

This module is designed to clarify any client concerns and refine case formulation. The module aims to identify participants' symptoms, presenting issues, treatment targets, and an initial treatment plan. The therapist is guided to: 1) explore affect, thoughts, behaviours and perpetuating factors related to presenting issues, 2) provide psycho-education regarding brain injury, depression and anxiety 3) introduce the CBT cognitive model, 4) provide a treatment rationale and 5) explain the importance of between-session practice (i.e., homework).

2.2.1.2   *Module 2: Anxiety management (relaxation).*

This module involves anxiety management psycho-education and practice of several relaxation methods. The module aims to 1) explain the rationale for relaxation strategies, 2)

identify a range of relaxation strategies that are realistic for the client, 3) identify at least one strategy for in-session practise, and 4) set up opportunities for between-session practice, including problem solving practice barriers.

2.2.1.3 Module 3: Behavioural activation.

This module is designed particularly as a treatment of depression *and* avoidant behaviour. The module aims to 1) explain the rationale for behavioural activation, 2) assess the client's current activity level, 3) identify pleasurable, meaningful activity options, 4) structure and schedule activities into daily routines, including problem solving behavioural activation barriers.

2.2.1.4 Module 4: Thinking strategies.

In this module therapists are guided to implement a simplified version of cognitive therapy. The manual states that cognitive restructuring should be avoided, or significantly modified, for clients with severe cognitive impairment. This is due to deficits in higher reasoning skills such as abstraction and reduced self-awareness. Furthermore the module recognises that some unhelpful thinking patterns might be based in the reality of the functional impact of a TBI. Module 4 aims to 1) explain the rationale for examining thoughts (i.e., relationship between thoughts, feeling and behaviours), 2) identify the client's own unhelpful thought content and patterns, 3) generate helpful alternative thoughts/self-statements, and 4) assist the client to incorporate these into everyday life.

2.2.1.5 Module 5: Graded exposure.

Module 5 focuses on addressing the avoidant/safety behaviours perpetuating anxiety symptoms. The module aims to 1) explain how avoidant/safety behaviour maintains the presenting issue(s), 2) introduce the concept and rationale for exposure, 3) construct a fear hierarchy, 4) conduct or role play an exposure exercise during session, and 5) assign a between session exposure task, including problem solving any task barriers.

2.2.1.6   Module 6: Structured problem solving.

Module 6 is considered an additional CBT-ABI skill that could be incorporated into treatment if suitable. The module aims to 1) introduce problem solving and explain when to use it, 2) explain steps to effective problem solving, 3) practise the steps during session, and 4) set up problem solving between session practice. This module is aimed at problems under the client's control.

2.2.1.7   Module 7: Self-soothing strategies.

Like module 6, module 7 is also considered an additional CBT-ABI skill that could be incorporated into treatment if suitable. However unlike module 6, this module is aimed at problems not under the client's control. The module recognises that some aversive experiences must be tolerated and a useful response to these situations can be acceptance and self-soothing. The module aims to 1) explain that when a problem or situation is outside of personal control, striving to 'fix' everything can sometimes be unhelpful, 2) introduce the concept of self-soothing and letting go, 3) introduce one or more self-soothing exercise(s), 4) practise an exercise in-session, and 4) set up between session practise.

2.2.1.8   Module 8: Relapse prevention.

The relapse prevention module is considered compulsory. The module aims to 1) explain the importance of relapse prevention, 2) introduce and implement strategies for relapse prevention, and 3) develop a reminder system for the client to refer to in the future. Strategies within the module (e.g., list of early symptom warning signs, coping statement cue cards or coping plan for times of setback) are considered best applied early and throughout therapy.

2.3   AIMS AND HYPOTHESES

Therapist delivery of CBT-ABI in a way that is both flexible and accommodating of client cognitive deficits is an important component of treatment integrity. Therefore one may expect a

relationship between the interventions delivered by a therapist and the client's clinical and cognitive needs. However without a suitable measure of module use, examination of such relationships is not possible. We aimed to: 1) create a checklist that could reliably measure CBT-ABI module use; 2) describe therapist module use in the parent RCT, and explore module use relationships with (a) clinical (i.e., presenting symptoms) and (b) TBI-related variables (i.e., years since brain injury, executive functioning, memory functioning and brain injury severity). The first aim comprised Study 1 and the remaining aims comprised Study 2.

It was hypothesised that therapists would not consistently implement modules in a sequential order. Beyond this, examination of module use patterns was exploratory. Based on module descriptions in the therapist manual, it was hypothesised that clients with clinically significant anxiety symptomology (primary) would receive Module 2: Anxiety Management (Relaxation) and Module 5: Graded Exposure more often than those with depression, or those with a combination of anxiety and depression symptoms. In regards to TBI characteristics, it was hypothesised that less use of cognitively based modules (i.e., Module 4: Thinking Strategies and Module 7: Self-soothing strategies) would be associated with the client having a more severe brain injury and poorer cognitive functioning. Association with years since injury was exploratory.

2.4   STUDY 1: MODULE IDENTIFICATION CHECKLIST DEVELOPMENT AND PILOT TESTING

2.4.1   Study 1: Method.

2.4.1.1   Content selection.

Module Identification Checklist development was directly based on the parent RCT therapist manual. All eight modules were listed on a rating sheet with a present/absent response option. Therapist-client dialogue was then directly observed in five CBT-ABI sessions. Based on these observations the checklist was modified to include coding of primary (main focus of the session) or secondary (brief focus of the session, eg. 5-10 minute homework review) modules. It

was considered possible for more than one module to be coded as the primary module, or secondary module. However the same module could not be identified as both primary and secondary. The checklist was also modified to distinguish between secondary modules and modules referred to in the context of relapse prevention (i.e., Module 8), in order to more accurately reflect session focus. Items assessing therapist CBT-ABI non-adherence and unclear module use were also added. In the case of unclear module use the rater was still required to document a best estimate of the module being used. Finally a team of two clinical neuropsychologists and one clinical psychologist, with expertise in brain injury and psychotherapy process scale development, provided feedback on the checklist before pilot testing.

2.4.1.2   Co-rater training.

Module Identification Checklist reliability was assessed through calculating inter-rater percentage agreement with a doctoral clinical psychology graduate (Y.A.) who served as co-rater. Y.A. had existing knowledge of the CBT-ABI therapist manual and overall treatment procedures. Prior to pilot testing the co-rater underwent training in the Module Identification Checklist. Training included re-familiarisation to the CBT-ABI modules via the therapist manual, and orientation to the rating procedure. The co-rater listened to a CBT-ABI session exemplar. Application of the Module Identification checklist to the exemplar session was discussed, and discrepancies in perception of therapist module use clarified.

2.4.1.3   Inter-rater agreement.

Thirteen CBT-ABI audio recordings were randomly chosen for pilot testing purposes. The primary researcher and co-rater coded sessions independently. Inter-rater agreement was assessed through calculation of percentage agreement for each session. Percentage agreement values $\geq 70\%$ have been considered acceptable (Stemler, 2004). In the current study percentage agreement $\geq 75\%$ was considered acceptable for pilot testing purposes.

2.4.2   Study 1: Results.

Overall raters achieved 86.5% agreement for module presence, 89.4% for primary module presence and 88.5% for secondary module presence. Table 2.1 shows inter-rater agreement for each of the 13 sessions.

Table 2.1 *Module Identification Checklist inter-rater agreement for 13 pilot testing sessions*

Rating No.	Module Presence Overall	Primary Module	Secondary Module
1	87.5%	87.5%	100%
2	100%	87.5%	87.5%
3	75%	100%	75%
4	100%	100%	100%
5	87.5%	75%	87.5%
6	87.5%	100%	87.5%
7	62.5%	75%	87.5%
8	87.5%	100%	87.5%
9	100%	75%	87.5%
10	87.5%	75%	87.5%
11	100%	100%	100%
12	50%	87.5%	62.5%
13	100%	100%	100%
Overall	86.5%	89.4%	88.5%

Note. Cut-off for percentage agreement $\geq$ .75

2.5   STUDY 2: THERAPIST MODULE USE AND RELATIONSHIP TO CLINICAL AND TBI VARIABLES

Once the reliability of the measure assessing module use was established, the primary researcher was permitted to move onto main data collection. The objectives of study 2 were to assess module use in the parent RCT, and explore relationships with client clinical and TBI related characteristics.

2.5.1   Study 2: Method.

2.5.1.1   Parent RCT.

A total of 177 CBT-ABI session recordings, representing 31 therapist-participant dyads, were available for the current study. The remaining recordings were lost due to random technological failure; therapists did not choose which sessions were coded. The CBT-ABI program was delivered over nine sessions. Clinical psychologists and clinical neuropsychologists, with an average of 7 years post-degree experience, were provided specialised training in delivering the manualised CBT-ABI program. Therapist treatment adherence and competence ratings were on average 5.71 - 5.79 (0 = unacceptable/not present to 7 = excellent/high occurrence), based on treatment integrity monitoring by a CBT expert.

2.5.1.2   Measures.

1.5.1.2.1   Module use.

The primary researcher rated all 177 CBT-ABI sessions with the Module Identification Checklist (see Appendix A). These ratings were conducted with session audio-recordings. The primary researcher was blind to participant information regarding years since injury, injury severity and cognitive functioning. Inevitably references were made to client presenting clinical issues throughout the audio recordings, however the primary researcher was generally blinded to participant specific diagnoses.

1.5.1.2.2   Clinical variables.

Participant psychiatric diagnosis and level of anxiety and depression symptomatology was assessed at pre-intervention in the parent RCT using the Structured Clinical Interview for DSM-IV (First et al., 2007), Hospital Anxiety and Depression Scale (HADS) – Anxiety subscale (Zigmond & Snaith, 1983), and Depression Anxiety Stress Scales (DASS) – Depression subscale (Lovibond & Lovibond, 1995). The HADS-Anxiety and DASS-Depression subscales have shown to be most sensitive to anxiety and depression symptoms in individuals with TBI (Dahm et al., 2013; Schönberger & Ponsford, 2010; Wong et al., 2013) and were chosen for this reason. All participants were experiencing clinically significant levels of anxiety and/or depression symptomatology, or had a formal psychiatric diagnosis at study entry.

1.5.1.2.3   TBI-related variables.

All brain injury related variables (i.e., years since injury, injury severity, memory functioning and executive functioning) were assessed in the parent RCT at pre-treatment. Injury severity was measured by days of Post Traumatic Amnesia (PTA). Memory functioning was measured using the score from trials 1-5 of the List Learning subtest from the Brain Injury Rehabilitation Trust Memory & Information Processing Battery (BIRT; Coughlan, Oddy, & Crawford, 2007). Executive functioning was measured using response latency in seconds from section two of the Hayling Sentence Completion test (Burgess & Shallice, 1997; Odhuba, Broek & Johns, 2005). Participants were required to inhibit a natural response and generate an ill-fitting response to 15 incomplete sentences. Section two was chosen due to the integral role of inhibition in executive control. Response latency was considered a more sensitive measure, relative to error or scaled scores.

2.5.1.3   *Data analysis.*

1.5.1.3.4   *Module use.*

Descriptive statistics were calculated to present 1) the number of participants who had received each module, 2) the number of sessions including each module and 3) the average number of times each module was delivered to the receiving participants. Descriptive statistics were also calculated to present therapist total module use according to time-point (i.e., session number), and function as a primary or secondary session focus.

1.5.1.3.5   *Module use relationship to clinical symptoms.*

Participants were grouped according to presenting clinical symptoms: 1) anxiety, 2) depression, and 3) combination of anxiety and depression. Participants with less than five available CBT-ABI sessions were removed from analysis in order to meaningfully compare groups. This resulted in $n = 20$ and a similar number of sessions per group (i.e., anxiety, $M = 8$; depression, $M = 8$; combined, $M = 7$). Despite the small sample size statistical analyses were conducted to investigate potential trends. Mean module use (total and individual modules) for each group was calculated and compared using one-way ANOVA, and the Kruskal-Wallis H test for modules with non-normally distributed data (Pallant, 2013; Tabachnick & Fidell, 2013).

1.5.1.3.6   *Module use relationship to TBI variables.*

Relationships between module use and participant injury-related variables (i.e., time since injury, injury severity, memory functioning and executive functioning) were explored through correlational analyses with Pearson's Product Moment Correlations (Rodgers & Nicewander, 1988), or Spearman's rho for non-normally distributed variables (Lehmann, 1975). These analyses utilised the complete sample ($n = 31$).

2.5.2   Study 2: Results.

2.5.2.1   Session and participant characteristics.

The 177 available CBT-ABI sessions from the parent RCT were distributed as follows: Session 1 = 25; session 2 = 22; session 3 = 18; session 4 = 21; session 5 = 18; session 6 = 20; session 7 = 17; session 8 = 18, and; session 9 = 18. The majority of participants (65%) each had at least five CBT-ABI sessions, dispersed across every therapy stage. On average participants were male, 47.32 years old (*SD* = 15.26), with 12.69 years of education (*SD* = 3.21) and a pre-morbid IQ of 111.03 (*SD* = 8.84).

Participants were diagnosed with the following disorders: Major Depressive Disorder *n* = 13; Generalised Anxiety Disorder *n* = 4; Anxiety Disorder-Not Otherwise Specified *n* = 4; Post Traumatic Stress Disorder *n* = 4; Phobia (i.e., driving or social = 4); Major Depressive Disorder-Not Otherwise Specified *n* = 2; Obsessive Compulsive Disorder *n* = 2; Panic Disorder *n* = 2; Adjustment Disorder *n* = 1; Alcohol Abuse Disorder *n* = 1, and; Dysthymia *n* = 1. Seven participants had clinically significant symptoms that did not meet diagnostic criteria. Overall 9 (29%) participants presented with depressive symptomatology, 9 (29%) with anxiety symptomatology and 13 (42%) a combination of both.

On average participants were 2.97 years post-TBI (*SD* = 4.70, Min = 0 and Max = 20) and had experienced 22.08 days of PTA (*SD* = 20.51). Executive functioning was in the 'low' to 'moderate average' range according to average Hayling response time (*M* = 76.55 seconds, *SD* = 61.95; Burgess & Shallice, 1997). Memory functioning was in the 10th to 25th percentile, according to average total words recalled on trials 1-5 of the BIRT (*M* = 40.79, *SD* = 15.21; Coughlan, Oddy, & Crawford, 2007).

2.5.2.2   Module use.

In total 387 instances of module use were coded over 177 CBT-ABI sessions. The module use in 12 (6.78%) sessions was considered unclear, however the rater was still required to provide a

best estimate of module use. Five (2.82%) sessions were considered non-adherent to the CBT-ABI protocol. Table 2.2 shows the total number of participants (out of $n = 31$) who received each of the modules, at least once over their treatment period. The table also shows the total number of sessions in which each module was delivered, and how many times each module was delivered to the receiving participants. *Figure 2.1* shows total module use according to each session.

Table 2.2 *Use and frequency of each module*

Module	No. of participants /31	No. of sessions /177	No. of times per participant *M* (*SD*)
1 – Assessment Feedback & Education	30 (96.77%)	97 (54.80%)	3.23 (2.10)
2 – Anxiety Management (Relaxation)	23 (74.19%)	65 (36.72%)	2.83 (1.53)
3 – Behavioural Activation	19 (61.29%)	55 (31.07%)	2.89 (2.16)
4 – Thinking Strategies	27 (87.10%)	92 (51.98%)	3.41 (1.82)
5 – Graded Exposure	7 (22.58%)	13 (7.34%)	1.86 (1.21)
6 – Structured Problem Solving	22 (70.97%)	36 (20.34%)	1.64 (0.73)
7 – Self-soothing Strategies	6 (19.35%)	8 (4.52%)	1.33 (0.52)
8 – Relapse Prevention	19 (61.29%)	21 (11.86%)	1.11 (0.32)
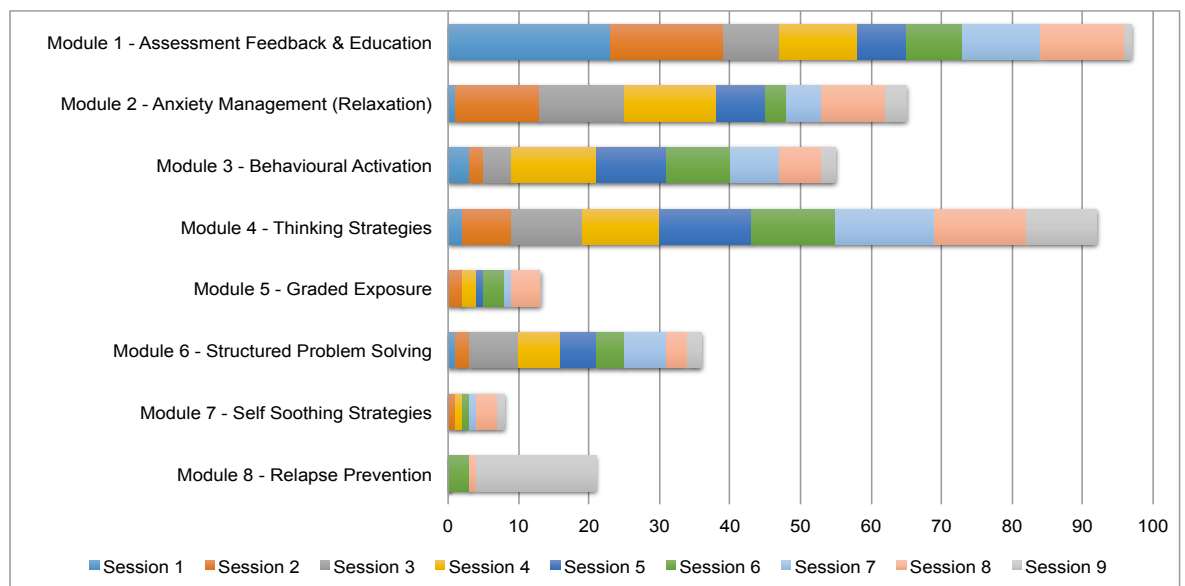
Figure 2.1 Overall module use frequency and timing

Of the 387 instances of module use, 232 were coded as primary modules (see *Figure 2.2*) and 155 coded as secondary modules (see *Figure 2.3*).
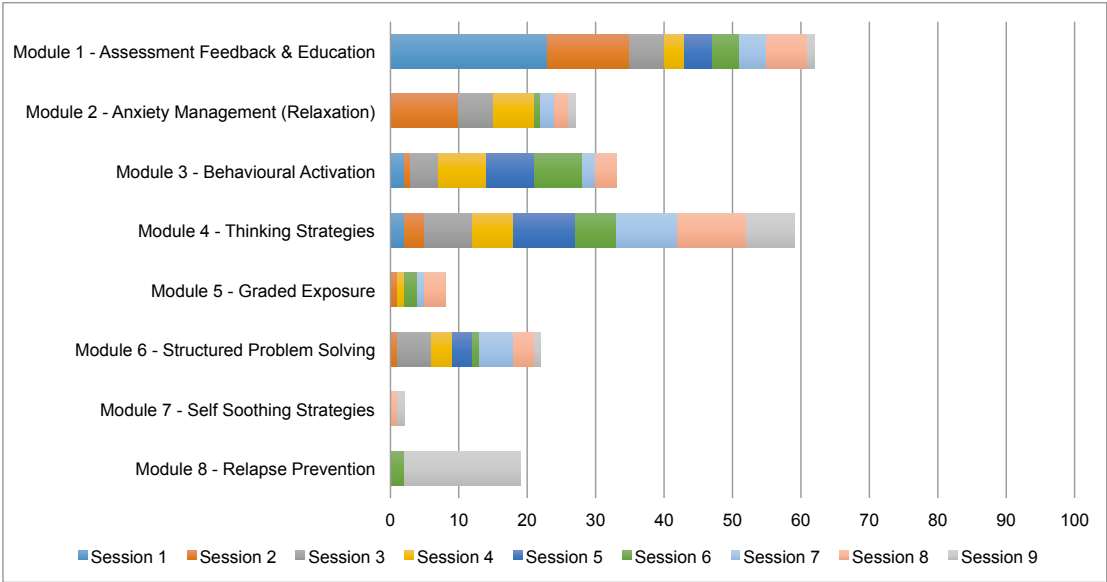
Figure 2.2 Primary module use frequency and timing
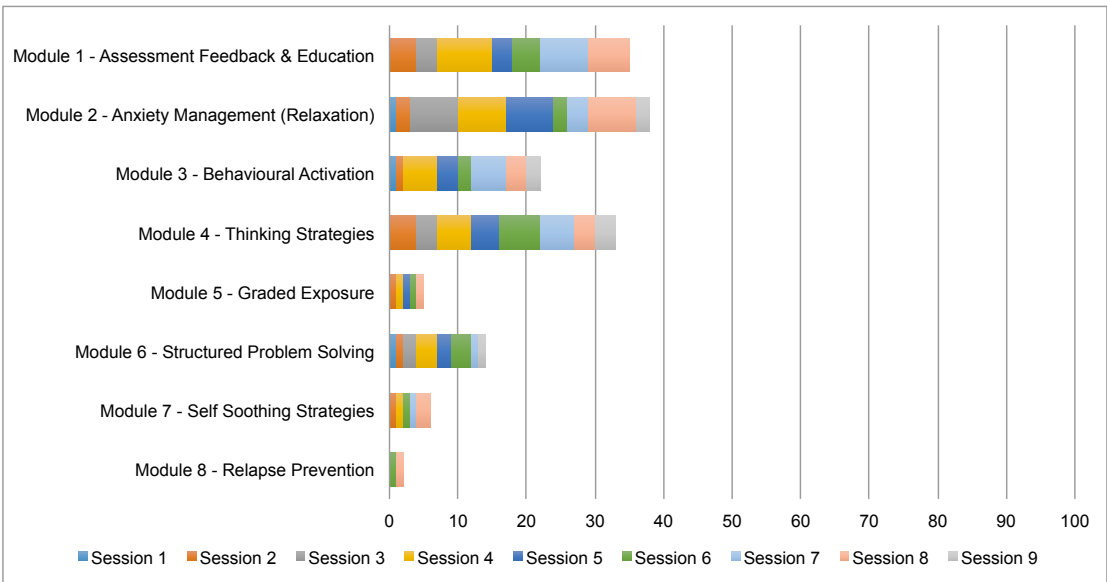
Figure 2.3 Secondary module use frequency and timing

In summary, the number of different modules utilised at each session for each participant ranged from 0 – 5. On average therapists utilised 2.19 modules per session. Module 1: Assessment Feedback & Education and Module 4: Thinking Strategies were utilised the most by therapists, both overall and as the main focus of the session. Module 5: Graded Exposure and Module 7: Self-Soothing Strategies were utilised the least. Early in therapy (sessions 1 – 3) Module 1: Assessment Feedback & Education and Module 2: Anxiety Management were utilised the most. Mid therapy (sessions 4 – 6) Module 4: Thinking Strategies and Module 3: Behavioural Activation were utilised the most. Late in therapy (session 7 – 9) Module 4: Thinking Strategies and Module 1: Assessment Feedback & Education were utilised the most. As expected Module 8: Relapse Prevention was utilised the most in Session 9. Module 2: Anxiety Management and Module 7: Self-Soothing Strategies were the only modules that were utilised more often as a secondary module, than as a primary module. For a detailed overview of primary and secondary module use at each session see Table 2.3 and Table 2.4.

Table 2.3 *Frequency of primary and secondary module use*

Session	Module 1: Assessment Feedback & Education		Module 2: Anxiety Management (Relaxation)		Module 3: Behavioural Activation		Module 4: Thinking Strategies	
	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary
1	23	0	0	1	2	1	2	0
2	12	4	10	2	1	1	3	4
3	5	3	5	7	4	0	7	3
4	3	8	6	7	7	5	6	5
5	4	3	0	7	7	3	9	4
6	4	4	1	2	7	2	6	6
7	4	7	2	3	2	5	9	5
8	6	6	2	7	3	3	10	3
9	1	0	1	2	0	2	7	3
Total (%)	62 (63.9%)	35 (36.1%)	27 (41.5%)	38 (58.5%)	33 (60.0%)	22 (40.0%)	59 (64.1%)	33 (35.9%)

Table 2.4 *Frequency of primary and secondary module use continued*

Session	Module 5: Graded Exposure		Module 6: Structured Problem Solving		Module 7: Self-Soothing Strategies		Module 8: Relapse Prevention	
	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary
1	0	0	0	1	0	0	0	0
2	1	1	1	1	0	1	0	0
3	0	0	5	2	0	0	0	0
4	1	1	3	3	0	1	0	0
5	0	1	3	2	0	0	0	0
6	2	1	1	3	0	1	2	1
7	1	0	5	1	0	1	0	0
8	3	1	3	0	1	2	0	1
9	0	0	1	1	1	0	17	0
Total (%)	8 (61.5%)	5 (38.5%)	22 (61.1%)	14 (38.9%)	2 (25.0%)	6 (75.0%)	19 (90.5%)	2 (9.5%)

2.5.2.3 *Module use relation to clinical symptoms.*

Table 2.5 shows mean module use, based on participant presenting symptoms (i.e., clinically significant anxiety, depression, or a combination of anxiety/depression). There was not a statistically significant difference between groups, according to one-way ANOVA or the Kruskal-Wallis H test, for any of the individual modules or total module use. However Module 4: Thinking Strategies approached significance ($\chi^2(2) = 5.25$, $p = .072$), with mean rank module use of 6.42 for anxiety, 13.36 for depression and 11.14 for combination symptoms.

Table 2.5 *Average module use according to clinical category*

Module	Mean (*SD*)		
	Anxiety	Depression	Combined
1 – Assessment Feedback & Education	4.83 (2.04)	4.00 (1.63)	3.71 (2.14)
2 – Anxiety Management (Relaxation)	3.33 (1.51)	2.86 (2.34)	2.71 (1.11)
3 – Behavioural Activation	4.00 (2.83)	2.14 (2.19)	2.14 (1.46)
4 – Thinking Strategies	2.83 (1.47)	4.57 (0.79)	4.57 (1.81)
5 – Graded Exposure	0.17 (0.41)	0.43 (0.79)	0.86 (1.46)
6 – Structured Problem Solving	1.50 (0.84)	1.29 (0.76)	1.57 (0.98)
7 – Self-soothing Strategies	0.33 (0.82)	0.57 (0.79)	0.14 (0.38)
8 – Relapse Prevention	1.00 (0.00)	0.71 (0.49)	0.86 (0.69)
Total	18.00 (6.03)	16.57 (4.50)	16.57 (3.95)

Note: Anxiety, $n = 6$; Depression, $n = 7$; Combined, $n = 7$.

2.5.2.4   *Module use relation to TBI variables.*

Correlational analyses found that BIRT trials 1-5 score was significantly associated with average frequency of Module 7: Self-Soothing Strategies ($r = 0.47$, $p = .01$). This suggested that better memory functioning was associated with greater therapist use of Module 7. Hayling response latency was significantly associated with Module 3: Behavioural Activation ($r_s = -0.46$, $p = .01$). Module 2: Anxiety Management approached significance ($r_s = -0.36$, $p = .06$). This suggested that poorer executive functioning (as indicated by a longer response time) was potentially associated with less use of Modules 2 and 3. All correlations with years since injury and injury severity (PTA duration) were non-significant, for both individual modules and overall module use.

2.6   STUDY 1 AND 2 DISCUSSION

The current study developed and pilot-tested a measure of therapist module use, within the context of the CBT-ABI program. The Module Identification Checklist was then used to assess

which modules therapists implemented, including timing and frequency. Whether module use was related to participant clinical needs and cognitive deficits was then examined.

2.6.1   Module Identification Checklist development and pilot testing.

Pilot testing demonstrated that consistently adequate inter-rater percentage agreement could be obtained with the Module Identification Checklist. The checklist was directly based on the therapist manual and required little modification to content. Although therapists were encouraged to combine modules within the same session, the occasionally large differences in time spent on modules within a session were not initially anticipated. This resulted in two important changes to the rating procedure: 1) coding of primary/secondary modules, and 2) discriminating between secondary modules and modules referenced in the context of relapse prevention (Module 8). These modifications ensured accurate representation of session focus.

TBI associated cognitive impairments are likely to impact engagement with certain types of CBT interventions and techniques. The capacity to identify the interventions a therapist is delivering in a consistent way facilitates reliable examination of potential content adaptations. Therefore the adequate inter-rater agreement found in pilot testing promotes confidence in the reliability of Study 2 data. This Module Identification Checklist is necessarily specific to the parent RCT treatment manual, therefore its capacity for use in other contexts is limited. However this study does provide a successful example of the pilot testing process, and reinforces the importance of considering time spent on interventions by therapists, not just intervention presence.

2.6.2   Module use.

Examination of module use patterns was primarily exploratory. It was hypothesised however that therapists would not consistently implement modules in a sequential order, which was generally supported by the results. All modules were utilised across sessions 1 – 9 with the exception of: Module 5: Graded Exposure, Module 7: Self-Soothing Strategies and Module 8: Relapse Prevention. This pattern of module use demonstrates that therapists were flexible in their treatment delivery.

Module 5 and 7 were not present at only three time-points (sessions 1, 3, 9 and 1, 3, 5 respectively). On the other hand Module 8 was only present at three time-points (sessions 6, 8 and 9). The use of Relapse Prevention in the second half of therapy, and primarily in the final session, was to be expected. Just as Module 1: Assessment Feedback & Education was primarily implemented in the first session. Furthermore Relapse Prevention was the only module referred to as 'compulsory' in the therapist manual. Seventeen (/18) of the session nine audio recordings included relapse prevention as the primary module, with the remaining session coded as Module 4: Thinking Strategies.

Comparison of module use in the current study to previous research is challenging, as RCTs of CBT post brain injury have not examined or reported the frequency of different interventions within their treatment programs. Rather treatment evaluation has focused solely on fidelity assessment. Studies in non-TBI samples have also primarily measured CBT components for the purpose of confirming treatment adherence/fidelity, and actual frequency of specific interventions is reported less often (Hill, Ogrady, & Elkin, 1992; Tang & Derubeis, 1999; Waller, Stringer, & Meyer, 2012).

One exception is a study by Kennard et al. (2009) who explored the impact of specific CBT treatment components on outcome in youths with medication resistant Major Depressive Disorder. Treatment was delivered over 12 sessions and a portion of these included parents. The percentage of participants receiving the most utilised treatment components was very similar to that of the current study: General therapy processes (i.e., psycho-education, reflecting on progress/therapy goals, and mood monitoring) - 95.2% vs current study 96.77%; Cognitive restructuring - 78.9% vs 87.10%; Behavioural activation - 72.3% vs 61.29%; and emotion regulation (i.e, self-soothing and relaxation) - 66.9% vs 74.19%. However in the current study relapse prevention was delivered to more participants: 4.2% vs 61.29%. Of course comparisons are limited due to significant differences in sample characteristics and use of different treatment manuals. However this consistency with previous research is encouraging.

2.6.3   Module use relationship to clinical symptoms.

Based on module descriptions in the therapist manual, it was hypothesised that clients with clinically significant anxiety symptomology (primary) would receive Module 2: Anxiety Management (Relaxation) and Module 5: Graded Exposure more often than those with depression or combination symptoms. On average Module 2 was utilised more for those with anxiety, relative to those with depression or a combination of symptoms. Module 5 was utilised the most for those with a combination of symptoms, but the least for those with primary anxiety symptoms. However differences between groups were not statistically significant, therefore hypotheses were not supported.

As Module 3: Behavioural Activation was described in the therapist manual as relevant for both anxiety and depression symptoms, differences in use based on clinical symptoms was not expected. However Module 3: Behavioural Activation was implemented the most on average for those with primary anxiety symptoms, although this difference between groups was not statistically significant. The module was designed as a treatment for low behavioural activation associated with depression and avoidant behaviour associated with anxiety. Therefore its elevated use for those with primary anxiety symptoms may reflect therapists targeting avoidance.

It appears that therapists spent more time focusing on Module 4: Thinking Strategies for those with both primary depression symptoms and a combination of symptoms. Furthermore, this difference between clinical groups approached significance. Module 4 was considered relevant for both anxiety and depression symptoms. Therapists possibly spent more time focusing on anxiety management strategies and ways to reduce avoidance (through behavioural activation) for participants with primary anxiety symptoms. This may have left less time to focus on thinking strategies. Furthermore the behavioural changes resulting from Modules 2 and 3 may have positively impacted client cognitions, and explicit focus on thinking strategies may have no longer been necessary.

The low frequency of Module 5: Graded Exposure (i.e., present in 13 sessions total) is notable as 35.48% of participants were diagnosed (separately or in combination) with Obsessive

Compulsive Disorder, Post Traumatic Stress Disorder, Panic Disorder and Phobia (e.g., driving, social). All of these participants also had comorbid generalised anxiety or depression symptoms. The only exception was a participant diagnosed with Obsessive Compulsive Disorder and Panic Disorder, who did not receive Module 5 throughout treatment (based on all 9 of the participant's CBT-ABI sessions). The participant who received the most sessions including Module 5 (i.e., four sessions) was diagnosed with a specific phobia. The manual advises therapists that it is helpful to pace Module 5 over several sessions. This may have contributed to therapists de-prioritising the module due to perceived timeframe restraints. Of course client diagnosis is one component of a broader client case conceptualisation and exclusion of Module 5 was likely driven by a variety of clinical factors. For example therapists may have perceived comorbid generalised anxiety and depression symptoms as a treatment priority. However, previous research has also found that negative beliefs about exposure therapy are not uncommon among practitioners and it is often underutilised (Deacon et al., 2013).

Taken together these findings indicate potential therapist tailoring of module use to client clinical symptoms. In particular therapists emphasised delivery of anxiety management strategies and behavioural activation (potentially targeting anxiety associated avoidance) to those presenting with primary anxiety symptoms. However group differences were not statistically significant. Therefore in the current sample participants with different clinical presentations likely received similar amounts of each module throughout treatment.

2.6.4   Module use relationship to TBI variables.

It was hypothesised that participant greater injury severity and poorer cognitive functioning would be associated with cognitively based modules (i.e., Module 4: Thinking Strategies and Module 7: Self-soothing strategies) being used less often by the corresponding therapist. Results generally did not support these hypotheses, as only one of these relationships was found to be statistically significant. Specifically, better memory functioning (higher BIRT score) was associated with greater therapist use of Module 7. In this module participants were taught to observe and accept experiences (internal and external), stay present and focus on their breath.

Participants were encouraged to initially practise daily, with the objective of utilising these strategies whenever they experienced challenging emotions. Beyond daily practice, this required the participant to spontaneously recall these strategies at potentially unpredictable and emotionally charged times. Therefore therapists may have been inclined to use this module with participants whose memory recall ability meant they had greater potential to utilise these strategies long term.

Memory functioning was not associated with use of Module 4. Furthermore injury severity (days of PTA) and executive functioning (Hayling response latency) were not associated with use of modules 4 or 7. Association with number of years since injury was exploratory and also not associated with module use. Overall therapists did not appear to favour use of behaviourally focused modules, as Module 4: Thinking Strategies was utilised the most. It is likely that the adaptations inherently incorporated within the therapist manual (e.g., strategies to modify the cognitive restructuring process for cognitively impaired participants) meant it could be implemented for clients with a relatively broad range of cognitive impairment as intended. Module 4 was also considered clinically applicable to both anxiety and depression symptoms. Therefore it makes sense that it was the most frequently used module, which is also in keeping with the emphasis placed on cognitions within the CBT model.

On the other hand, Module 7: Self-Soothing Strategies was the least utilised module. Module 7 was relatively less accommodating of cognitive impairment, due to an emphasis on the abstract concepts of mindfulness and acceptance. This may also explain why it was the only module to be statistically associated with cognitive functioning. Furthermore this module was described in the therapist manual as an additional CBT skill, rather than a stand-alone intervention. Module 7 was present in a total of eight sessions across six participants, and was mostly utilised as a secondary module. This could be considered an example of "flexibility within fidelity", as therapists presumably met a client need through the module's inclusion, but its low frequency indicates fidelity to the core modules and CBT model.

Additionally, an unexpected statistically significant association was found between executive functioning and Module 3: Behavioural Activation use. A relationship with Module 2:

Anxiety Management also approached significance. This suggested that poorer executive functioning was associated with less use of Module 3, and potentially less use of Module 2. Both of these modules are behaviourally based, therefore this result is not in keeping with the recommended behavioural intervention emphasis for people with TBI. This is particularly the case for those with poorer executive functioning, associated with difficulties engaging with abstract concepts.

Behavioural activation homework potentially involved hourly activity monitoring on a daily basis. While all modules incorporated homework, the between session frequency of Module 3 homework may have been perceived by therapists as requiring a level of organisational ability that exceeded the capacity of those with relatively poorer executive functioning. Module 2: Anxiety Management was similar, in that homework included a daily record form of relaxation practise. While therapists were encouraged to adapt homework to the cognitive needs of clients, the record form homework templates may have introduced some hesitation in using these modules with clients whose executive functioning was poorer.

2.6.5 Limitations and directions for future research.

These results are considered preliminary due to the small sample size on which they are based. However they indicate potential trends that warrant further exploration. In particular, the relative emphasis of relaxation and relative de-emphasis of thinking strategies for those with primary anxiety symptoms needs to be verified in a larger sample size, as does the association between better memory functioning and use of more mindfulness strategies. Furthermore non-significant results may be due to a lack of statistical power to detect a difference between clinical symptom groups or a relationship with TBI related characteristics.

While the Module Identification Checklist demonstrated adequate inter-rater agreement during pilot testing, reliability was not assessed again during main data collection. Ideally future research would re-assess Module Identification Checklist reliability at different time-points throughout data collection to reinforce confidence in the reliability of resulting data. Furthermore

the module use in 12 (6.78%) sessions was considered to be unclear, therefore a small percentage of sessions may have been coded differently by a co-rater.

A total of 177 CBT-ABI session recordings, representing 31 therapist-participant dyads, were available for the current study. However the parent RCT included 75 participants. Therefore it is not possible to determine whether the module use and relational trends found in the current study extend to the entire parent RCT. However module frequencies were generally in keeping with previous research (Kennard et al., 2009), suggesting it is possible the current data is representative of general therapist module use in the CBT-ABI program.

Further research is needed to replicate findings and explore the reason for relational trends in more detail. The current findings have highlighted the possible influence of homework task requirements on module use in those with poorer executive functioning. Therefore it would be useful for future research to distinguish between interventions (e.g., behavioural activation) and corresponding techniques/strategies (e.g., hourly/daily activity monitoring). In this example the content of the intervention is behaviourally focused and therefore accommodating to poorer executive functioning, however the associated techniques and strategies may require a level of future planning and organisation that is not accommodating to poorer executive functioning. In order to better understand therapist module use in relation to individual client cognitive deficits, a better understanding of module cognitive requirements is needed.

2.6.6   Conclusion.

TBI associated cognitive impairment has the potential to interfere with engagement in CBT. Therefore therapist choice, timing and frequency of certain CBT interventions, arguably needs to be guided by both client clinical needs and cognitive deficits. The current study has taken the first step in bringing clarity to our understanding of which interventions are actually delivered in CBT post brain injury. Findings indicate that therapists in the CBT-ABI program did implement "flexibility within fidelity". This was primarily demonstrated through implementation of different modules across time-points, and varying module frequencies. This variability is possibly related to

client clinical symptoms, primary anxiety in particular, and client cognitive functioning. Further research is needed to verify and extend upon these findings, in order to better understand the process of tailoring CBT-ABI to individual client needs.

CHAPTER **T**HREE

COGNITIVE **D**EFICIT **C**OMPENSATORY **S**TRATEGY **C**HECKLIST

DEVELOPMENT AND **S**TRATEGY **U**SE

3.1   CHAPTER OUTLINE AND AIMS

This chapter introduces the Cognitive Deficit Compensatory Strategy (CDCS) Checklist, and describes its development. The CDCS Checklist was designed in the context of Cognitive Behaviour Therapy (CBT) adapted for Traumatic Brain Injury (CBT-ABI; Ponsford et al., 2016; Wong et al., in press). Using observer coding of therapist-client dialogue, the checklist provides detailed tracking of therapist CDCS use throughout a session. This is the first checklist to define, operationalise and measure therapist CDCS use. The aim of this chapter is to describe development and pilot testing of the checklist's content and rating procedure. Strategy use of therapists delivering CBT-ABI will then be described, based on assessment with the CDCS Checklist. Finally, the relationship between brain-injury variables and CDCS use will be explored.

3.2   INTRODUCTION

CBT is structured, yet driven by the client's individual conceptualisation, and therefore inherently flexible, within and across sessions. This is one reason why CBT is considered best-placed to address the needs of people with brain injury experiencing psychological problems (see Chapter 1). Nonetheless modifications to CBT delivery are still arguably necessary in order to compensate for client impairments in attention, memory, learning and executive function. Without additional support, a brain-injured client is less likely to retain and apply therapy content, thereby reducing the opportunity to fully benefit from treatment. Several randomised controlled trials (RCTs) have demonstrated the efficacy of CBT reportedly adapted for brain injury (Hodgson et al., 2005; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Ponsford et al., 2016). However the nature and role of brain-injury specific adaptations in these CBT interventions has not been explicitly examined.

In discussing approaches to psychological therapy after brain injury, brain injury experts (Block & West, 2013; Khan-Bourne & Brown, 2003; Klonoff, 2010; Leathem & Christianson, 2007; Ponsford, Sloan, & Snow, 2012) have previously recommended various adaptations. These generally include pre-treatment considerations, external cognitive aids and changes to therapist

delivery of session content. The following provides a brief overview of recommended adaptations within each of these categories.

An up to date neuropsychological assessment is considered important in establishing a comprehensive understanding of the type and severity of client cognitive impairments. It is also recommended that pre-treatment assessment include evaluation of client symptom awareness and consequent motivation for treatment. This information equips the therapist to better anticipate the impact of the client's brain injury on treatment engagement (Klonoff, 2010). Another consideration is session timing, duration and frequency, which may differ depending on client needs. For example some may require shorter but more frequent sessions, or need longer sessions with more breaks, while others may want to schedule sessions in accordance with times of lowest fatigue. Pre-treatment decisions regarding timing/frequency may require ongoing review throughout treatment (Ponsford, Sloan, & Snow, 2012).

External cognitive aids refer to tangible people or objects that can exist both in and out of the therapy session. It is recommended, and sometimes necessary, that a co-therapist (i.e., family member or close other) be involved with both the pre-treatment and treatment process. The co-therapist's willingness to be involved, and the impact this may have on them, needs to be taken into consideration (Klonoff, 2010; Leathem & Christianson, 2007). Other recommended external cognitive aids include incorporating a therapy diary/folder, note-taking, simplified handouts/worksheets, visual aids and electronic reminders (Khan-Bourne & Brown, 2003; Ponsford, Sloan, & Snow, 2012).

Experts recommend changes to both session content and the way in which content is delivered. It is considered helpful to provide clients with brain-injury specific psycho-education (Block & West, 2013). Experts also recommend presenting session content in a clear and concrete way, reducing the use of abstract terminology or complex language. Relatable analogies and metaphors are considered useful, as they associate new information with that which is already stored in the client's memory. If appropriate, the therapist can also incorporate internal memory strategies (e.g., mnemonic devices, imagery etc.). It is recommended that therapists adopt a slower

pace, use a more directive approach and build in many opportunities for repetition. This includes repetition of important points throughout the session, session summaries and task practice in-session (Klonoff, 2010; Ponsford, Sloan, & Snow, 2012).

Unfortunately the research base underpinning these recommendations is negligible. Very few studies have examined brain-injury specific adaptations in the context of psychological therapy. A single case study by Brindley, Bateman, and Gracey (2011) explored the use of SenseCam (wearable camera) for a participant with Traumatic Brain Injury (TBI) undertaking CBT for an anxiety disorder. The participant required assistance with autobiographical memory retrieval and the camera served as a memory aid. The findings showed that SenseCam supported retrieval of anxiety trigger events, and was superior to both automatic thought record sheets and no strategy at all. However the participant did not show a significant improvement in anxiety or depression symptoms throughout treatment.

A study by Mohlman, Gorenstein, and Kleber (2003) examined the efficacy of CBT for Generalised Anxiety Disorder in elderly participants. The authors tested both a standard version of CBT and a version enhanced with learning and memory aids. In the enhanced condition several strategies were incorporated, such as homework reminder calls and increased reviews of all concepts and techniques. The enhanced CBT yielded larger effect sizes than standard CBT, when each was compared against a wait-list control group. However, the enhanced CBT was not directly compared to the standard CBT. Furthermore participants with potential cognitive dysfunction were excluded, so comparison with brain-injured populations is limited.

A recent systematic review by Gallagher et al. (2016) was the first to examine how recommended adaptations were reportedly being implemented in CBT for psychological issues post brain injury. The authors synthesised both therapy modifications recommended in review articles, and modifications reported in intervention studies. The findings of the review highlighted three important issues impacting examination of CBT adaptations, 1) the conceptual ambiguity of 'adaptation', 2) mixed reporting quality and 3) inability to determine implementation of adaptations.

Gallagher et al. (2016) acknowledged that some reported adaptations were "…*difficult to distinguish from 'competent' CBT that is being delivered in a dynamic and flexible fashion for people without brain injury*" (p. 15). For example, the review identified seven studies reporting modelling and generalisation of homework (e.g., practising homework in session, recording homework effects and applying newly learned techniques to daily activities). Yet homework is considered integral to CBT (J. S. Beck, 2011) and is implemented across a range of clinical presentations. Indeed the homework-outcome relationship in CBT has been firmly established in meta-analytic research (Kazantzis et al., 2010; Kazantzis et al., 2016; Mausbach et al., 2010). Arguably CBT treatment excluding the review and assignment of homework could be considered to have reduced fidelity, therefore conceptualising homework as an adaptation is unjustified.

The review also included quality analysis of treatment reporting procedures within the intervention studies. Results showed that all articles provided a description of the general components of CBT covered in their interventions. Yet considerable variability was found between studies on all other levels of reporting quality. Five studies indicated that a treatment manual was available, however none were provided in response to the authors' request. The literature search by Gallagher et al. (2016) was completed in June 2014. Since this time there has been an improvement in the level of detail describing intervention session-to-session content and adaptations (Ashman et al., 2014; Fann et al., 2015). However Ponsford et al. (2016) is the only RCT that refers to use of a specific adapted CBT manual (Wong et al., in press) that has been pilot tested (Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012).

Findings from RCTs examining the effectiveness of CBT adapted for brain injury are promising, and the study by Mohlman et al. (2003) highlights the potential for non-adaptation to result in treatment that is less effective. The review by Gallagher et al. (2016) also identified that it is currently impossible to determine how therapists interpret and apply adaptations in-session. Direct observation of therapist behaviour is necessary in order to address this research gap. However observation is currently impeded by the lack of an appropriate measure. Such a measure would facilitate examination of adaptation use and how this relates to therapy outcome, thereby identifying ways to increase treatment efficacy.

In the Gallagher et al. (2016) review, modifications were included if study authors explicitly labelled them as such, or they were "…*inferred when there was a discernable alteration to the content or process of the CBT offered…*" (p. 4). The following core content and processes of 'standard' CBT were described: use of active change strategies; deliberate use of homework; guided by an individualised formulation based on the cognitive model; prioritising of a "here and now" focus; and emphasis on linking thought to patterns of behaviour and feeling. We propose that greater conceptual specificity is needed in order to identify adaptations most pertinent to brain injury. Indeed these broad definitions are likely to have contributed to identification of homework as an adaptation, as discussed above. Outlined below is the conceptualisation and definition of 'TBI-specific adaptation' utilised in the current study.

3.2.1   Conceptualising and defining TBI-specific adaptations.

CBT aims to empower clients with psychological knowledge and skills; therefore the capacity to learn is a prerequisite to treatment engagement. Problems with cognition, commonly associated with both psychological disorders and brain injury, may hinder the learning process. Arguably, treatment delivery needs to be adapted to address client cognitive needs. Therefore it is important to distinguish between the cognitive needs of clients with and without brain injury, particularly when similarities can exist in cognitive presentations.

Cognitive difficulties are generally situational or state-dependent for a person without brain injury. Their cognitive ability is affected by the presence of psychological symptoms. Therefore improvement in the latter is likely to be associated with recovery of the former. A greater underlying learning potential exists, which increases the client's capacity to benefit from treatment. On the other hand, a person with a brain injury may experience persistent cognitive deficits across various domains. Those cognitive impairments will remain present irrespective of psychological symptom improvement. This means the individual with brain injury may have inherently limited learning potential and less capacity to benefit from treatment if this is not taken into account. Regardless of cause, cognitive problems necessitate changes to treatment delivery. However TBI-specific compensatory modifications may circumvent the impact of enduring cognitive deficits.

Berkel et al. (2011) proposed a theoretical model of relations between implementation and outcomes, in the context of evidence-based preventive interventions (e.g., mental health, substance use etc.). As part of their model, adaptation was defined as "…*the extent to which facilitators add to or modify content and processes as prescribed in the manual*" (p. 26). Ferrer-Wreder et al. (2012) evaluated nine adaptation models, in the context of cultural adaptation to evidence-based interventions. The authors extended upon the definition of Berkel et al. (2011) by stating that adaptations "…*can occur within any part of the totality of what might be involved in the implementation of an intervention (e.g., changes to an intervention's deep structure, intervention processes or materials, and/or intervention support structures)*" (p. 151). These definitions indicate that 'adaptation' can be considered an umbrella term for any type of change that occurs to a treatment for any reason.

On the other hand Bäckman and Dixon (1992) propose that compensation is "…*inferred when an objective or perceived mismatch between accessible skills and environmental demands is counterbalanced…by investment of more time or effort (drawing on normal skills), utilization of latent (but normally inactive) skills or acquisition of new skills…*" (p. 272). The Encyclopedia of Clinical Neuropsychology defines compensatory strategies as "…*environmental modifications or behavioural strategies designed to bypass persistent impairment in attention, memory, executive-function, and/or other cognitive skills as a means to achieve desired rehabilitation goals*" (Kurtz, 2011, p. 44).

Taken together, these definitions indicate that 'compensation' is one form of 'adaptation' (i.e., CBT is adapted by meeting the need for compensation for cognitive deficits). The role of a therapist is to adapt the treatment by counterbalancing the mismatch between the client's cognitive ability and cognitive demands of the therapy session. While a therapist will also need to compensate for the cognitive impairments of a non brain-injured client, their behaviours are being driven by different needs. The therapist of a brain-injured person aims to bypass cognitive deficits in order to achieve psychological symptom improvement. The therapist of a non brain-injured person aims to recover cognitive ability through psychological symptom improvement.

The categorisation of "standard" and "adapted" likely oversimplifies the dynamic nature of CBT, which is guided by an "…*ever-evolving formulation, and conceptualization of each patient's problems in cognitive terms*" (J. S. Beck, 2011, p. 7). Arguably CBT delivery is in a constant state of adaptation, as is a client's individual formulation. Furthermore, "standard" CBT components may take on adaptive value due to the way in which they are utilised. For example, in order to bypass TBI related memory deficits, a therapist may need to provide several verbalised summaries per session, and direct the client to write them down. In this example the therapist has changed the frequency and way in which a typical CBT session component (i.e., session summary) is delivered. Therefore some TBI-specific adaptations can be conceptualised as existing on a frequency continuum. The act of increasing or decreasing the frequency of a specific behaviour is the modification.

The current study had two overarching aims. The first was to create a checklist that could reliably measure therapist in-session cognitive deficit compensatory strategy (CDCS) use (Study 1). The second aim was to describe therapist CDCS use and explore relational trends with TBI-related variables: years since brain injury, executive functioning, memory functioning and brain injury severity (Study 2). Both Study 1 and 2 utilised CBT-ABI audio recordings from the parent RCT described in Chapter 1 (Ponsford et al., 2016). The CBT-ABI program is a manualised intervention (Wong et al., in press) based on Beck's CBT model (A. T. Beck et al., 1979) and designed to accommodate participants' TBI associated cognitive impairments.

3.3 STUDY 1: COGNITIVE DEFICIT COMPENSATORY STRATEGY CHECKLIST DEVELOPMENT AND PILOT TESTING

Study 1 aimed to create a checklist that could reliably measure therapist in-session CDCS use. The following definition of CDCS was utilised: *A therapist behaviour that maximises the brain-injured client's opportunity to meaningfully engage with therapy interventions and processes, by compensating for a cognitive deficit.*

3.3.1 Study 1: Method.

3.3.1.1 Content selection.

Development of the checklist began with collation of a CDCS list sourced from the brain injury literature and parent RCT therapist manual. Strategies were only selected for inclusion if they met the definition of CDCS described above. The primary researcher (L.Z.) then reviewed five CBT-ABI sessions from the parent RCT in order to identify any additional strategies and develop definitions.

To ensure content validity of the CDCS Checklist, feedback was obtained from three experts with extensive research and clinical expertise in brain injury and psychotherapy process scale development. A brain injury expert (D.W.) directly observed three full CBT-ABI sessions and the primary researcher's corresponding coding with a preliminary version of the CDCS Checklist. The remaining two experts (J.P. & N.K.) directly observed CBT-ABI session segments corresponding to items that were identified by L.Z. and D.W. as challenging to code. Qualitative expert feedback was provided regarding the checklist's structure, presentation, item relevance and item clarity. This assisted in further operationalising items and ensuring they accurately reflected the compensatory strategies they proposed to measure (John & Benet-Martinez, 2000).

Finally, an updated preliminary version of the checklist was reviewed and discussed with the expert team to confirm its readiness for pilot testing. A rating sheet was also designed to accompany the CDCS Checklist, which provided space for documenting relevant therapist-client session dialogue and the corresponding checklist item number.

3.3.1.2 Co-rater training.

CDCS Checklist reliability was assessed through calculating inter-rater agreement with a doctoral clinical psychology graduate (Y.A.) who served as co-rater. Y.A. had existing knowledge of the CBT-ABI therapist manual and overall treatment procedures, but importantly was not a therapist in the parent RCT. Prior to pilot testing the co-rater underwent training in the CDCS

Checklist. Training included introduction to the items and rating procedure, and re-familiarisation with the therapist CBT-ABI manual. Examples and non-examples (e.g., therapist behaviour addressing knowledge deficits rather than cognitive deficits) of each checklist item were provided before the co-rater listened to a CBT-ABI session exemplar. Item application to the exemplar session was discussed, and discrepancies in understanding of item operationalisation were clarified.

3.3.1.3   *Pilot testing.*

Eleven CBT-ABI audio recordings were randomly chosen for pilot testing purposes. Two of these sessions were utilised more than once, resulting in 14 pilot testing sessions altogether. The primary researcher and co-rater coded sessions independently. Inter-rater agreement was assessed for both the *presence* of an item in the session, and *frequency* of that item. Two reliability indices were utilised, percentage agreement and free marginal kappa.

Percentage agreement is a commonly used index of inter-rater agreement. However percentage agreement does not take into account agreement based on chance, and can overestimate agreement levels (McHugh, 2012). Supplementing percentage agreement values with another index of reliability is recommended. Therapist behaviour observed in the checklist content selection process (i.e., initial five CBT-ABI sessions) indicated that certain items were likely to have a low frequency. Therefore free marginal kappa was considered most appropriate for the current dataset because it takes into account agreement by chance and does not assume a fixed distribution (Von Eye & Von Eye, 2008; Warrens, 2010).

Percentage agreement values $\geq$ 70% have been considered acceptable (Stemler, 2004). Kappa scores ranging between .41 and .60 are considered an indication of weak agreement, while a range of .61 - .80 indicates moderate/substantial agreement, and .80 – 1.00 indicates strong to perfect agreement (McHugh, 2012; Viera & Garrett, 2005). Based on these cut-offs, percentage agreement $\geq$ 75% and $\kappa \geq 0.61$ was considered acceptable for pilot testing purposes in the current study.

Rating discrepancies were regularly discussed throughout pilot testing. Ongoing modifications to CDCS Checklist content and rating procedure were iterative and guided by 1) item inter-rater agreement levels, 2) rater debriefings, and 3) expert team consultation, and are described within the results.

3.3.2   Study 1: Results.

3.3.2.1   *Checklist content modifications.*

Pilot testing revealed that ambiguous wording within certain item labels and definitions was impacting inter-rater agreement. This was addressed by replacing wording with more specific language. For example the strategy of "therapist guidance/corrections" was modified to "therapist directive instruction/corrections". The generic strategy of "therapist repetition" of any content was broken down into repetition sub-items (e.g., "repetition of therapist directive instruction/corrections"). The broad item label of "therapist summary" was re-defined to "therapist homework summary". Item examples and non-examples based on verbatim quotes from the CBT-ABI sessions were also added to item descriptors. For example the descriptor of the item capturing therapist use of "analogies/metaphors" was modified to include a concrete rating example (e.g., *"so a thought is like a cloud, clouds pass"*) and a non-example (e.g., *"this strategy works like a dream"*).

Pilot testing debriefings also identified a need to add rating guidelines to item descriptors. For example raters were instructed to code certain items inclusively (i.e., if in doubt code item instance as present; e.g., therapist sourced examples) and others exclusively (i.e., if in doubt code item instance as absent; e.g., repetition of psycho-education). Raters were also provided explicit instruction to rely solely on therapist dialogue to determine item presence for paper-based external aids. This reduced subjective interpretation (e.g., coding as present based on sound of rustling paper) and potential over-coding of the item. Additional rating guidelines also assisted in clearly defining the parameters of an item 'instance'. For example it had to be reasonably clear to raters that the client could see the notes or handouts in-session before coding as an instance. This ensured

that the therapist behaviour of bringing the client's visual attention to the notes or handouts was captured, while general verbal references to the notes or handouts only were not. To assist with item instance identification for the process of inter-rater agreement calculation, the rating sheet was modified to include session time-stamps.

The Gallagher et al. (2016) review identified the recommended adaptations *reportedly* utilised in intervention studies of CBT post brain-injury. Table 3.1 shows which adaptations identified in the Gallagher et al. (2016) review were operationalised into CDCS Checklist items, including corresponding session dialogue examples (paraphrased and de-identified). The final version of the CDCS Checklist is presented in Appendix B.

3.3.2.2   *Inter-rater agreement.*

Results showed that 86.7% of the checklist items obtained adequate inter-rater agreement when raters coded item presence or absence of the strategy over the course of the entire CBT-ABI session (i.e., the use of the strategy at least once during the session). The only exceptions were the following four items: Therapist sourced examples (item 3), repetition of a therapist-sourced example (item 3a), repetition of potential responses (item 7a.) and therapist directive instruction/corrections (item 8). Three of these items (items 3a, 7a and 8) had been added to the CDCS Checklist later in pilot testing and were therefore coded from five out of the 14 sessions. Therapist sourced examples (item 3) was coded from all 14 sessions.

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Table 3.2 *Adaptations identified in Gallagher et al. (2016) review and corresponding CDCS Checklist items*

Gallagher et al. (2016) review recommended modifications (paraphrased)		CDCS Checklist item - *"Paraphrased/de-identified example"*
Cognitive need	Modification	
Therapeutic education and formulation specific to brain injury	• Include cognitive assessment within formulation	• N/A
	• Provide CBT model psycho-education (i.e., ensuring link between cognitions and affect are understood)	• Checking understanding (item 10) - *"Can you say to me what the plan is for your homework this week?"*
	• Provide clear information on brain injury effects	• N/A
Problems with attention, concentration and alertness	• Provide rest breaks during sessions	• Session breaks (item 22) - *"Do you need to stop for some water or something?"*
	• Shorten session length	• Modification of session duration (item 21) - *"I've noticed it's almost an hour and you're tired, so let's wrap up"*
	• Increase session frequency	• N/A
Communication difficulties	• Use clear, structured questioning	• Therapist provision of potential responses (item 7) - *"Was your anxiety low, medium or high?"*
	• Incorporate visual resources	• Introduction of handout (item 6) - *"This is in your book, the model is outlined on this page right here"* • Visual aids (item 11) - *"Now looking at this picture [photo] here of you in rehab, how far have you come since then?"*
	• Place emphasis on behavioural techniques	• N/A
	• N/A	• Analogies/metaphors (item 5) - *"We are driving a bus, our emotions are the passengers…anxiety kicks us out of the driver's seat"*
Memory deficits	• Use therapy notebook or folder	• Note-taking/therapy diary (item 9) - *"I'll get you to write that example into the model"* • Handout folder/dividers (item 19) - *"I've brought this for you today, it has the plastic sleeves so you can change the order of your handouts"*
	• Use memory aids (e.g., written notes or audiotapes)	• Reminders (item 12) - *"So put a reminder in the calendar in your phone so you don't forget"* • Written session summaries (item 15) - *"Maybe what I can do is write a bit of a summary for you, type it up, and post it to you"*

		• Cue cards (item 17) - *"Let's write down a few coping thoughts in your phone to look at when you're in the shopping centre"* • Provision of session audio recording (item 18) - *No examples observed*
	• Summarise and repeat salient points at frequent intervals during the session	• Repetition of psycho-education (item 1) - *"As I said before, this model is identifying the consequences of having that thought…"* • Therapist reference to previous session (item 2) - *"We talked at the beginning of the program about how anxiety is a natural thing we all experience"* • Homework summary (item 4) - *"Use the alternative thoughts and slowed breathing when you're driving this week, because that will help bring your stress levels down"* • Verbalised session summaries (item 16) – *"So all in all things are going really well…with the job stuff, we've decided you'll continue with that over the break, and as I said before you have this list of people to contact during that time if you need to"* • Repetition sub-items (items 3a, 5a, 6a, 7a, 8a and 11a)
	• Involve a close other	• Inclusion of co-therapist (item 20) - *"Using [spouse] as a prompt worked last time, let's do that again"*
	• N/A	• Internal memory strategies (item 13) - *No examples observed*
Executive dysfunction	• Present information more slowly and allow extra time for client response	• N/A
	• Use summarising or agreed-upon signal to alert tangential clients	• Re-focusing client (item 14) - *"You're jumping ahead a bit…just coming back to what we're doing"*
	• Focus on concrete examples and aid generation of alternative solutions	• Therapist sourced examples (item 3) – *"What could the next challenge be on the exposure hierarchy? Sitting in the car without turning it on maybe?"*
	• Take a directive and structured approach if necessary	• Therapist directive instruction/corrections (item 8) - *"So flip the page over and write down what we've said"*
	• Model homework completion and encourage generalisation	• Implementing strategies in-vivo (item 24) – *"So at our last session we walked along that busy street and tried some of the strategies…"*
Low motivation	• N/A	• Employment of cost-benefit analysis (item 23) - *No examples observed*

Note: N/A identifies that associated measurement requirements were outside the scope of the checklist, the strategy did not meet the definition of CDCS utilised in the current study or the checklist item did not correspond to a recommendation in the Gallagher et al. (2016) review (see Study 1 Discussion).

Results showed that nearly half (46.7%) of the checklist items did not obtain an adequate level of inter-rater agreement when raters coded item instance frequency. Item absence and low frequency meant free marginal kappa could not be calculated for several items. As low instance frequency impacted several items, both percentage agreement and free marginal kappa values must be interpreted with caution.

Item frequency inter-rater agreement levels improved over time (i.e., from pilot ratings 1 to 14) for the following five items: Analogies/metaphors (item 5), introduction of handout (item 6), therapist provision of potential responses (item 7), note-taking (item 9) and checking understanding (item 10). Although these items did not meet adequate inter-rater agreement levels overall, this improvement trend indicated that rating practice, debriefings and alterations to the checklist descriptors/rating guidelines were beneficial.

Item frequency inter-rater agreement levels for the following two items remained consistently insufficient over time: Therapist reference to previous session (item 2; 67.1%) and therapist sourced example (item 3; 10.1%). This indicated that rating practice, debriefings and changes to the checklist descriptors/rating guidelines were not beneficial for these items. Inter-rater agreement for frequency of verbalised session summaries (item 16) decreased over time. This was due to 100% agreement for absence of the item in the first nine pilot-testing sessions. Therefore raters had low agreement only when the item was present for the final five sessions.

Item frequency inter-rater agreement levels were adequate for 10 items. It is important to note these item instance frequencies were quite low, ranging from one to eight instances overall. Agreement on complete absence of an item was consistently high. Table 3.3 shows inter-rater agreement levels for both the presence/absence of an item, and the frequency of present items.

Table 3.3 *Inter rater agreement for item presence/absence and frequency of present items*

CDCS Checklist item	% agreement item present/absent	Item instance frequency	
		% agreement (*n* instances)	Free marginal kappa
1. Repetition of psycho-education*	80.0%	33.3% (13)	-0.33
2. Therapist reference to previous session	100%	67.1% (78)	0.34
3. Therapist sourced examples	50.0%	10.1% (129)	-0.80
3a. Repetition of a therapist sourced example*	40.0%	15.4% (11)	-0.69
4. Homework summary*	100%	100% (1)	-
5. Analogies/metaphors	78.5%	30.0% (98)	-0.40
5a. Repetition of analogies/metaphors*	80.0%	80.0% (2)	-
6. Introduction of handout	85.7%	45.3% (75)	-0.09
6a. Repetition of handout*	100%	33.3% (47)	-0.33
7. Therapist provision of potential responses	78.5%	34.6% (52)	-0.31
7a. Repetition of potential responses*	60.0%	60.0% (2)	0.20
8. Therapist directive instruction/corrections*	20.0%	25.0% (16)	-0.50
8a. Repetition of directive instruction/correction*	80.0%	80.0% (1)	-
9. Note-taking or therapy diary	78.5%	45.0% (39)	-0.10
10. Checking understanding	92.8%	70.8% (15)	0.42
11. Visual aids	100%	77.7% (7)	0.47
11a. Repetition of visual aids*	100%	72.7% (7)	0.45
12. Reminders	85.7%	76.5% (8)	0.53
13. Internal memory strategies	92.8%	92.9% (1)	-
14. Re-focusing client	100%	93.3% (3)	0.87
15. Written session summaries	92.8%	92.9% (2)	0.86
16. Verbalised session summaries	78.5%	68.8% (5)	0.38
17. Cue cards	100%	100% (0)	-
18. Provision of session audio recording	100%	100% (0)	-
19. Handout folder/dividers	100%	100% (0)	-
20. Inclusion of co-therapist	92.8%	92.9% (1)	-
21. Modification of session duration	92.8%	92.9% (1)	-
22. Session breaks	100%	100% (0)	-
23. Employment of cost-benefit analysis	100%	100% (0)	-
24. Implementing strategies in-vivo	100%	100% (0)	-

Note: Items added to CDCS Checklist later in pilot testing (*), coded from five out of the 14 sessions.

3.3.2.3   *Audio vs transcription based inter-rater agreement.*

Based on rater debriefings and consultation with the expert team, it was agreed that excessive rater cognitive load was likely contributing to the lack of adequate item frequency inter-rater agreement. The design of the CDCS Checklist requires high levels of rater vigilance to session dialogue. The cognitive requirements of the rating procedure are as follows: 1) attend to an entire therapy session (typically $\geq$ 50 minutes), 2) determine whether dialogue meets criteria of 30 unique item descriptors/rating guidelines, 3) determine whether dialogue constitutes a subsequent 'instance' of an item, and 4) record relevant session dialogue and corresponding time-stamp. The duration needed to code an audio-recorded CBT-ABI session with the CDCS Checklist ranged from approximately 1.5 to 3 hours per session.

Requirement 3) 'determining subsequent item instances' was particularly demanding for repetition-based items, including summaries. This was due to the need for raters to accurately recall previous session content from memory, in order to correctly determine if dialogue later in the session constituted some form of repetition. Lapses in concentration, mishearing session dialogue or forgetting previous dialogue meant coding between raters had the potential to be highly discrepant, as lack of awareness of earlier session dialogue impacted interpretation and ratings of dialogue later in the session.

In order to address the issue of potentially excessive rater cognitive load, five written transcriptions of the sessions were pilot tested and inter-rater agreement compared to the inter-rater agreement of the same audio-recorded sessions. This change in rating procedure reduced the intensity of cognitive requirements in the following ways: 1) relatively shorter duration of attention was required for reading of session content, 2) the need to make a note of relevant session dialogue and corresponding time stamp was eliminated, 3) reference to previous session content was easier to identify, to determine presence of repetitions, and 4) influence of mishearing content and subjective interpretation of therapist tone was eliminated.

Relying on written dialogue rather than audio recordings therefore meant an overall reduction in the amount of information raters had to attend to, identify, interpret and rate. Therefore

it was anticipated this would result in transcription-based inter-rater agreement reaching adequate levels ($\geq$ 75%) across more items compared to audio-based inter-rater agreement. Re-ratings of the five CBT-ABI sessions via transcription occurred approximately 12 months after the original ratings via audio recording, in order to reduce impact of rater session familiarity. Comparison of inter-rater agreement for the five transcription and audio based sessions are shown in Table 3.4. Only items rated as present (i.e., at least one instance) are reported.

Table 3.4 *Inter-rater percentage agreement and item frequency for five audio recorded and transcribed CBT-ABI sessions*

CDCS Checklist item	% agreement (item frequency)	
	Audio	Transcription
1. Repetition of psycho-education	23.1% (13)	**29.2% (24)**
2. Therapist reference to previous session	57.1% (21)	**60.0% (20)**
3. Therapist sourced example	14% (43)	**36.2% (47)**
3a. Repetition of therapist sourced example	0% (11)	0% (6)
4. Homework summary	**100% (1)**	33.3% (3)
5. Analogies/metaphors	42.9% (7)	**60.0% (10)**
5a. Repetition of analogies/metaphors	**50% (2)**	0% (6)
6. Handouts	60% (15)	**83.3% (12)**
6a. Repetition of handouts	31.9% (47)	**63.5% (52)**
7. Provision of potential responses	43.8% (16)	**58.8% (17)**
7a. Repetition of potential responses	0% (2)	**100% (0)**
8. Directive instruction/corrections	25% (16)	**50.0% (20)**
8a. Repetition of directive instruction/correction	0% (1)	**100% (0)**
9. Note-taking	**83.3% (6)**	42.9% (7)
10. Checking understanding	**100% (1)**	50.0% (2)
11. Visual aids	100% (2)	100% (3)
11a. Repetition of visual aids	57.1% (7)	**66.7% (6)**
12. Reminders	100% (1)	100% (0)
14. Re-focusing client	**100% (0)**	0% (2)
15. Written session summaries	0% (1)	**100% (0)**
16. Verbalised session summaries	0% (5)	**50.0% (2)**
19. Handout folder/dividers	100% (1)	100% (1)
21. Modification of session duration	0% (1)	0% (1)

Note: Bold text indicates comparatively higher inter-rater percentage agreement

Twenty-three items were identified as present over the five transcribed CBT-ABI sessions. Of those, the following four items were identified as present in the audio recording but absent in the transcription: Repetition of potential responses (item 7a), repetition of directive instruction/correction (item 8a), reminders (item 12) and written session summaries (item 15). Re-focusing client (Item 14) was the only item identified as absent in the audio recording and present in the transcription. Twelve (52.2%) items showed higher instance frequency for transcriptions, whereas nine (39.1%) items showed higher instance frequency for audio recordings.

Five items (21.7%) showed the same levels of inter-rater agreement for audio recordings and transcriptions. Thirteen (56.5%) items showed superior inter-rater agreement for transcriptions, whereas five (21.7%) items showed superior inter-rater agreement for audio recordings. Seven items (30.4%) obtained adequate inter-rater agreement ($\geq$ 75%) for the audio recordings, and seven items obtained adequate inter-rater agreement for the transcribed sessions.

3.3.3 Study 1: Discussion.

The current study was the first to operationalise specific CDCS' and apply them to real-life CBT-ABI content. The Gallagher et al. (2016) review identified the recommended adaptations *reportedly* utilised in intervention studies of CBT post brain-injury. The current study took the next step of identifying how these modifications are implemented and whether they can be assessed reliably. The resulting checklist was a comprehensive list of compensatory strategies used in CBT-ABI; however the ability for raters to identify the strategies reliably from either audio recordings or written transcriptions was mixed.

3.3.3.1 *Content selection.*

Several CDCS Checklist items did not correspond to the adaptations identified by Gallagher et al. (2016), and certain adaptations did not meet the definition of CDCS utilised in the current study (see Table 3.1). For example Gallagher et al. (2016) identified the need for psycho-education to be brain-injury specific. In the current study this was considered to be a therapy content adaptation that addressed a knowledge deficit, rather than a cognitive deficit. Instead,

strategies such as repetition of psycho-education (item 1), introduction of handouts (item 6) and checking client understanding (item 10) were seen as maximising the client's opportunity to encode, store and recall psycho-education, regardless of the content. Likewise incorporation of cognitive assessment results into client formulation was seen as a content adaptation within an integral CBT process, i.e. using an individualised conceptualisation to guide treatment (J. S. Beck, 2011).

The measurement requirements of certain adaptations identified by Gallagher et al. (2016) were also considered to be outside the scope of this study: increasing session frequency, presenting information more slowly, allowing extra time for client response and placing emphasis on behavioural techniques. The CDCS Checklist was designed specifically to measure *frequency* of therapist CDCS use *in session*. While these adaptations were consistent with the definition of CDCS utilised in the current study, they likely required measurement of variables out-of-session (e.g., therapists' usual rate of speech) or were unlikely to be verbalised in session (e.g., session frequency). While such adaptations may be challenging to measure, further research into their potential operationalisation is warranted, as memory problems, difficulty understanding abstract concepts and slowed processing speed are common cognitive deficits post brain-injury.

Two items were selected for inclusion in the CDCS Checklist that were not identified in the review by Gallagher et al. (2016): Internal memory strategies (item 13) and employment of cost-benefit analysis (item 23). Internal memory strategies (item 13) referred to therapist incorporation of mnemonics such as mental rehearsal, imagery and association. This strategy was selected for inclusion in the CDCS Checklist based on recommendations from the literature (Klonoff, 2010). Employment of cost-benefit analysis (item 23) was identified in the CBT-ABI therapist manual as a way to overcome barriers to low motivation or difficulty initiating activities. Specifically, it was suggested therapists encourage clients to list task advantages and disadvantages on a piece of paper. Deficits in motivation and self-awareness are also common post brain-injury, therefore this strategy was considered relevant for inclusion in the CDCS Checklist. Finally, analogies/metaphors (item 5) was identified in the Gallagher et al. (2016) review as an additional theme sourced from intervention studies (Hsieh, Ponsford, Wong, et al., 2012a, 2012b), rather than

recommendations in review articles. This strategy was included in the CDCS Checklist due to association of new information to pre-existing information relieving burden on client memory, and consequently enhancing understanding.

3.3.3.2   *Inter-rater agreement.*

Pilot testing with two raters coding audio recordings of CBT-ABI sessions showed that 26 out of the 30 CDCS checklist items obtained adequate inter-rater percentage agreement, when raters coded item presence or absence for the entire CBT-ABI session. Sixteen out of the 30 checklist items obtained an adequate level of inter-rater percentage agreement when raters coded item instance frequency.

Several steps were taken to maximise the potential for adequate inter-rater agreement across items. Firstly, checklist item operationalisation was guided by the detailed feedback of an expert team, who had directly observed entire CBT-ABI sessions or session segments. The chosen co-rater was a doctoral clinical psychology graduate who had existing knowledge and involvement in the parent RCT. Training included didactic instruction and observation of an exemplar session to highlight real life examples. Inter-rater agreement levels were monitored throughout pilot testing, utilising a combination of inter-rater agreement indices most appropriate for the data set. Co-raters discussed ratings at regular intervals, in conjunction with the expert team. This continuous feedback was integrated into the checklist throughout pilot testing and served to refine and clarify rating guidelines.

The chosen percentage agreement cut-off was 75%, however previous research has considered as low as 70% (Stemler, 2004) to be acceptable. Therefore there were five items which approached acceptable inter-rater percentage agreement levels for item frequency: Therapist reference to previous session (item 2; 67.1%), repetition of potential responses (item 7a; 60%), checking understanding (item 10; 70.8%), repetition of visual aids (item 11a; 72.7%) and verbalised session summaries (item 16; 68.8%). Taken together with the additional four items showing consistent inter-rater agreement improvement throughout pilot testing, and the 10 items

that reached adequate inter-rater agreement levels when defined as $> 75\%$, this suggests there is potential for reliable CDCS assessment across the majority of items with further checklist refinement.

As this is the first pilot-testing attempt for the CDCS Checklist, items with low inter-rater agreement were expected. An important part of the pilot testing process was to identify sources of non-agreement. The following provides an overview of contributing factors and how they might be addressed in future research.

3.3.3.3   *Item operationalisation.*

Feedback throughout pilot testing highlighted that naturally occurring ambiguity in therapist-client dialogue, and variability between observer perspectives (i.e., expert team members, primary researcher and co-rater), meant item operationalisation needed to be highly specific. Initial definition wording ambiguity likely increased differences in rater subjective interpretation and application of the items. In particular, therapist sourced examples (item 3) had consistently low inter-rater agreement levels (10.1%) that did not improve over time with debriefings, practice or increased definition and rating guideline specificity. This item was challenging to code for several reasons.

Firstly the corresponding rating guideline required inclusive coding (i.e., if in doubt raters code as present) and therapist-sourced examples were the most commonly occurring strategy overall (i.e., 129 instances across 14 pilot testing sessions; 426 instances across 30 main data collection sessions). Very brief sentences or single words could potentially comprise an example (see dialogue below), therefore relevant session dialogue was easy to miss, especially with audio recordings. Indeed transcription-based inter-rater agreement was superior to audio-based inter-rater agreement for this item. Secondly, as this strategy was designed to assist clients with understanding abstract concepts, raters had to accurately identify the abstract concept the therapist was attempting to make more concrete, in order to correctly code the corresponding example (see dialogue below).

Finally, the concept of an "example" is vulnerable to conjecture, as demonstrated by the following

therapist dialogue comparison:

Dialogue 1: *"This breathing exercise can be done for as long as you like, for example you could do*

a long session or just do it very briefly."

Dialogue 2: "*This breathing exercise can be done for as long as you like, for example 30 minutes, 1*

hour, or 60 seconds while you're in line at the supermarket."

In both scenarios the abstract concept of duration is the same (*"…as long as you like…"*)

and the therapist provides at least two corresponding examples. However dialogue 2 would

arguably compensate more effectively for client cognitive deficits (i.e., difficulty engaging with

abstract concepts). Taken together this indicates that therapist sourced examples (item 3) requires

further item operationalisation. This should include exclusive coding (i.e., if in doubt raters code as

absent) and increased specificity of the definitions of "abstract" and "concrete example".

3.3.3.4 *Training and practise.*

Co-rater training incorporated one CBT-ABI exemplar session. Therefore it is possible the

co-rater was not exposed to an adequate number of examples of each item prior to pilot testing.

Although theoretical examples and non-examples were provided throughout didactic training,

understanding of item real life application may have been limited. Future training of multiple co-

raters including more exposure to real life examples (e.g., five exemplar sessions), prior to a second

round of pilot testing, would arguably strengthen inter-rater agreement.

Ongoing rater debriefings and practice did have a positive effect on inter-rater agreement

levels for several items throughout the 14 pilot testing sessions. Therefore the improvement

trajectory for several items would likely continue with more sessions (e.g., approximately 25 pilot

testing sessions overall), and eventually translate into adequate agreement levels (i.e., > 75%).

Furthermore the repetition sub-items were introduced later in pilot testing and corresponding inter-

rater agreement was based on five pilot-tested sessions. A higher number of CBT-ABI sessions in a second round of pilot testing would provide a more accurate measurement of agreement levels for the repetition sub-items. Of course decisions regarding training length and number of pilot testing sessions must also be guided by what is feasible, particularly in time- and resource-constrained settings.

3.3.3.5   *Rating procedure.*

The superior inter-rater agreement levels of transcription-based items indicated that sourcing dialogue from audio recordings might have negatively impacted inter-rater agreement. Utilising the current version of the CDCS Checklist with audio-recorded sessions may require potentially unreasonable levels of rater cognitive vigilance. It appears transcriptions may have eased rater cognitive load, increasing the chance of raters applying items accurately. Furthermore transcription-based ratings showed a tendency to identify less items as present, but identify higher instance frequencies for present items. Therefore dialogue source (i.e., audio recordings) was also considered a potential contributor to rater non-agreement.

Transcription-based ratings achieved higher levels of inter-rater agreement across more items relative to the audio-based ratings. However the same number of items (i.e., seven) reached the inter-rater agreement cut-off ($\geq 75\%$) regardless of dialogue source. Comparison of audio and transcription-based ratings was undertaken with five pilot-tested sessions. It is possible that with a larger number of sessions the trend toward superior inter-rater agreement with transcriptions also would have continued, with more items eventually reaching cut-off compared to audio recordings. This finding requires replication with a larger sample size to verify that transcriptions are indeed a preferable component of the CDCS Checklist rating procedure.

Both audio recordings and transcribed sessions have advantages and disadvantages. For example transcriptions eliminate therapist-client dialogue tone and non-verbal sounds (e.g., sound of rustling paper when handouts are being introduced). Tone was anecdotally observed to be particularly informative in coding therapist directive instruction/corrections (item 8). Ideally

therapist-client interactions would be sourced from video recordings so that use of external/visually based aids would be obvious.

3.3.3.6   *Item absence or low frequency.*

Pilot testing revealed very low frequency and/or absence of the majority of the CDCS Checklist items. Specifically, 21 out of the 30 items had frequencies lower than the number of pilot tested audio recordings (i.e., < 14). Of the 21 items, 6 were not identified as present at all from the perspective of both raters. This meant raters had minimal or no exposure to session dialogue for these 21 items and little or no practice rating them. Free marginal kappa could not be calculated for 12 of the items due to item absence or low frequency. Therefore although 10 of the items did achieve adequate inter-rater percentage agreement, the associated low frequency means this needs to be interpreted with caution.

3.4   STUDY 2: THERAPIST COGNITIVE DEFICIT COMPENSATORY STRATEGY USE AND RELATIONSHIP TO TBI VARIABLES

Study 2 aimed to describe therapist CDCS use and explore relational trends between CDCS use and TBI-related variables (i.e., years since brain injury, executive functioning, memory functioning and brain injury severity).

3.4.1   Study 2: Method.

3.4.1.1   *Participants and therapists.*

CBT-ABI sessions conducted by all therapists involved in the parent RCT were unavailable due to technological failures. The available subset of CBT-ABI sessions ($n = 177$) was delivered by six therapists (clinical psychologists and clinical neuropsychologists). To gain a representative spread of therapist CDCS behaviour, an equal number of sessions were chosen from each of the therapists (i.e., five sessions each), at each therapy stage (i.e., 10 sessions from early,

mid and late in therapy), and from as many different participants as possible ($n = 17$). This resulted in 30 CBT-ABI sessions for the current study altogether.

The five CBT-ABI sessions from each therapist were delivered to a differing number of participants: Therapist 1 – two participants; Therapist 2 – four participants; Therapist 3 – four participants; Therapist 4 – one participant; Therapist 5 – two participants; Therapist 6 – four participants. The average participant was male (64.7%), 46.24 ($SD = 15.45$; 22 – 68) years old, with 12.62 ($SD = 3.10$; 7 – 18) years of education, and a premorbid IQ of 110.71 ($SD = 8.47$; 88 – 121) according to the National Adult Reading Test (NART; Nelson & Willison, 1991).

3.4.1.2   Measures.

1.4.1.2.7   Cognitive Deficit Compensatory Strategy Checklist.

The primary researcher rated all 30 CBT-ABI sessions with the final version of the CDCS Checklist (see Appendix B). These ratings were conducted with session transcriptions due to the superior inter-rater agreement levels found in pilot testing relative to audio recordings. Utilising digital Microsoft Office word documents, the primary researcher highlighted the relevant dialogue and recorded the corresponding checklist item. The frequency of each item across sessions and within sessions was tallied and recorded.

1.4.1.2.8   TBI variables.

All brain injury related variables (i.e., years since injury, injury severity, memory functioning and executive functioning) were assessed in the parent RCT at pre-treatment. Injury severity was measured by days of Post Trauma Amnesia (PTA). Memory functioning was measured using the score from trials 1-5 of the List Learning subtest from the Brain Injury Rehabilitation Trust Memory & Information Processing Battery (BIRT; Coughlan, Oddy, & Crawford, 2007). Executive functioning was measured using response latency in seconds from section two of the Hayling Sentence Completion test (Burgess & Shallice, 1997).

The current sample was 2.53 (SD = 4.67; 0 – 20) years post-TBI and had experienced 23.64 (SD = 21.57; 0 – 60 days) days of PTA. The average BIRT trials 1-5 score (memory functioning) was 44.29 (SD = 15.56; 14 – 69), and Hayling response time (executive functioning) was 72.20 seconds (SD = 64.74; 9 – 202).

3.4.1.3   *Data analysis.*

Relations between average CDCS use and participant injury-related variables (i.e., time since injury, injury severity, memory functioning and executive functioning) were explored through correlational analyses with Pearson's Product Moment Correlations, or Spearman's rho for non-normally distributed variables.

3.4.2   Study 2: Results.

3.4.2.1   *Item presence.*

Table 3.5 shows the number of sessions in which each CDCS Checklist item was identified as present, at each therapy stage (i.e., early, mid and late) and in total. The following five items were present in > 75% of the 30 transcribed CBT-ABI sessions: Therapist reference to previous session (item 2, 100%), therapist sourced example (item 3, 96.67%), therapist directive instruction/correction (item 8, 96.67%), therapist provision of potential responses (item 7, 90%) and introduction of handout (item 6, 80%).

The following 12 items were present in < 25% of the sessions: Visual aids (item 11), reminders (item 12), re-focusing client (item 14), written session summaries (item 15), repetition of visual aids (item 11a), handout folder/dividers (item 19), inclusion of co-therapist (item 20), modification of session duration (item 21), repetition of potential responses (item 7a), cue cards (item 17), session breaks (item 22) and implementing strategies in vivo (item 24). Three items were absent from all sessions: Internal memory strategies (item 13), provision of session audio recording (item 18) and employment of cost-benefit analysis (item 23).

Table 3.5 *Number of sessions in which each CDCS was identified as present*

CDCS Checklist item	Therapy Stage			Total /30
	Early	Mid	Late	
2. Therapist reference to previous session	10	10	10	30
3. Therapist sourced examples	9	10	10	29
8. Therapist directive instruction/corrections	10	10	9	29
7. Therapist provision of potential responses	9	10	8	27
6. Introduction of handout	10	7	7	24
6a. Repetition of handout	10	7	5	22
9. Note-taking or therapy diary	10	6	5	21
10. Checking understanding	6	6	9	21
5. Analogies/metaphors	7	6	7	20
3a. Repetition of a therapist sourced example	8	4	7	19
4. Homework summary	8	5	4	17
1. Repetition of psycho-education	10	2	4	16
8a. Repetition of directive instruction/correction	5	5	3	13
5a. Repetition of analogies/metaphors	5	3	3	11
16. Verbalised session summaries	2	3	4	9
11. Visual aids	0	0	5	5
12. Reminders	2	0	3	5
14. Re-focusing client	0	2	2	4
15. Written session summaries	1	1	2	4
11a. Repetition of visual aids	0	0	3	3
19. Handout folder/dividers	2	0	1	3
20. Inclusion of co-therapist	1	0	1	2
21. Modification of session duration	0	1	1	2
7a. Repetition of potential responses	1	0	0	1
17. Cue cards	0	0	1	1
22. Session breaks	1	0	0	1
24. Implementing strategies in-vivo	0	0	1	1
13. Internal memory strategies	0	0	0	0
18. Provision of session audio recording	0	0	0	0
23. Employment of cost-benefit analysis	0	0	0	0

Figure 3.1 shows the number of different CDCS Checklist items utilised by each therapist across all 30 CBT-ABI sessions. The average number of strategies used in each session ranged between 8 and 14.2 across therapists (*M* = 11.33, *SD* = 3.30).
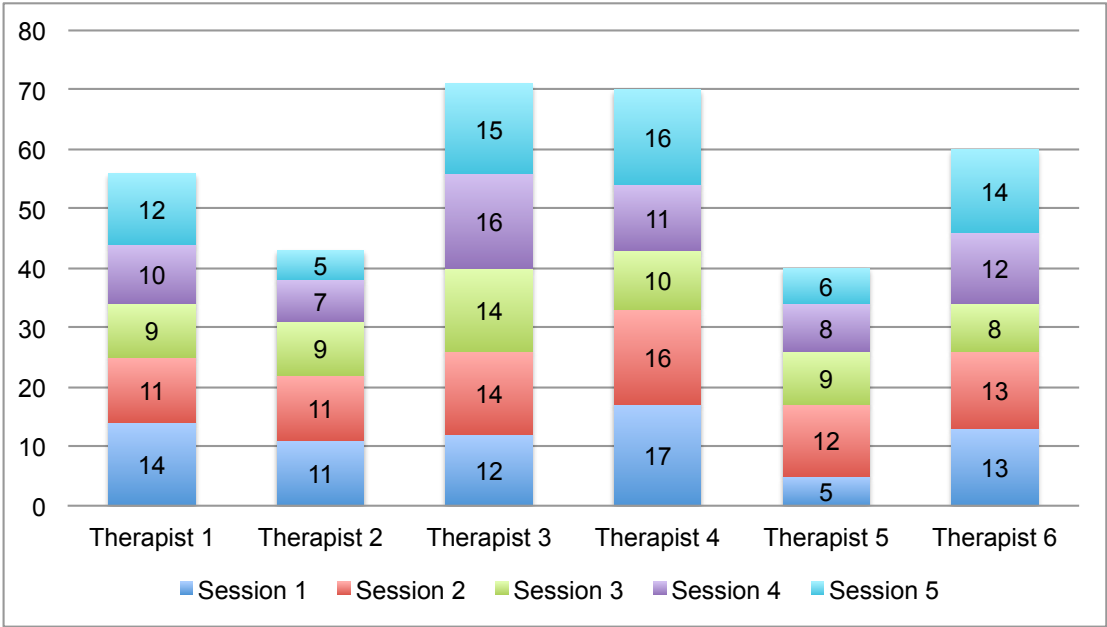
Figure 3.1 Total number of different CDCS' used per session

3.4.2.2   *Item frequency.*

Table 3.6 shows CDCS Checklist item frequency at each therapy stage and in total. In the current study CDCS frequency totalled 1,710 across the 30 transcribed CBT-ABI sessions. Overall strategies were utilised the most early and late in therapy. The most commonly occurring strategies primarily served to provide more concrete structure to session content (i.e., items 3, 7 and 8), overcome memory deficits (i.e., item 2) and provide more opportunity for encoding of information (items 3a and 6a). When all summary and repetition based item instance frequencies were combined, this totalled 506. Therefore the strategy of repetition was utilised the most overall. Fourteen items were utilised less than the number of CBT-ABI sessions rated (i.e., < 30 instances total). These infrequent or absent items represent CDCS' which could potentially compensate for a range of cognitive deficits.

Table 3.6 *CDCS frequency per item*

CDCS Checklist item	Therapy Stage			Total
	Early	Mid	Late	
3. Therapist sourced examples	126	98	202	426
8. Therapist directive instruction/corrections	95	57	49	201
2. Therapist reference to previous session	64	57	66	187
6a. Repetition of handout	60	44	70	174
3a. Repetition of a therapist sourced example	42	27	72	141
7. Therapist provision of potential responses	46	54	25	125
6. Introduction of handout	43	24	23	90
1. Repetition of psycho-education	41	7	9	57
10. Checking understanding	19	20	15	54
5a. Repetition of analogies/metaphors	16	27	10	53
5. Analogies/metaphors	18	16	18	52
9. Note-taking or therapy diary	16	11	8	35
4. Homework summary	13	11	10	34
8a. Repetition of directive instruction/correction	7	5	3	15
11a. Repetition of visual aids	0	0	14	14
16. Verbalised session summaries	2	4	6	12
12. Reminders	5	0	5	10
11. Visual aids	0	0	9	9
14. Re-focusing client	0	2	3	5
15. Written session summaries	1	1	3	5
19. Handout folder/dividers	2	0	1	3
20. Inclusion of co-therapist	1	0	1	2
21. Modification of session duration	0	1	1	2
7a. Repetition of potential responses	1	0	0	1
17. Cue cards	0	0	1	1
22. Session breaks	1	0	0	1
24. Implementing strategies in-vivo	0	0	1	1
13. Internal memory strategies	0	0	0	0
18. Provision of session audio recording	0	0	0	0
23. Employment of cost-benefit analysis	0	0	0	0
Total	619	466	625	1710

Figure 3.2 shows total CDCS Checklist item frequency for each therapist, across all sessions. On average there were 57 instances of CDCS use per session (*SD* = 33.86; Min = 11 to Max = 131). Total CDCS frequency ranged considerably between individual therapists, from 123 to 522 (*M* = 285, *SD* = 158.80).
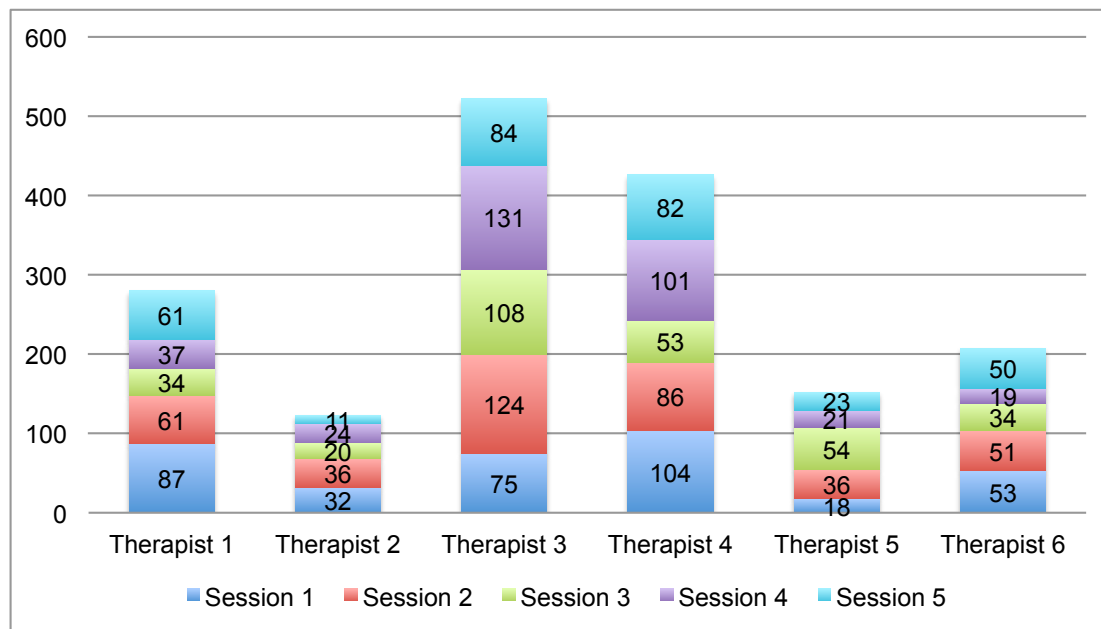
Figure 3.2 Total CDCS frequency per session

Comparison of *Figure 3.1* and *Figure 3.2* show the number of different strategies used in a session, relative to the total strategy frequency for that same session. For example, in the first session Therapist 1 applied 14 different strategies a total of 87 times. Therapist 3 utilised strategies at a higher frequency overall, however both Therapist 3 and 4 applied nearly the same number of different strategies across all of their sessions.

3.4.2.3   *Relationship between CDCS use and TBI variables.*

The relationships between participants' injury-related variables (i.e., years since injury, executive functioning, memory functioning and injury severity) and the average CDCS frequency of the corresponding therapist were examined. Correlations were non-significant ($p > .05$) for all variables: years since injury, $r = -0.26$; days of PTA, $r = 0.23$; Hayling response latency (executive functioning), $r_s = 0.38$, and; BIRT trials 1-5 score (memory functioning), $r = -0.40$.

3.4.3   Study 2: Discussion.

The Gallagher et al. (2016) review identified the number of intervention studies *reportedly* utilising recommended adaptations. The current study took the next step of identifying the number of sessions in which strategies were used, and how frequently they were used in those sessions. This provided the opportunity to explore whether the most commonly reported adaptations were also the most commonly implemented.

3.4.3.1   Therapist CDCS use.

Based on coding of 30 transcribed CBT-ABI sessions, it was found that half of the checklist items (i.e., 15) were utilised across < 25% of sessions, three of these items were not utilised at all. Therefore a large proportion of strategies were rarely used. Five items were present across > 75% of the sessions. As Study 1 found adequate inter-rater agreement for coding of item presence for majority of items, it is likely this data is reliable. On the other hand inter-rater agreement for item frequency coding was mixed and therefore needs to be interpreted with caution. The total frequency of 14 items was less than that of the number of sessions rated (i.e., < 30 instances each in total). Six items had the highest frequencies (i.e., > 100 instances each in total), and the remaining occurred between 34 to 90 times across the 30 sessions.

Notably, approximately half of the items used across the least sessions *and* with the lowest frequency served as external aids. The strategies identified as present across the most sessions *and* used with the highest frequency by therapists, served to provide more concrete structure to session content, overcome memory deficits, provide more opportunity for encoding of information, and overcome communication difficulties with visual aids. They were all primarily related to the way in which therapists delivered session content and only one was an external aid (i.e., handouts).

3.4.3.2   Most commonly occurring CDCSs.

The following seven strategies were identified as present across the most sessions and/or at the highest frequencies: Therapist reference to previous session (item 2), therapist sourced example

(item 3), therapist directive instruction/corrections (item 8), repetition of a therapist-sourced example (item 3a), therapist provision of potential responses (item 7) and introduction or repetition of a handout (items 6, 6a).

In the Gallagher et al. (2016) review adaptations reportedly used the most were identified in a maximum eight out of 16 intervention studies. The recommended modification of 'summarise and repeat salient points at frequent intervals during the session', was reported in seven intervention studies. In keeping with the Gallagher et al. (2016) review this modification corresponded with three of the most utilised CDCS Checklist items (2, 3a, 6a). Furthermore when repetition and summary based CDCS Checklist item frequencies were summed (i.e., 506), the strategy of repetition was utilised the most overall in the current study.

Item 3 corresponded to the Gallagher et al. (2016) recommended modification of 'focusing on concrete examples and aiding generation of alternative solutions', which was reported in five intervention studies. This item had the highest frequency in the current study and was utilised across 29 of the 30 CBT-ABI sessions. Therefore its reported use according to the Gallagher et al. (2016) review is not in keeping with current findings. Item 8 (corresponding to 'take a directive and structured approach if necessary') and item 7 (corresponding to 'use clear, structured questioning') were both reported in two intervention studies. Item 6 (corresponding to 'incorporate visual resources') was not reported in any intervention studies. Therefore although these strategies were utilised the most in the current study it appears they were *reportedly* utilised the least according to the Gallagher et al. (2016) review. These findings raise the possibility that certain strategies are taken for granted by therapists and therefore not explicitly reported.

The more recent RCTs by Ashman et al. (2014) and Fann et al. (2015) also reported utilising concrete examples, reviewing the previous session content and incorporating repetition. Using concrete concepts, instructing clients and incorporating repetition were strategies integrated throughout the entire CBT-ABI therapist manual. This may help to explain why they were utilised so frequently.

Furthermore a large number of handouts in the CBT-ABI therapist manual simultaneously incorporated visual aids, analogies/metaphors, concrete examples, potential responses, directive instructions and summaries. Therefore it is not surprising that therapists referred back to the same handout several times throughout a session, as this was one of the most efficient ways to compensate for cognitive deficits. As mentioned this level of handout use is not in keeping with reported adaptations (Gallagher et al., 2016). Ashman et al. (2014) and Fann et al. (2015) also did not refer to specific visual resources. In the current study visual aids (item 11) were utilised only nine times. This is likely due to visual aids already being incorporated into the handouts, which were coded separately. Non-handout visual aids included therapist use of photographs and original drawings/diagrams. Combining of these items in future CDCS Checklist pilot testing is warranted.

Finally, the CBT-ABI therapist manual did not explicitly suggest utilising structured questioning (i.e., verbally providing potential responses so client can accomplish a response). Therefore this high frequency item may be representative of common therapist behaviour or therapists generalising the simplified and structured nature of the handouts into verbal content. This highlights that therapists may use strategies that are not listed in the treatment manual, and the importance of direct observation in determining how a manual is implemented.

3.4.3.3   *Least commonly occurring CDCSs.*

Notably, the highest number of intervention studies (i.e., eight) in the Gallagher et al. (2016) review reported the adaptation least utilised in the current study, namely 'memory aids (e.g., written notes and audiotapes)'. This adaptation was operationalised into the following items in the current study: Reminders (item 12), written session summaries (item 15), cue cards (item 17) and provision of session audio recording (item 18). Similarly four low frequency repetition/summary based items (i.e., repetition of directive instruction/correction, item 8a; repetition of visual aids, item 11a; repetition of potential responses, item 7a; and verbalised session summaries, item 16) were not in keeping with the seven intervention studies reporting use of 'summarise and repeat salient points at frequent intervals during the session'. These findings raise the possibility that what therapists say they do and what they are observed to actually do may not always align.

In the current study reminders (item 12) referred to external memory strategies promoting client recall of therapy appointments or between-session therapy tasks (e.g., calendars, alarms, text messages, physical reminders etc.). Interestingly, the Gallagher et al. (2016) review made no specific reference to electronic memory aids. This may reflect differences in how these adaptations were conceptualised and therefore comparison may be inappropriate.

In the CBT-ABI therapist manual cue cards (item 17) were suggested in the context of client reference to coping statements between sessions, and as part of relapse prevention. Therapists may not have seen cue cards as necessary when note-taking, both separately and on program handouts, served a similar purpose. In the current sample note-taking (item 9) was used 35 times across 70% of the 30 CBT-ABI sessions. Combining of these items is warranted in future pilot testing.

In the CBT-ABI therapist manual provision of the audio recording (item 18) was suggested in the context of "problem solving barriers to homework completion". In the manual therapists were warned that listening to the full session could be overwhelming for some clients. This may help to explain why this item was never utilised in the current study, as therapists may have experienced justifiable hesitation in providing the full session audio recording.

The low frequency of written and verbalised session summaries in the current study is somewhat surprising. However, in total there were 506 (29.59%) instances of strategies that provided clients with additional opportunity to encode information (i.e., repetitions and summaries) across the 30 sessions. Therefore it appeared therapists in the current sample spent a lot of time incorporating repetition, however not in the form of entire session summaries.

Use of a handout folder/dividers (item 19) was reported in six of the Gallagher et al. (2016) review intervention studies, which is at odds with its low frequency in the current study. According to Ponsford et al. (2016) "*All participants received a handbook to organize treatment materials…*". Therefore it is quite possible this was provided to clients early in treatment, but not necessarily verbalised in session audio recordings.

Implementing strategies in-vivo (item 24) occurred only once across the 30 sessions. This item corresponded to the recommended modification of encouraging generalisation of homework, which was identified in seven of the intervention studies reviewed by Gallagher et al. (2016). While the CBT-ABI therapist manual clearly encouraged clients to implement strategies between sessions (e.g., graded exposure), there was not explicit reference to therapist and client conducting parts of the therapy session in-vivo. This may explain the low frequency of this item. It is also likely in-vivo sessions were logistically harder to arrange, and possibly challenging to record (e.g., privacy concerns).

As already mentioned, visual aids (item 11) were not identified in any of the intervention studies reviewed by Gallagher et al. (2016). Furthermore the following low frequency items in the current study were reported in no more than two of the reviewed intervention studies: re-focusing client (item 14), inclusion of co-therapist (item 20), modification of session duration (item 21) and session breaks (item 22). Therefore the current findings relating to these items are in keeping with the Gallagher et al. (2016) review.

Only two instances of co-therapist inclusion (item 20) were identified in the current study. This is consistent with a study of individual CBT for social anxiety post-ABI by Hodgson et al. (2005). The authors intended to involve significant others in their program but were unable due to logistical reasons (i.e., significant others had incompatible commitments or could not be identified).

Finally, internal memory strategies (i.e., Item 13) and employment of cost-benefit analysis (item 23) were not identified in the Gallagher et al. (2016) review. This indicates these strategies are not commonly recommended or reportedly utilised, which is in keeping with their absence in the current study. As a large portion of participants in the parent RCT had received pre-CBT Motivational Interviewing, the likelihood of cost-benefit analysis (item 23) being utilised in the CBT-ABI sessions was possibly already reduced.

3.4.3.4   CDCS use variability.

Marked variability between strategies in regard to presence and frequency was found in the current study. Three strategies were absent from the dataset and one strategy (reference to previous session, item 2) was used in all 30 CBT-ABI sessions. Five strategies were present in > 75% of sessions, seven in 50% – 75%, three in 25% – 50% and 12 in < 25%. In regards to how often these strategies were used, frequencies ranged from one to 426. Specifically, those items with fewer instances than the number of sessions rated (i.e., < 30 total instances) had frequencies ranging from one to 15. Items utilised most often (i.e., > 100 total instances) had frequencies ranging from 125 to 426, and the remaining item frequencies ranged from 34 to 90.

This variability extended to individual therapists who utilised between 5 to 17 different strategies per session ($M = 11.33$, $SD = 3.30$), at a frequency ranging from 11 to 131 ($M = 57$, $SD = 33.86$). Five sessions were utilised from each therapist, however these sessions represented differing numbers of participants. One therapist had five sessions representing one participant, two therapists had sessions representing two participants, and three therapists had sessions representing four participants. Therefore the ranges in individual therapist CDCS use indicate variability both between and within participants.

A large difference was found between strategy use at mid-therapy compared to early and late in therapy. This is interesting considering that TBI associated cognitive deficits would be expected to be relatively stable throughout treatment, as well as the need to compensate for them. This indicates that session characteristics may also be relevant. For example, CDCS use may also depend on the types of therapy tasks being conducted in the session, with some being more cognitively demanding than others. More CDCS use may be needed during the initial learning process early in treatment, and later when the therapist is setting the client up to maintain therapy gains (e.g., relapse prevention). Indeed in the current study highest frequencies were found early and late in therapy.

The CBT-ABI therapist manual strongly emphasised implementing treatment in a flexible manner tailored to the client's needs. Therefore CDCS use variability may reflect therapists

individualising treatment. Correlational analyses indicated that CDCS use was not related to participant brain-injury variables (i.e., injury severity, time since injury, executive functioning and memory functioning), however these need to be replicated with a larger sample size to verify this finding. In particular the relationship between CDCS use and cognitive functioning approached that of a moderate strength, therefore further investigation is warranted.

3.5   STUDY 1 AND 2 LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

In the current study 30 CBT-ABI sessions, comprising 11 pilot testing sessions, were sourced from a potential pool of 177. Despite selecting an equal number of sessions from each therapist and each therapy stage, these findings cannot be generalised beyond this specific sample. It is possible that several low frequency/absent items were utilised more often overall in the treatment provided by the parent RCT.

In Study 1, we found that the majority of items obtained adequate inter-rater agreement when strategy absence or presence within a session was being assessed. However when strategy frequency within a session was being assessed, only 16 of the 30 items obtained adequate inter-rater agreement. This is the most salient limitation of Study 2, as it is possible that another rater may not have identified similar frequencies for a large portion of items. Nonetheless, large overlap was found between strategies utilised across the most sessions and strategies utilised at the highest frequencies. This also applied to low use strategies. Findings from the frequency assessments need to be interpreted with caution, although they appear to corroborate the strategy presence/absence assessments, which were generally reliable.

Previous studies have also found difficulties reaching adequate inter-rater reliability across items, when assessing therapist CBT competence from the observer perspective (Barber, Liese, & Abrams, 2003; Blackburn et al., 2001; Muse & McManus, 2013). However research has also demonstrated adequate observer inter-rater reliability (Kazantzis, Clayton, et al., 2018; Sachsenweger, Fletcher, & Clarke, 2015) with appropriate training and observer reliability monitoring. Therefore inter-rater agreement issues in the current study may partly be reflective of

general challenges commonly associated with observer-sourced assessments, as well as challenges specific to assessment of CDCS use as outlined in the Study 1 Discussion.

The CDCS Checklist (Appendix B) has several areas for improvement as part of continued pilot testing. The checklist includes a relatively long list of items, all with unique descriptors and rating guidelines. Excessive rater cognitive load was identified as an important factor impacting inter-rater agreement. Reducing the checklist's length may assist with this issue and findings from the current study can help to guide item removal. Certain CDCS' might have been more likely to occur outside of session. For example, the CBT-ABI therapist manual suggested mailing session summaries (item 15) to clients between sessions, and it is quite possible therapists did this without verbalising it in session. Out-of-session behaviour is impossible to capture with the CDCS Checklist, and removal of similar items (e.g., provision of session audio recording, item 18; handout folder/dividers, item 19; implementing strategies in vivo, item 24) may be helpful.

There is no way of truly knowing the intentions driving therapist in-session verbalisations. Independent observer raters can code only direct language in order to promote inter-rater agreement. Therefore therapists may have the aim of compensating for a client's cognitive deficits but the language used makes this unobservable or ambiguous to raters. It is also possible that the CDCS Checklist items captured the therapist's natural style (e.g., consistent level of active involvement), and aspects of their behaviour did not actually intend to compensate for cognitive deficits.

Comparison of current findings to previous research (Gallagher et al., 2016) indicate the potential for therapist and observer assessments of CDCS use to differ. Variability in therapy process assessment according to source is not uncommon (Hartmann et al., 2015; Markin et al., 2014) and this highlights the importance of not relying solely on one perspective. Considering the potential for several strategies to occur outside of session, complementing CDCS Checklist ratings with the therapist perspective could be useful. Future research may wish to investigate the logistical requirements of such an endeavour.

As the CDCS Checklist was designed to capture strategy frequency, this may give the impression that "more is better". However currently it is not possible to determine whether a relationship exists between client characteristics, such as the severity and nature of their brain-injury, and CDCS use. It is possible that a high frequency of CDCS use could represent a lack of consideration of the client's needs. For example, numerous concrete examples in the same session could be overwhelming, or the use of visual resources could be perceived as condescending. In order to investigate this further, examination of these factors needs to be conducted with a larger sample size, preferably comparing CDCS use in CBT with CDCS use in CBT-ABI.

3.5.1   Conclusion.

There is currently no research that identifies 1) how adaptations are applied in CBT adapted for brain-injury and 2) how often they are implemented. The current study attempted to bring clarity to both of these questions in the context of CDCS use in CBT-ABI. CDCS Checklist development highlighted that applying theoretical adaptations recommended from the literature to real life therapist-client dialogue is inherently complex. Furthermore assessing therapists' use of CDCS' from an observer perspective reliably (i.e., with adequate inter-rater agreement) is associated with various challenges.

CDCS use found in the current study indicates some inconsistencies with the adaptations reportedly used in intervention studies examining CBT post brain-injury (Ashman et al., 2014; Fann et al., 2015; Gallagher et al., 2016; Ponsford et al., 2016). CDCS Checklist items utilised the most served to provide concrete structure to session content, remind the client of previous session content, provide repeated opportunities for information encoding and overcome communication difficulties with visual aids. Overall therapists appeared to modify delivery of session content relatively more often than incorporating external aids, with the exception of handouts.

The current findings also demonstrated the potential for variability in CDCS use according to therapist, participant and session. A relationship between CDCS use and brain-injury variables was not found, however replication with a larger sample size is necessary in order to verify this

finding. Future pilot testing of the CDCS Checklist will need to consider combining certain items, item operationalisation modifications, item removal and changes to co-rater training in order to realise the checklist's full potential.

CHAPTER FOUR

PREDICTORS OF WORKING ALLIANCE IN COGNITIVE BEHAVIOUR THERAPY

ADAPTED FOR TRAUMATIC BRAIN INJURY

This chapter constitutes a manuscript revised and re-submitted for publication to *Neuropsychological Rehabilitation* in January 2019. It is presented according to the specific formatting requirements of the journal, with the sections renumbered for this doctoral thesis.

4.1   DECLARATION FOR THESIS CHAPTER FOUR

Declaration of the Candidate: In the case of Chapter Four, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution
Formulation of study design, data collection, data analyses and writing of the manuscript	70%

The following co-authors contributed to the work:

Name	Nature of contribution
Nikolaos Kazantzis	Consultation in formulation of study design, discussion of ideas expressed in manuscript and critical review of manuscript.
Dana Wong	Consultation in formulation of study design, discussion of ideas expressed in manuscript and critical review of manuscript.
Dean McKenzie	Consultation in data analyses and critical review of manuscript.
Marina Downing	Consultation in data analyses and critical review of manuscript.
Jennie Ponsford	Consultation in formulation of study design, discussion of ideas expressed in manuscript and critical review of manuscript.

Candidate's Signature:

Date: 04/02/2019

Declaration by Co-authors: The undersigned hereby certify that:

1. The above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
2. They meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
3. They take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
4. There are no other authors of the publication according to these criteria;
5. Potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
6. The original data are stored at The Monash-Epworth Rehabilitation Research Centre, Epworth Hospital, Richmond, and will be held for at least five years from the date indicated below:

Date:

Signature 1:

04/02/2019

Signature 2:

04/02/2019

Signature 3:

04/02/2019

Signature 4:

04/02/2019

Signature 5:

04/02/2019

4.2 ABSTRACT

Cognitive Behaviour Therapy (CBT) has the strongest preliminary support for treatment of depression and anxiety following traumatic brain injury (TBI). TBI associated cognitive impairments may pose an obstacle to development of a strong working alliance, on which therapeutic gains depend. The current study examined the association of demographic (i.e., gender, age at study entry, years of education and premorbid IQ) and injury-related (i.e., years since injury, post-trauma amnesia duration, memory and executive functioning test performance) variables with alliance in CBT adapted for TBI (CBT-ABI). The audio-recordings of 177 CBT-ABI sessions from 31 participants were assessed with an observer version of the Working Alliance Inventory at 9 time-points. Multi-level mixed model regressions showed that participants and therapists maintained a relatively strong alliance across all sessions. Pre-intervention symptom severity was considered as a confounder variable and was found to have no statistically significant influence on the models. None of the demographic variables were significantly associated with alliance scores. More years since injury was associated with a stronger alliance. These findings demonstrate that TBI associated cognitive impairments do not necessarily pose an obstacle to development and maintenance of a strong working alliance, which is more likely to develop with more time post-brain injury.

Keywords: brain injury; cognitive behavior therapy; working alliance; anxiety; depression

4.3   **INTRODUCTION**

Clinically significant depression and anxiety is common following traumatic brain injury (TBI) (Bombardier et al., 2010; Osborn et al., 2014). Prevalence has been documented in moderate to severe TBI patients at rates significantly higher than those in the general population, or those with mild brain injury (Alway et al., 2016; Gould, Ponsford, & Spitz, 2014; O'Donnell, Creamer, Pattison, & Atkin, 2004). Systematic reviews (Fann et al., 2009; Soo & Tate, 2007) have found Cognitive Behaviour Therapy (CBT) to have the strongest preliminary support for treating depression and anxiety following TBI. However, injury-related cognitive impairments of memory, attention and executive function (Klonoff, 2010; Ponsford, Sloan, & Snow, 2012) may limit potential for gains from CBT. While the structured nature of CBT makes it relatively well suited for a brain-injured client, modifications (e.g., inclusion of a co-therapist, note-taking and visual aids) are likely to be required in order to address specific cognitive impairments (Hodgson et al., 2005; Ponsford et al., 2016). Several RCTs of adapted CBT (Bédard et al., 2014; R. A. Bryant et al., 2003; Ponsford et al., 2016) have shown a clinically significant improvement in depression and/or anxiety symptoms compared to control groups.

CBT depends upon a productive and stable therapeutic relationship, one component of which is the working alliance (A. T. Beck et al., 1979; Kazantzis, Dattilio, & Dobson, 2017). Bordin's (1979) definition of the alliance includes: 1) a mutual agreement regarding therapy goals; 2) mutual agreement on tasks that facilitate reaching therapy goals; and 3) a therapeutic bond. Meta-analyses have shown the working alliance to account for approximately 7% of variance in therapy outcome across a range of clinical populations (Flückiger et al., 2018; Horvath & Symonds, 1991; Martin et al., 2000). However few studies have examined the specific features of a clinical population that may influence the development of the alliance (Everitt, Cini, & Kazantzis, 2017; Lorenzo-Luaces, DeRubeis, & Webb, 2014), including individuals with cognitive deficits.

Several studies have demonstrated statistically significant alliance-outcome relations in clinical populations with cognitive deficits, including TBI cohorts (Rosti-Otajärvi, Mäntynen, Koivisto, Huhtala, & Hämäläinen, 2014; Schönberger, Humle, et al., 2006b; Schönberger, Humle,

Zeeman, et al., 2006; Sherer et al., 2007). TBI-related deficits in self-awareness and social communication (Fleming & Ownsworth, 2006; G. Kelly et al., 2008; Togher et al., 2014) can potentially weaken the alliance by decreasing the client's capacity for effective engagement with the therapist (Judd & Wilson, 2005). This highlights a need for better understanding of ways in which TBI impacts the alliance in CBT, and which factors contribute to a strong alliance in this population.

Only a limited number of studies have examined the factors associated with working alliance post-TBI. Currently data exists solely in the context of holistic neuropsychological outpatient rehabilitation programs, rather than in psychological therapies (Schönberger, Humle, et al., 2006a, 2006b; Schönberger, Humle, Zeeman, et al., 2006; Sherer et al., 2007). Here, the alliance has been measured in various ways. Schönberger, Humle, Zeeman, et al. (2006) used the working alliance scale developed by Prigatano et al. (1994) (e.g., percentage of patient attendance). The study by Sherer et al. (2007) modified the California Psychotherapy Alliance Scales (Gaston & Marmar, 1994), while Schönberger, Humle, et al. (2006b) and Schönberger, Humle, et al. (2006a) used the short form of the Working Alliance Inventory (WAI-SF) (Tracey & Kokotovic, 1989), including total scale and subscale scores. Alliance ratings were sourced from therapists, clients and client family members. Schönberger, Humle, et al. (2006a) and Sherer et al. (2007) found clients and client family members rated the working alliance as stronger compared to therapists.

Differences based on data source are consistent with previous research (Hartmann et al., 2015; Markin et al., 2014), and highlight the importance of considering all perspectives. Independent observer assessments are considered unbiased (Webb et al., 2011). In the context of TBI, an objective rater may arguably be important, given the potential impact of memory and executive functioning deficits on client ratings. To date, an observer perspective has not been utilized in working alliance research involving brain-injured clients. An observer version of the WAI shortened revised form (WAI-SR-O) (Kazantzis, Cronin, Farchione, & Dobson, 2018) has recently been developed, incorporating greater specificity in the identification and rating of target behaviors. Thus, potentially more reliable observer rated alliance assessment is now possible.

Across the studies of working alliance in TBI patients, alliance ratings have been collected either retrospectively (i.e., 18 months - 4 years following program end in Schönberger, Humle, Zeeman, et al. (2006) and Sherer et al. (2007)) or concurrently, at one or four time-points (i.e., 2, 6, 10 and 14 weeks in Schönberger, Humle, et al. (2006a) and Schönberger, Humle, et al. (2006b)). Research shows that working alliance changes over the course of therapy (Hilsenroth, Peters, & Ackerman, 2004; Piper et al., 2005), and aggregated or single time-point ratings are limited in their ability to capture this variability (Zilcha-Mano, 2017). Retrospective ratings may be biased by therapy outcome, and are less reliable due to dependence on memory for a very nuanced therapy process. Therefore, alliance ratings at each session across therapy would ideally capture its dynamic nature (Norton & Kazantzis, 2016).

The influence of demographic and injury-related variables on working alliance has been examined in three studies (Schönberger, Humle, et al., 2006a; Schönberger, Humle, Zeeman, et al., 2006; Sherer et al., 2007). A significant association was found between younger age and stronger therapist-rated WAI goal subscale scores across four time-points. Stronger patient-rated task subscale, goal subscale and total scale scores were also associated with younger age, but not consistently across time-points (Schönberger, Humle, et al., 2006a). Bi-frontal or right hemisphere injury location was found to be associated with weaker therapist-rated alliance (Schönberger, Humle, et al., 2006a). Stronger client-rated alliance was also associated with higher education (Sherer et al., 2007). Alliance might also arguably increase with time post-injury as cognitive impairments resolve and self-awareness increases. Schönberger, Humle, et al. (2006a) examined chronicity in their study, however results were not reported. Additionally, Schönberger, Humle, et al. (2006b) found a relationship between brain injury related deficits and therapeutic alliance at program commencement, which disappeared after controlling for clients' self-awareness. Sherer et al. (2007) found depression symptoms to not be associated with working alliance ratings.

The present study examined working alliance and its predictors in the context of CBT for anxiety and depression adapted for brain injury (CBT-ABI) (Wong et al., in press), utilizing observer-rated alliance assessments with the WAI-SR-O at each therapy session (i.e., 9 time-points). This study aimed to examine the association of demographic (i.e., gender, age at study

entry, years of education and pre-morbid IQ), and injury-related (i.e., years since injury, post-traumatic amnesia duration (PTA) and performance on memory/executive functioning tests) variables with working alliance ratings, while controlling for pre-intervention symptom severity. Based on previous studies, it was hypothesized that younger age and higher education would be associated with stronger working alliance. Examination of gender and pre-morbid IQ was exploratory. Post-morbid factors were expected to impact the working alliance, specifically it was hypothesized that greater time since injury, shorter PTA duration and better performance on memory and executive functioning tests would be associated with a stronger working alliance.

4.4 METHOD

4.4.1 Parent study.

The current study utilized therapy audio recordings and demographic, clinical and injury-related data from a completed randomised controlled trial (RCT; ethics approved by Monash University Human Research Ethics Committee – project no. 9670). This parent RCT examined the efficacy of Motivational Interviewing as a prelude to CBT-ABI (Ponsford et al., 2016). The CBT-ABI program is a manualised intervention based on Beck's CBT model (A. T. Beck et al., 1979) and designed to accommodate participants' TBI associated cognitive impairments. Modifications included implementing external memory aids (e.g., handouts, note-taking and audiotapes), increased therapist guidance and involvement of significant others.

To be eligible for the RCT individuals were required to a) have sustained a TBI, b) be aged 18 years or above, c) have adequate comprehension of English and d) currently experiencing symptoms consistent with depressive and/or anxiety disorders. Seventy-five participants were recruited into the RCT in total. The majority of the sample was male (73.3%). On average they were aged 42.24 years, with 12.8 years of education and a pre-morbid IQ of 104.8. They were also 3.73 years post-injury, with 22 days post-traumatic amnesia (PTA), and anxiety/depression symptoms in the moderate range. Clinical psychologists and clinical neuropsychologists provided nine CBT-ABI sessions to participants over a 9-week period. For more detail regarding

inclusion/exclusion criteria, therapist training/supervision and treatment fidelity monitoring see Ponsford et al. (2016).

4.4.2 Participants.

A total of 177 CBT-ABI audio recordings from 31 therapist-participant dyads were utilized for the current study. These represented all available recordings, the remainder having been lost due to technological failures. Thus, the sample size was not based on therapist session self-selection. The available CBT-ABI audio recordings were unevenly distributed according to session number, ranging from 17 (session 7) to 25 (session 1). Table 4.1 shows comparison of participant characteristics collected at pre CBT-ABI based on audio recording availability. In the current study PTA data were missing for five participants, anxiety pre-intervention scores for three and depression pre-intervention scores for two. A statistically significant difference was found for age at study entry and anxiety score. Specifically the current sample was older and had slightly lower anxiety symptoms compared to those participants with unavailable audio recordings.

Table 4.1 *Comparison of participant characteristics at pre CBT-ABI, for both unavailable and available audio recorded CBT-ABI sessions*

Variable	Unavailable session recordings (n = 44)				Available session recordings (ie. current study; n = 31)			
	n	*M*	*SD*	Range	*n*	*M*	*SD*	Range
Gender	44		75% male		31		70.97% male	
Age at study entry**	44	38.66	12.85	21-77	31	47.32	15.26	19-69
Education (years)	43	12.85	3.67	6-22	31	12.69	3.21	7-19
Years since injury	44	4.27	9.37	0-57	31	2.97	4.70	0-20
PTA duration (days)	39	22.00	25.15	0-120	26	22.08	20.51	0-65
HADS-Anxiety**	40	11.75	4.19	3-20	29	9.21	4.33	3-21
DASS-Depression	40	17.88	11.44	0-42	28	16.93	12.40	1-41

Note: DASS – Depression, Anxiety & Stress Scales; HADS – Hospital Anxiety & Depression Scale; PTA – Post-Traumatic Amnesia; **$p < 0.05$

Participants in the current study (n = 31) also had an average pre-morbid IQ of 111.03 (SD = 8.84), Hayling response time (executive functioning test) of 76.55 seconds (SD = 61.95) and Brain Injury Rehabilitation Trust Memory & Information Processing Battery (BIRT) score (memory functioning test) of 40.79 (SD = 15.21). The number of participants with anxiety symptoms in the normal range was 11 (37.9%), mild was 7 (24.1%), moderate was 8 (27.6%), and severe was 3 (10.3%). The number of participants with depression symptoms in the normal range was 8 (28.6%), mild was 4 (14.3%), moderate was 5 (17.9%), severe was 2 (7.1%), and very severe was 9 (32.1%). Therapist-participant age discrepancy was on average 13.52 years (SD = 8.85; Min = 1, Max = 33). Eleven of the participants had received three sessions of motivational interviewing prior to CBT-ABI.

4.4.3 Measures.

4.4.3.1 *Working alliance.*

Therapist-participant alliance strength, as defined by Bordin (1979), was measured using the Working Alliance Inventory-Short form, Revised-Observer version (WAI-SR-O) (Kazantzis, Cronin, et al., 2018), at each of the 9 CBT-ABI sessions. The WAI-SR-O is comprised of three subscales. The Goal Subscale relates to client and therapist agreement and prioritisation of overall therapy and session goals (e.g., *"The client and therapist collaborated in setting goals for the session"*). The Task Subscale relates to client perception of therapy task usefulness and link with therapy goals (e.g., *"There is agreement about the usefulness of the current activity in therapy - i.e., the client is seeing new ways to look at their problem"*). The Bond Subscale relates to therapist and client mutual liking, respect, trust and appreciation for one another (e.g., *"The client and therapist respect each other"*). The WAI-SR-O has 12 items, which are rated on a 5-point Likert scale, ranging from 1 (*always*) to 5 (*seldom*). Consistent with previous WAI scale rating process (Hatcher & Gillaspy, 2006; Munder, Wilmers, Leonhart, Linster, & Barth, 2010), a rating of 1 "*always*" was used unless there was an instance when a relational element did not take place. Raters were required to take into consideration both the frequency of missing relational elements

and intensity of alliance ruptures over the entire session. For example, therapist-client alliance would be considered weaker if the therapist did not seek client contribution to session agenda, or did not explore client resistance to therapy tasks. Likewise alliance would be considered weaker if the client ignored therapist input, or indicated therapy tasks were unhelpful. Total scores range from 12 (strongest alliance) to 60 (weakest alliance). Preliminary psychometric evaluation (Kazantzis, Cronin, et al., 2018) shows the scale has excellent internal consistency (Cronbach's α = 0.89) and inter-rater reliability between observers (Finn's r = 0.88 to 0.91) (Finn, 1970).

4.4.3.2   *Demographic and injury-related variables.*

Demographic (i.e., gender, age at study entry, years of education and pre-morbid IQ) and injury-related variables (i.e., years since injury, days in PTA and performance on memory/executive functioning tests) were collected in the parent RCT before treatment began. Pre-morbid IQ was based on performance on The National Adult Reading Test (NART) (Nelson & Willison, 1991). Memory functioning was measured using the List Learning subtest from the Brain Injury Rehabilitation Trust Memory & Information Processing Battery (BIRT) (Coughlan et al., 2007), specifically participant raw score from total words recalled over five trials. Executive functioning was measured using the Hayling Sentence Completion test (Burgess & Shallice, 1997), in which participants were required to inhibit a natural response and generate an ill-fitting response to 15 incomplete sentences. The response latencies recorded in seconds was utilized for the current study.

4.4.3.3   *Confounder variables.*

Participant pre CBT-ABI anxiety and depression symptom levels were examined as potential confounder variables. Participant pre CBT-ABI group allocation status (i.e., motivational interviewing or non-directive counselling/wait-list control) was also considered as a potential confounder, as motivational interviewing potentially influenced client engagement with subsequent CBT-ABI sessions.

Intervention efficacy in improving anxiety and depression symptoms was assessed in the parent RCT using the Hospital Anxiety and Depression Scale (HADS) - Anxiety subscale (Zigmond & Snaith, 1983) and Depression Anxiety Stress Scales (DASS) - Depression subscale (Lovibond & Lovibond, 1995). The HADS-Anxiety and DASS-Depression subscales were used because they have been shown to be most sensitive to anxiety and depression symptoms in individuals with TBI (Dahm et al., 2013; Schönberger & Ponsford, 2010; Wong et al., 2013).

The HADS is a 14-item self-assessment scale designed for non-psychiatric medical settings (Dawkins, Cloherty, Gracey, & Evans, 2006). It is divided into 7-item depression and anxiety subscales, scaled from 0 (*not at all/very little/definitely*) to 3 (*most of the time/very often/not at all*). The patient endorses items based on how they have been feeling in the past week. Higher scores indicate higher anxiety or depression. Both subscales have demonstrated adequate internal consistency (anxiety subscale α = 0.83; depression subscale α = 0.82) (Bjelland, Dahl, Haug, & Neckelmann, 2002; Brennan, Worrall-Davies, McMillan, Gilbody, & House, 2010).

The DASS is a 42-item self-assessment scale, divided into 14-item depression, anxiety and stress subscales (Ownsworth, Little, Turner, Hawkes, & Shum, 2008). The patient rates on a 4-point severity/frequency scale the extent to which they have experienced each symptom over the past week: 0 (*did not apply to me at all*) to (3 = *applied to me very much, or most of the time*). The DASS has shown high internal consistency, with Cronbach's alphas for the DASS Depression, Anxiety, and Stress subscales of .97, .92, and .95, respectively (Antony, Bieling, Cox, Enns, & Swinson, 1998).

4.4.4   Procedure.

4.4.4.1   Observer rater training.

Two post-graduate level clinical psychology students with considerable expertise in psychotherapy process research provided specialist WAI-SR-O training to the primary researcher (L.Z.). Training was approximately 17 hours in total, including four hours of didactic instruction, and 13 hours of practice ratings using sessions from a non-TBI depression trial (Jacobson et al.,

1996). Inter-rater reliability was calculated for each session using established criterion ratings. Debriefings with trainers occurred after each rating for the first 5 ratings, and thereafter were conducted only if inter-rater reliability was inadequate.

The primary researcher then assessed 18 CBT-ABI sessions from the parent study with the WAI-SR-O, which served as criterion ratings for the purpose of co-rater training. The primary researcher then delivered the same WAI-SR-O training to a co-rater (advanced psychology graduate), utilising sessions from the parent RCT only (i.e., delivering the same didactic information, but using CBT-ABI recordings as practice sessions). Both the primary researcher and co-rater achieved a high degree of inter-rater reliability (Finn's r > 0.80) within 10 practice sessions, and were then permitted to proceed with main data collection.

4.4.4.2   *Main data collection.*

A total of 177 CBT-ABI sessions were assessed using the WAI-SR-O, representing interactions for 31 participants and their therapists. Inter-rater reliability was calculated for each of the 27 (15.3%) sessions assessed by the co-rater. Debriefings were held between raters throughout main data collection to discuss any rating difficulties. As a further check of reliability, a random selection of sessions (n = 45, 25.4%) was re-rated by the primary researcher. This occurred in a period no less than 3 months after the original ratings, to minimize memory of session content. All procedures contributing to this work comply with the Helsinki Declaration of 1975, as revised in 2008.

4.4.4.3   *Data analyses.*

1.4.4.3.9   *WAI-SR-O reliability.*

Low variability is typical of WAI-SR-O ratings because the alliance is assumed to be strong until relevant session content suggests otherwise. Therefore Finn's r (Finn, 1970) was used to measure WAI-SR-O inter-rater and within rater reliability, as this statistic can accommodate low

variability in responses (Tinsley & Weiss, 2000; Whitehurst, 1984). Finn's $r \geq 0.80$ was considered acceptable (Fleiss, Levin, & Paik, 2013; Streiner, Norman, & Cairney, 2015).

1.4.4.3.10 *Demographic and injury-related variables association with alliance.*

Demographic and injury-related variables served as predictor variables, and total WAI-SR-O scores at each of the 9 time-points served as the dependent variable. Correlational analyses examining relationships between pairs of predictors within each variable group were undertaken to screen for multicollinearity. Multilevel mixed-model linear regressions (Snijders & Bosker, 2012) were then utilized to assess the relationship between predictors and working alliance scores across time. Preliminary graphical analysis suggested a potential quadratic relationship between time and working alliance score. Therefore models comprising linear trend only, and linear and quadratic trends, with and without a term for random slopes for time, were examined initially. Relationships with time were also examined as fixed effects and all models included a term for random intercepts (Tabachnick & Fidell, 2013; Wade et al., 2015).

To ensure that increase in model complexity was commensurate with increased model fit, selection was guided by Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) values (Harrell, 2015), with comparatively lower values for <u>both</u> indices indicating best fit. While initial examination of scatterplots suggested a slight quadratic relationship between time and working alliance, adding the quadratic term made little difference to model fit, so only linear effects were employed in the final models. All subsequent models therefore included a linear relationship with time as fixed effects and random intercepts only.

The inclusion of pre CBT-ABI HADS-Anxiety, DASS-Depression scores and pre CBT-ABI group allocation status (i.e., motivational interviewing or non-directive counselling/wait-list control) as possible confounders made minimal difference to the models and so were not retained. Due to the small sample size, possible interactions between predictors, or between predictors and time, were not examined. Statistically significant predictors considered for entry into a final model

were individually defined using a cut-off point of $p < 0.10$. Once chosen, statistical significance was re-defined as $p < 0.05$. All statistical analyses were conducted in Stata 15.1 (StataCorp, 2017).

4.5 RESULTS

4.5.1 Preliminary analyses.

In the present study an overall Finn's r of 0.83 was obtained for 15.3% of co-rated sessions. A Finn's r of 0.87 was obtained for an additional 25.4% of sessions re-rated for within rater reliability calculation. Table 4.2 shows descriptive statistics for WAI-SR-O scores at each time-point. On average scores indicated a relatively strong alliance at each session, with a minimum score of 13 and maximum of 37.

Table 4.2 *WAI-SR-O descriptive statistics*

Time-point	n	M	SD	Min.	Max.
1	25	19.20	4.39	13	28
2	22	20.45	6.06	14	37
3	18	20.00	5.12	14	37
4	21	23.67	6.82	14	35
5	18	22.33	6.33	13	35
6	20	21.35	4.83	14	30
7	17	23.18	5.14	17	33
8	18	23.67	6.97	14	37
9	18	20.61	5.91	14	32

Note: WAI-SR-O possible total scores range from 12 (strongest alliance) to 60 (weakest alliance)

4.5.2   Demographic and injury-related variables association with alliance.

4.5.2.1   Correlational analyses.

Gender and age at study entry were significantly associated (t_{29} = -2.47, $p \leq$ .05). Females (*M* = 57.11, *SD* = 13.82) were on average 13.79 years older than males (*M* = 43.32, *SD* = 14.22) at study entry. Remaining non-statistically significant ($p \geq$ .05) correlations for demographic variables fell between -0.30 and 0.27. Years since injury and BIRT memory score were significantly correlated (*r* = 0.37, $p \leq$ .05), with longer time since injury associated with better memory performance. Remaining non-statistically significant ($p \geq$ 0.05) correlations for injury-related variables fell between -0.39 and 0.37.

4.5.2.2   Multilevel mixed-model linear regressions.

No demographic variables were significantly associated with WAI-SR-O score. Years since injury was the only injury-related variable significantly associated, Wald χ^2 = 14.44, $p \leq$ .001, 95% CI = -0.52 to -0.14. Specifically, more years since injury was associated with a lower WAI-SR-O score (see Table 4.3), i.e., stronger working alliance. As only one variable was significantly associated with alliance, it was not necessary to run a multilevel mixed-model regression to calculate a final model.

Table 4.3 reports statistics for each variable entered individually, in addition to the final model, including both time and years since injury. There was a statistically significant positive association (0.33, 95% CI = 0.08 to 0.57) between time-point/session and WAI-SR-O score. Specifically, with each additional time-point/session, the WAI-SR-O score increased (ie. weakened) on average by 0.33.

Table 4.3 *Multilevel mixed-model regressions of WAI-SR-O total score over 9 time-points for demographic and injury-related variables*

Predictor Variables	Coeff.	95% CI	
Demographic group			
Gender[a]	1.17	-2.16	4.50
Age at study entry[a]	0.02	-0.09	0.13
Years of education[a]	0.08	-0.42	0.57
NART IQ[b]	-0.04	-0.30	0.22
Injury-related group			
Years since injury[a]	-0.33***	-0.52	-0.14
PTA (days)[b]	0.01	-0.07	0.08
Hayling response time (seconds)[c]	0.01	-0.02	0.03
BIRT trials 1-5 score[d]	0.02	-0.08	0.13
Final Model[a]			
Time	0.33**	0.08	0.57
Years since injury	-0.33***	-0.52	-0.14

Note: WAI-SR-O possible total scores range from 12 (strongest alliance) to 60 (weakest alliance); **$p \leq 0.05$; ***$p \leq 0.005$; Coeff. - unstandardized regression coefficient; [a]n = 31; [b]n = 26; [c]n = 29; [d]n = 28

4.6 DISCUSSION

The current study was the first to examine working alliance in the context of CBT adapted for brain injury (CBT-ABI), and its association with demographic and injury-related variables. WAI-SR-O ratings reflected a strong alliance in the current TBI sample, and these were relatively stable across the nine-session intervention.

4.6.1 Demographic variables association with alliance.

The results did not support the presence of an association between age at study entry and observer rated working alliance, thereby failing to support our hypothesis. In the rehabilitation context, Sherer et al. (2007) also found no association between age and the alliance ratings sourced

from therapists, patients and patient family members. However Schönberger, Humle, et al. (2006a) found younger age to be significantly associated with therapist rated WAI-SF scores. In non-brain injured patients, Connors et al. (2000) found older age to be associated with a stronger alliance in the treatment of alcoholism. In contrast, a study by Knerr et al. (2011) examining the therapeutic relationship in couples therapy, found that younger clients had a stronger alliance. The authors speculated that lower age discrepancy between patient and therapist might have been a contributor to these findings. Relatively large variability in both participant age at study entry and therapist-participant age discrepancy existed in the current study, yet no significant association was evident. This suggests that neither age or therapist-participant age discrepancy necessarily impacted the development of a solid alliance. This is positive considering those most likely to be impacted by a TBI are the elderly or adolescents/young adults (Bruns & Hauser, 2003).

Results of the current study did not support the hypothesized association between education and observer rated working alliance. In the rehabilitation context, Sherer et al. (2007) found more years of education to be significantly associated with stronger patient rated alliance, whereas Connors et al. (2000) found patient rated alliance to be negatively predicted by patient education level in the treatment of alcoholism. No significant association between premorbid IQ and observer rated working alliance were obtained in the present study. We are aware of no other research examining IQ-alliance relations in psychological therapy following TBI. These findings suggest that neither education nor IQ represented an impediment to the working alliance, despite their association with improved recovery following brain injury (Satz, 1993; Stern, 2002).

Gender was also not associated with observer rated working alliance in this study. In the context of neuropsychological outpatient rehabilitation, gender has been examined in relation to alliance, but results not reported (Schönberger, Humle, et al., 2006a). In a study examining treatment for alcoholism in non-brain injured patients, Connors et al. (2000) found therapist rated alliance to be positively associated with the client being female, but a potential explanation for this was not offered. An absence of gender-alliance association in the current study indicates that either gender has the potential to develop a strong alliance with their CBT-ABI therapist.

4.6.2   Injury-related variables association with alliance.

The hypothesis that greater time since injury would be associated with stronger working alliance was supported. Over a broader timeframe it is possible that clients develop increased self-awareness and social cognition that would maximize strong alliance development. Numerous studies have shown that awareness increases with time post-injury (Fleming & Strong, 1999; Ownsworth, Desbois, Grant, Fleming, & Strong, 2006; Richardson, McKay, & Ponsford, 2015).

Additionally, the current study found years since injury and BIRT score to be significantly correlated, suggesting that a greater number of years since injury was associated with better memory functioning. The significant correlation between years since injury and memory functioning is in keeping with findings from a meta-analysis by Schretlen and Shapiro (2003). They showed that the impact of TBI on cognitive functioning varies as a function of time since injury. Specifically, cognitive functioning tends to improve during the first two years after moderate–severe TBI and then decelerates.

Nevertheless, the current study found no significant association between performance on memory and executive functioning tests and observer rated working alliance. There was also no significant association between days of PTA as a measure of injury severity and alliance. To our knowledge, no previous studies have examined these relationships in the context of psychological therapy following TBI. The findings suggest that neither cognitive impairments nor injury severity per se are barriers to development of an effective working alliance.

4.6.3   Working alliance strength and score reliability.

The current study demonstrated that, following comprehensive training and a series of reliability checks, high inter-rater and within rater reliability could be achieved and maintained with the WAI-SR-O in a TBI sample. WAI-SR-O reliability performance, average scores and ranges were consistent with preliminary psychometric evaluations (Kazantzis, Cronin, et al., 2018). Alliance levels were also in keeping with client and therapist sourced WAI-SF scores reported by Schönberger, Humle, et al. (2006a), which were relatively strong and restricted in range. Once

again this highlights that TBI does not necessarily pose an obstacle to the development of a strong working alliance in CBT-ABI.

4.6.4   Limitations and directions for future research.

Although the current study had the methodological strength of collecting ratings across nine therapy sessions, the small number of therapist-participant dyads renders the findings preliminary. Therefore the non-significant findings may be due to low statistical power. However it is also possible that these variables do not impact the working alliance in the context of CBT-ABI, and future studies with larger samples are required to further clarify this. Furthermore it is important to note that the statistically significant association with years since injury indicates potential prediction of the observer-rated alliance only. This relationship may not necessarily extend to the client and therapist rated alliance, as differences in alliance ratings according to source are common (Hartmann et al., 2015; Lysaker et al., 2011; Schönberger, Humle, et al., 2006a).

As the current study is the first of its kind, the WAI-SR-O total scale score was considered the most appropriate starting point at which to begin examination. Furthermore factor analytic evaluation of the relatively new WAI-SR-O scale was considered outside of the scope of this study. Nonetheless, the WAI-SR-O is composed of three theoretically defined subscales assessing client and therapist agreement on therapy goals and tasks, in addition to client and therapist emotional bond (i.e., mutual liking, trust, respect and appreciation for one another). The study by Schönberger, Humle, et al. (2006a) utilized client and therapist sourced total scale score and all subscale scores, finding only the bond subscale to not be significantly associated with any of the demographic and injury-related variables. Therefore future studies may want to consider factor analytic evaluation of the WAI-SR-O and consequently identify predictors of the separate components of the observer rated working alliance.

The same study by Schönberger, Humle, et al. (2006a) also found that patient rated emotional bond, as measured by the WAI-SF bond subscale, was significantly associated with

patient self-awareness, even more so than injury localization. This highlights the importance of considering awareness and social-cognitive deficits as potential predictors of working alliance, as these are common problems in the TBI population (S. McDonald, 2013). A review by Bach and David (2006) found that both premorbid and current intellectual functioning were not strongly related to levels of self-awareness after brain injury. This highlights that such constructs need to be examined both together and independently in relation to working alliance. Self-awareness was not directly measured in the current study, however time since injury may be representative of this construct, as well as overall adjustment to injury.

The current study indicates that gender, age, education level, pre-morbid IQ, PTA duration and performance on memory/executive functioning tests do not necessarily affect the working alliance in people with TBI undertaking CBT-ABI. Rather, years since injury was the only variable found to impact the alliance. It is possible this is reflective of the development of self-awareness and social cognition over time post-injury. This highlights the importance of considering psychotherapeutic treatment timing in relation to TBI recovery stage. A stronger working alliance maximizes the opportunity to benefit from therapy (Flückiger et al., 2018; Schönberger, Humle, et al., 2006b; Schönberger, Humle, Zeeman, et al., 2006; Sherer et al., 2007). Findings of the current study show that, with more time post-injury, a person with TBI has the potential to develop the solid alliance on which effective CBT-ABI depends.

4.7   ACKNOWLEDGEMENTS

CHAPTER FIVE

PREDICTORS OF HOMEWORK ENGAGEMENT IN CBT ADAPTED FOR TRAUMATIC BRAIN INJURY: PRE/POST-INJURY AND THERAPY PROCESS FACTORS

This chapter constitutes a manuscript submitted for publication to *Cognitive Therapy and Research* in January 2019. It is presented according to the specific formatting requirements of the journal, with the sections renumbered for this doctoral thesis.

5.1   DECLARATION FOR THESIS CHAPTER FIVE

Declaration of the Candidate: In the case of Chapter Five, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution
Formulation of study design, data collection, data analyses and writing of the manuscript	70%

The following co-authors contributed to the work:

Name	Nature of contribution
Nikolaos Kazantzis	Consultation in formulation of study design, discussion of ideas expressed in manuscript and critical review of manuscript.
Dana Wong	Consultation in formulation of study design, discussion of ideas expressed in manuscript and critical review of manuscript.
Dean McKenzie	Consultation in data analyses and critical review of manuscript.
Marina Downing	Consultation in data analyses and critical review of manuscript.
Jennie Ponsford	Consultation in formulation of study design, discussion of ideas expressed in manuscript and critical review of manuscript.

Candidate's Signature:

Date: 04/02/2019

Declaration by Co-authors: The undersigned hereby certify that:

1. The above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
2. They meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
3. They take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
4. There are no other authors of the publication according to these criteria;
5. Potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
6. The original data are stored at The Monash-Epworth Rehabilitation Research Centre, Epworth Hospital, Richmond, and will be held for at least five years from the date indicated below:

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04/02/2019

5.2   ABSTRACT

Traumatic brain injury (TBI) associated cognitive impairments may pose an obstacle to homework engagement in Cognitive Behaviour Therapy (CBT) for depression and anxiety. The current study examined the association of demographic, injury-related and CBT process variables with homework engagement in CBT adapted for TBI (CBT-ABI). The audio-recordings of 177 CBT-ABI sessions, representing 31 therapist-client dyads, were assessed from the independent observer perspective. Client homework engagement, therapist competence in assigning and reviewing homework, and working alliance strength, were measured. Multi-level mixed model regressions showed that older client age, more time since injury, stronger working alliance and greater therapist competence in homework review, were significantly associated with higher levels of homework engagement. The findings highlight how CBT-ABI therapists can enhance homework engagement for clients with TBI.

Keywords: brain injury; cognitive behavior therapy; homework; working alliance; therapist competence; anxiety; depression

5.3   **INTRODUCTION**

Traumatic brain injury (TBI) causes cognitive impairments in memory, attention, and executive function (Klonoff, 2010; Ponsford, Sloan, & Snow, 2012) that in turn result in significant disability across several life domains. Consequently, depression and anxiety are commonplace (Bombardier et al., 2010; Osborn et al., 2014), with research showing rates of symptoms significantly higher than those in the general population, or following mild brain injury (Alway et al., 2016; Gould et al., 2014; O'Donnell et al., 2004). Given the frequency of these problems, there has been relatively limited research evaluating treatments. Several randomised controlled trials (RCTs) have demonstrated the efficacy of CBT adapted to accommodate the specific needs of brain-injured clients (Hodgson et al., 2005; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Ponsford et al., 2016), but the specific processes that may enhance treatment efficacy have not been examined.

Between-session interventions (i.e., homework) are integral to CBT, and represent the main vehicle for the generalization of in-session learning (J. S. Beck, 2011). Meta-analyses have demonstrated clinically significant relationships between higher levels of homework quantity and quality (i.e., skill acquisition), and better CBT outcomes (Kazantzis et al., 2000; Kazantzis, Luong, et al., 2018; Kazantzis et al., 2010; Kazantzis et al., 2016; Mausbach et al., 2010). Therefore, problems with homework completion may prevent clients from receiving the full benefits of CBT. In the context of TBI, cognitive deficits may negatively influence client capacity to undertake and complete the homework, given the complex attention, memory and executive processes involved in homework review, design, and assignment (Leathem & Christianson, 2007).

Demographic variables (i.e., gender, age, education) have typically shown no association with homework compliance (Fehm & Mrose, 2008; Gonzalez et al., 2006; Weck et al., 2013). However N. Schmidt and Woolaway-Bickel (2000) did find that older age and being unemployed was associated with higher levels of homework compliance. Higher levels of homework compliance have also been associated with greater therapist competence in reviewing homework

(M. Bryant et al., 1999; Weck et al., 2013), assigning homework (Conklin, Strunk, & Cooper, 2018), and stronger therapeutic alliance (Dunn et al., 2006; Taft et al., 2003).

While numerous studies have reported the *use* of homework in the TBI population (e.g., Archer et al., 2015; Ashman et al., 2014; Ponsford et al., 2016), only two have actually measured homework compliance (Tsaousides et al., 2014; Zencius et al., 1991). The study by Zencius et al. (1991) involved memory notebook training with four participants in the cognitive rehabilitation context. The study by Tsaousides et al. (2014) measured homework compliance in the psychotherapeutic context, however factors associated with homework compliance were not examined.

Few studies have examined potential predictors of homework compliance in client groups with cognitive deficits similar to those with TBI. Granholm, Auslander, Gottlieb, and McQuaid (2006) found baseline levels of symptom severity and insight before treatment were not significantly correlated with homework compliance during Cognitive Behavioral Social Skills Training for people with schizophrenia. The same study found homework attempts were significantly greater in higher functioning patients who already had greater baseline skill knowledge. Gehring, Aaronson, Taphoorn, and Sitskoorn (2011) made an anecdotal observation in their cognitive rehabilitation study that older patients with brain tumors reported more difficulty with strategy training homework than younger patients.

Theoretically a variety of antecedents and consequences may determine client homework behavior (Cameron & Leventhal, 2003; Kanfer & Goldstein, 1991). For example, a client may be more likely to undertake homework that reduces unpleasant emotional states (Skinner, 1972), or involves a task in which they perceive themselves to be competent (Bandura, 1977). In the case of people with TBI the latter belief is of particular relevance due to associated issues with self-awareness and cognitive capability. Derived from established theories of behavior modification and social cognition, an integrated model of the determinants of homework engagement focusing on client's beliefs has been proposed (Kazantzis & L'Abate, 2005). Therefore, it may be argued that homework quantity, quality, and beliefs assessment is necessary in order to capture a meaningful

representation of client engagement with homework in CBT (Holdsworth et al., 2014). Fortunately, progress in scale development now allows for such assessment to be undertaken, specifically with The Homework Rating Scale-Revised (HRS-II; Kazantzis, Deane, Ronan, & L'Abate, 2005). The HRS-II assesses quantity, quality and beliefs, with an aim to identify the determinants of homework engagement.

The present study aimed to identify whether: 1) demographic (i.e., gender, age, education level, premorbid IQ); 2) injury-related (i.e., years since injury, injury severity, memory/executive functioning); and/or 3) CBT process variables (i.e., working alliance and therapist competence) were associated with client homework *engagement* (as measured by the HRS-II) in TBI patients undertaking adapted CBT (CBT-ABI: Wong et al., in press). It was hypothesized, on the basis of previous studies, that: 1) homework engagement would not be significantly associated with gender, age or education level; 2) more years since injury and better performance on memory and executive functioning tests would be significantly associated with higher levels of engagement; and 3) stronger working alliance and higher level of therapist competence would also be significantly associated with higher levels of homework engagement. The role of premorbid IQ and injury severity, as measured by Post Traumatic Amnesia (PTA) duration, was exploratory.

5.4   METHOD

5.4.1   Parent study.

Data were collected from the audio-recorded CBT-ABI sessions of a completed RCT. The parent RCT compared two treatment groups with wait-list control: 1) motivational interviewing + CBT-ABI, and 2) non-directive counseling + CBT-ABI (Ponsford et al., 2016). All participants had sustained a TBI and were experiencing symptoms consistent with depressive and/or anxiety disorders according to the Structured Clinical Interview for DSM-IV (First et al., 2007). Seventy-five participants were recruited into the parent RCT in total. A total of 177 CBT-ABI session recordings, representing 31 therapist-participant dyads, were available for the current study. The

remaining recordings were lost due to random technological failure; therapists did not choose which sessions were coded in the current study.

The CBT-ABI program was delivered over nine sessions in accordance with a previously pilot-tested therapist manual (Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Wong et al., in press), based on Beck's CBT model (A. T. Beck et al., 1979), and adapted for TBI associated cognitive deficits. Clinical psychologists and clinical neuropsychologists, with an average of 7 years post-degree experience, were provided specialized training in delivering the manualised CBT-ABI program. Therapist treatment adherence and competence ratings were on average 5.71 - 5.79 (0 = unacceptable/not present to 7 = excellent/high occurrence), based on treatment integrity monitoring by a CBT expert. Participants who received CBT-ABI showed significantly larger reductions in anxiety (g = 0.84) and depression (g = 0.82) by 30 weeks post-baseline compared to wait-list control. Treatment effect sizes were comparable to findings from CBT efficacy meta-analytic research (Hofmann et al., 2012; Watts, Turnell, Kladnitski, Newby, & Andrews, 2015).

5.4.2   Measures.

5.4.2.1   *Outcome – homework engagement.*

Participant homework engagement was measured using the observer version of the HRS-II (Kazantzis, Deane, et al., 2005). Ratings were based on therapist-participant dialogue in the context of homework review. The HRS-II is a 12-item measure rated on a 5 point Likert scale (0 = *not at all*, 1 = *little/somewhat*, 2 = *moderately/some*, 3 = *a lot/very* and 4 = *extensively/extremely/completely*). HRS-II total score (i.e., sum of all items, following reverse key of negatively worded items) was utilized in the current study. The client and therapist versions of the HRS-II have demonstrated excellent internal consistency (α = .89 in B. R. McDonald & Morgan, 2013; α = .71 to α = .91 in Sachsenweger, Fletcher, & Clarke, 2015). The observer version has also achieved excellent internal consistency (α = .86) and inter-rater reliability (ICC = .83) in preliminary psychometric evaluation (Kazantzis, Zelencich, et al., 2018).

5.4.2.2   Confounders.

In the parent RCT, anxiety symptoms were assessed using the Hospital Anxiety and Depression Scale (HADS) – Anxiety subscale (Zigmond & Snaith, 1983). Depression symptoms were assessed using the Depression Anxiety Stress Scales (DASS) – Depression subscale (Lovibond & Lovibond, 1995). The HADS-Anxiety and DASS-Depression subscales have shown to be most sensitive to anxiety and depression symptoms in individuals with TBI (Dahm et al., 2013; Schönberger & Ponsford, 2010; Wong et al., 2013) and were chosen for this reason. Anxiety and depression symptom assessment was undertaken before 9 sessions of CBT-ABI commenced. These were included in statistical analyses in the current study to control for the effect of pre-intervention symptom severity.

5.4.2.3   Aim 1: Demographic variables.

Demographic (i.e., gender, age at study entry, years of education and pre-morbid IQ) variables were collected in the parent RCT at pre-treatment. Pre-morbid IQ was measured using the National Adult Reading Test (NART; Nelson & Willison, 1991).

5.4.2.4   Aim 2: injury-related variables.

Injury-related variables (i.e., years since injury, days in PTA and performance on memory/executive functioning tests) were also collected in the parent RCT at pre-treatment. Executive functioning was measured using response latency in seconds from section two of the Hayling Sentence Completion test (Burgess & Shallice, 1997) and memory functioning was measured using total score from trials 1-5 of the Brain Injury Rehabilitation Trust Memory & Information Processing Battery (BIRT; Coughlan, Oddy, & Crawford, 2007).

5.4.2.5   Aim 3: CBT process variables.

Working alliance strength was measured using the Working Alliance Inventory – Short-Form Revised – Observer version (WAI-SR-O; Kazantzis, Cronin, Farchione, & Dobson, 2018),

which is based on the client version (WAI-SR; Hatcher & Gillaspy, 2006). The WAI-SR-O is a 12-item observer-rated measure, rated on a 5-point Likert scale, ranging from 1 (*always*) to 5 (*seldom*). Ratings took into consideration the frequency of missing relational elements and intensity of alliance ruptures over the entire session. Total scores range from 12 (strongest alliance) to 60 (weakest alliance). Preliminary psychometric evaluation for the WAI-SR-O (Kazantzis, Cronin, et al., 2018) shows the scale has excellent internal consistency ($\alpha = 0.89$) and reliability (Finn's $r = 0.88 - 0.91$; see reliability index details below).

Therapist competence in using homework was measured using the Homework Adherence and Competence Scale (HAACS; Kazantzis, Dobson, Munro, & Wedge, 2006). The HAACS is a 19-item observer-rated scale, based on a comprehensive guiding model for practice in CBT homework use (Kazantzis, MacEwan, & Dattilio, 2005). Level of competence is rated on a seven point Likert scale from 0 (*non-adherent/extremely poor*) to 6 (*excellent*). The HAACS is comprised of three subscales: homework 1) review, 2) design, and 3) assign. Based on scores of the corresponding items within each subscale and relevant contextual factors, the rater provides an overall competence score for each subscale (i.e., 0 to 6), which was utilized in the current study. Psychometric evaluation (Cummins, 2013; Kazantzis et al., 2006; Sachsenweger et al., 2015) has shown excellent inter-rater reliability (ICC = 0.91) and acceptable to excellent internal consistency ($\alpha = 0.76 - 0.91$).

5.4.3   Rater training.

The primary researcher (L.Z.) undertook comprehensive training in all CBT process scales (i.e., working alliance, homework engagement and therapist homework competence). The training program was designed and overseen by a senior researcher (N.K.) with specialized psychotherapy process research expertise. Training took approximately 41 hours, including didactic instruction and practice ratings. Practice ratings were sourced from a non-TBI depression trial (Jacobson et al., 1996) and rated independently by the primary researcher.

Inter-rater reliability was calculated for each practice session relative to criterion ratings. The Finn's *r* (Finn, 1970) statistic was utilized for reliability assessment to accommodate non-normally distributed data (Tinsley & Weiss, 2000; Whitehurst, 1984). A cut-off of Finn's $r \geq 0.80$ was considered adequate (Fleiss et al., 2013; Streiner et al., 2015). Debriefings with the program trainers (i.e., two post-graduate clinical psychology candidates) were regularly undertaken to discuss scoring rationale.

After achieving consistently adequate inter-reliability with the practice ratings, the primary researcher then assessed a selection of CBT-ABI sessions from the parent RCT with all three scales. These served as criterion ratings for the purpose of co-rater training. The primary researcher then delivered the same scale training to a co-rater (advanced psychology graduate), utilising both TBI (i.e., CBT-ABI) and non-TBI sessions. Both the primary researcher and co-rater achieved an adequate degree of inter-rater reliability (Finn's $r \geq 0.80$) within 28 practice sessions, and could then proceed with main data collection.

5.4.4   Main data collection.

The primary researcher assessed all sessions with the CBT process scales. The working alliance scale was applied to all sessions, the homework engagement scale was only applied to sessions including homework review, and the scale measuring therapist competence in using homework was applied to sessions that included homework review and/or assignment. Primary researcher within-rater reliability was calculated through re-rating a random subset of sessions. These re-ratings occurred at least 3 months after the original ratings and ensured consistency in scale application. The co-rater also independently assessed a subset of sessions. Inter-rater reliability was calculated prospectively for each session. When the reliability threshold was not met, debriefings were held to clarify discrepant understanding of scale item application in the CBT-ABI dataset.

5.4.5   Data analyses.

5.4.5.1   CBT process scale reliability.

In the current study the Finn's *r* (Finn, 1970) statistic, with a two-way random effect model, was utilized for reliability assessment of all CBT process scales within main data collection. This reliability index was chosen to accommodate non-normally distributed data (Tinsley & Weiss, 2000; Whitehurst, 1984). A cut-off of ≥ 0.80 was utilised (Fleiss et al., 2013; Streiner et al., 2015).

5.4.5.2   Preliminary analyses.

Means and standard deviations were calculated for WAI-SR-O total scores, HRS-II total scores and HAACS review, design and assign total subscale scores at each of the 9 CBT-ABI sessions. Potential multicollinearity was screened through correlational analyses between pairs of predictors using Pearson Product-Moment Correlations (Rodgers & Nicewander, 1988).

5.4.5.3   Predictor variables association to homework engagement.

Total HRS-II session score served as the dependent variable. Multilevel mixed-model linear regressions (Snijders & Bosker, 2012) were utilized. Initial graphical analysis indicated a potential quadratic relationship (inverted U shape) between time and HRS-II scores. Therefore several models were assessed, all including a term for random intercept: linear trend only, linear and quadratic trend, with random slope and without random slope for time (Tabachnick & Fidell, 2013).

Model Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) values (Harrell, 2015) were compared to determine best model fit. Specifically, the model with lowest values on <u>both</u> the above indices was chosen. It was found that adding a quadratic term made little difference to model fit. Therefore, all subsequent models included a linear relationship with time as fixed effects and random intercepts only.

Potential confounders, pre CBT-ABI HADS anxiety and DASS depression scores, had minimal effect when included in analyses and were excluded. Due to the small sample size, possible interaction effects were not examined. Statistically significant predictors considered for entry into a final model were individually defined using a cut-off point of $p \leq 0.05$. This conservative p value was chosen to limit final model variable numbers in the context of a relatively small sample size. All statistical analyses were conducted in Stata 15.1 (StataCorp, 2017).

5.5   RESULTS

5.5.1   Session and participant characteristics.

The 177 available CBT-ABI sessions from the parent RCT were distributed as follows: Session 1, $n = 25$; session 2, $n = 22$; session 3, $n = 18$; session 4, $n = 21$; session 5, $n = 18$; session 6, $n = 20$; session 7, $n = 17$; session 8, $n = 18$, and; session 9, $n = 18$. The majority of participants (65%) each had at least five CBT-ABI sessions, dispersed across every therapy stage. Table 5.1 shows comparison of participant characteristics based on audio recording availability. The current sample was older (t (73) = -2.66, $p = 0.01$) and had slightly lower anxiety symptoms (t (67) = 2.46, $p = 0.02$) compared to those participants with unavailable audio recordings.

Table 5.1 *Comparison of participant characteristics at pre CBT-ABI, for both unavailable and available audio recorded CBT-ABI sessions*

Variable	Unavailable session recordings (*n* = 44)			Available session recordings (i.e., current study; *n* = 31)		
	M	*SD*	Range	*M*	*SD*	Range
Gender	75% male			70.97% male		
Age at study entry**	38.66	12.85	21-77	47.32	15.26	19-69
Education (years)	12.85	3.67	6-22	12.69	3.21	7-19
Years since injury	4.27	9.37	0-57	2.97	4.70	0-20
PTA duration (days)	22.00	25.15	0-120	22.08	20.51	0-65
HADS-Anxiety*	11.75	4.19	3-20	9.21	4.33	3-21
DASS-Depression	17.88	11.44	0-42	16.93	12.40	1-41

Note: DASS – Depression, Anxiety & Stress Scales; HADS – Hospital Anxiety & Depression Scale; PTA – Post-Traumatic Amnesia; $*p < 0.05$; $**p < 0.01$

Participants in the current study (*n* = 31) had an average pre-morbid IQ of 111.03 (*SD* = 8.84). Executive functioning was in the 'low' to 'moderate average' range according to average Hayling response time (*M* = 76.55 seconds, *SD* = 61.95; Burgess & Shallice, 1997). Memory functioning was in the 10th to 25th percentile, according to average total words recalled on trials 1-5 of the BIRT (*M* = 40.79, *SD* = 15.21; Coughlan, Oddy, & Crawford, 2007). On average anxiety and depression symptoms were within the 'mild' to 'moderate' range at pre CBT-ABI. Three (10.3%) participants had anxiety symptoms in the 'severe' range, whereas 9 (32.1%) had depression symptoms in the 'very severe' range.

5.5.2   CBT process scale reliability.

The total 177 CBT-ABI sessions were assessed for working alliance strength (WAI-SR-O), 143 (80.8%) for therapist competence in using homework (HAACS), and 99 (55.9%) for level of client homework engagement (HRS-II). The primary researcher re-rated 23.2% (23) of sessions

with the HRS-II, 26.6% (38) with the HAACS and 25.4% (45) with the WAI-SR-O. The co-rater assessed 7.1% (7) of sessions with the HRS-II, 15.4% (22) with the HAACS and 15.3% (27) with the WAI-SR-O. Adequate within-rater reliability (Finn's r = HRS-II – 0.85; WAI-SR-O – 0.87, and; HAACS – 0.91) and inter-rater reliability (Finn's r = HRS-II – 0.81; WAI-SR-O – 0.83, and; HAACS – 0.88) was achieved for all scales.

5.5.3   Preliminary analyses.

Table 5.2 shows descriptive statistics for HRS-II total scores at each time-point. On average scores indicated moderate participant homework engagement, with a minimum score of 5 and a maximum score of 38.

Table 5.2 *HRS-II total score descriptive statistics*

Session	n	M	SD	Min.	Max.
2	11	22.55	7.27	10	31
3	13	25.08	7.77	9	34
4	15	23.80	7.72	5	33
5	12	24.33	6.11	16	36
6	11	23.55	7.08	6	32
7	13	21.62	7.92	9	35
8	13	24.85	7.37	10	38
9	10	20.30	7.06	10	31

Note: The HRS-II total scores range from 0 (*no homework engagement*) to 48 (*complete homework engagement*)

Table 5.3 shows descriptive statistics for HAACS total subscale scores at each time-point. Results indicated 'mediocre' to 'good' therapist competence in reviewing and designing homework, and 'poor' to 'fair' therapist competence in the process of assigning homework.

Table 5.3 *HAACS subscale score descriptive statistics*

Session	n	Review		n	Design		Assign	
		M	SD		M	SD	M	SD
1	-	-	-	14	2.29	0.91	1.21	1.05
2	11	2.55	1.21	15	3.13	1.19	2.33	1.18
3	13	3.38	1.12	13	2.92	0.64	2.46	0.66
4	15	2.87	0.92	16	3.38	0.50	2.38	0.89
5	12	2.08	1.31	14	2.29	1.07	1.21	0.80
6	11	2.64	0.67	14	2.86	0.86	1.86	0.86
7	13	2.54	0.97	13	2.85	0.99	1.54	0.78
8	13	2.15	1.41	13	3.00	0.82	1.62	0.96
9	10	2.30	1.06	13	2.46	0.78	1.31	0.63

Note: Possible HAACS subscale scores range from 0 (*non-adherent/extremely poor*) to 6 (*excellent*).

On average WAI-SR-O scores indicated a relatively strong and stable alliance at each session ($M = 21.60$, $SD = 5.73$; Min = 13 to Max = 37). WAI-SR-O possible total scores range from 12 (strongest alliance) to 60 (weakest alliance).

Correlational analyses found age differed significantly between genders ($p \leq .05$). Females ($M = 57.11$ years, $SD = 13.82$) were on average 13.79 years older than males ($M = 43.32$ years, $SD = 14.22$) at study entry. Years since injury and BIRT score were significantly correlated ($r = 0.37$, $p \leq .05$), with longer time since injury associated with better memory performance.

5.5.4   Predictor variables association to homework engagement.

5.5.4.1   Aim 1: Demographic variables.

When demographic variables were examined individually (i.e., one predictor per model), only age at study entry was significantly associated with HRS-II score (Wald χ^2 = 15.73, $p \leq$ .005). Specifically, older age was associated with higher levels of homework engagement (see Table 5.4).

5.5.4.2   Aim 2: Injury-related variables.

When injury-related variables were examined individually, only years since injury was significantly associated with HRS-II (Wald χ^2 = 6.60, $p \leq$ .05). Specifically, more years since injury was associated with higher levels of homework engagement (see Table 5.4).

5.5.4.3   Aim 3: CBT process variables.

When CBT process variables were examined individually, both working alliance and therapist competence in homework review were significantly associated with HRS-II. Specifically, stronger working alliance (Wald χ^2 = 9.92, $p \leq$ .05) and higher levels of therapist competence in reviewing homework (HAACS-review subscale; Wald χ^2 = 13.57, $p \leq$ .005) were separately associated with higher levels of homework engagement (see Table 5.4).

5.5.4.4   Final model.

A multilevel mixed-model linear regression was repeated and included all statistically significant predictor variables: age, years since injury, working alliance and HAACS-review (see Table 5.4). This final model was statistically significant, Wald χ^2 = 109.46, $p \leq$ .005. Age ($p \leq$ .005), years since injury ($p \leq$ .005) and HAACS-review ($p \leq$ .05) were each statistically significant when entered into the final model together, whereas working alliance was not ($p \leq$ .10).

Table 5.4 *Multilevel mixed-model regressions of HRS-II total score over 9 time-points for demographic, injury-related and CBT process variables*

Predictor Variables	Coeff.	95% CI	
Demographic group			
Gender[a]	1.88	-3.01	6.76
Age at study entry[a]	0.16**	0.06	0.27
Years of education[a]	-0.72	-1.48	0.04
NART IQ[b]	0.02	-0.33	0.37
Injury & Cognitive group			
Years since injury[a]	0.35*	0.05	0.64
PTA (days)[c]	0.12	-0.00	0.23
Hayling Section 2 total time (seconds)[d]	0.01	-0.03	0.04
BIRT total trials 1-5[d]	-0.05	-0.21	0.10
CBT Process Group			
Working Alliance[a]	-0.25*	-0.44	-0.07
HAACS-review[a]	1.98***	0.78	3.19
HAACS-design[d]	0.59	-1.16	2.34
HAACS-assign[d]	0.39	-1.02	1.80
Final Model[a]			
Time	-0.17	-0.79	0.45
Age at study entry	0.18***	0.09	0.28
Years since injury	0.49***	0.26	0.72
Working alliance	-0.16	-0.34	0.01
HAACS Review	1.70*	0.49	2.91

$* < 0.05$ $** < .01$ and $*** < 0.001$; Coeff. - unstandardized regression coefficient; [a]n = 23; [b]n = 21; [c]n = 18; [d]n = 22

5.6 DISCUSSION

The current study was the first to examine homework engagement in the context of CBT-ABI, and its association with demographic, injury-related and CBT process variables. Homework engagement was significantly associated with age at study entry, years since injury, working alliance and therapist competence in reviewing homework. Homework engagement was not associated with gender, education, premorbid IQ, injury severity, executive/memory functioning and therapist competence in homework design/assign. Therefore, our hypotheses were partially

supported across all variable groups. These results suggest that CBT-ABI therapists should focus on fostering a strong working alliance and reviewing homework effectively to maximize homework engagement (and therefore potentially outcomes) for TBI survivors with depression and anxiety.

5.6.1   Aim 1: Demographic variables.

Gender was not found to be significantly associated with homework engagement, thereby supporting our hypothesis. This is in keeping with previous studies (M. Bryant et al., 1999; Fehm & Mrose, 2008; N. Schmidt & Woolaway-Bickel, 2000; Weck et al., 2013). An exception is a study by Helbig and Fehm (2004) who surveyed 77 cognitive-behavioural therapists, and found clinicians made global assessments of male clients as being less compliant with homework than female clients. The level of homework engagement achieved in the current TBI sample was not impacted by gender. This is reassuring considering a large proportion of TBI patients are male (Bruns & Hauser, 2003).

Older age at study entry was significantly associated with higher levels of homework engagement, which was inconsistent with our hypothesis. Findings from non-TBI samples, with similar age ranges to those in the current study, have rarely found a significant association between age and therapy homework compliance (M. Bryant et al., 1999; Fehm & Mrose, 2008; Helbig & Fehm, 2004; Weck et al., 2013). An exception is a study by N. Schmidt and Woolaway-Bickel (2000), involving a 12-session CBT protocol for panic disorder. Their preliminary analyses found older and unemployed individuals showed higher quality homework, however a potential explanation for this was not provided. It could be argued that increased life experience and higher maturity levels resulted in a more responsible approach to the homework in the current study.

Education level and pre-morbid IQ were not associated with homework engagement. The finding in regards to education is in keeping with previous research (M. Bryant et al., 1999; Gonzalez et al., 2006; Weck et al., 2013), and supported our hypothesis. Examination of premorbid IQ was exploratory, as to our knowledge this is the first study to analyse its association with homework engagement. Although both these factors play a significant role in recovery post-ABI

(Satz, 1993; Stern, 2002), these findings indicate that lower premorbid education and IQ levels did not hinder homework engagement in the current TBI sample.

5.6.2   Aim 2: Injury-related variables.

Greater number of years since injury was associated with higher levels of homework engagement, thereby supporting our hypothesis. Over a longer timeframe it is possible that clients have developed more insight into the psychological impact of their brain injury (O'Callaghan, McAllister, & Wilson, 2012), leading to increased motivation to engage with therapy homework. Furthermore, clients have also had more time to learn how to compensate, either independently or through rehabilitation, for the cognitive deficits that would typically impair homework engagement.

Examination of the association with brain injury severity (i.e., PTA duration) was exploratory, and no statistically significant association was demonstrated. Executive and memory functioning (i.e., Hayling response latency and BIRT score) was also not associated with homework engagement, which did not support our hypothesis. Similar research with non-brain injured participants has been conducted in CBT for Generalized Anxiety Disorder in older age (Mohlman, 2013; Mohlman & Gorman, 2005). Mohlman and Gorman (2005) found participants with executive dysfunction produced lower-quality homework than those with executive function that was intact or had improved over the course of treatment. Mohlman (2013) found verbal executive skills to be a predictor of homework, utilizing a score comprised of both homework quantity and quality.

It is possible that the adaptations that were made to the CBT-ABI homework exercises (Wong et al., in press) to account for each participant's cognitive impairments were successful in preventing those impairments from acting as barriers to successful homework engagement. To our knowledge this is the first study to examine the association between homework engagement and brain-injury related variables, therefore comparison to previous research is limited. However, these findings indicate that TBI severity and associated cognitive impairments do not necessarily impede

capacity to engage in CBT-ABI homework. Indeed HRS-II scores indicated that engagement in a moderate level of homework was still possible in the current TBI sample.

5.6.3   Aim 3: CBT process variables.

In partial support of our hypothesis, therapist competence in reviewing homework was associated with homework engagement, however therapist competence in the designing and assigning of homework was not. This is in keeping with previous cognitive therapy research (M. Bryant et al., 1999; Weck et al., 2013) demonstrating that therapist competence in reviewing homework in particular, is associated with greater homework compliance. However Conklin et al. (2018) recently found the opposite (i.e., therapist assigning behavior predicted homework engagement and review behavior did not) in Cognitive Therapy for depression. Conklin et al. (2018) coded sessions early in therapy and considered this a potential contributor to non-significant findings. In the current study HAACS-design and assign total subscale scores also had lower variability relative to the review subscale scores. Reviewing homework demonstrates appreciation for the client's therapeutic efforts between sessions, and provides the opportunity to reinforce task rationale and problem-solve barriers to completion. These elements are likely to be especially helpful in compensating for TBI associated cognitive deficits.

Working alliance was associated with homework engagement, which supported our hypothesis. However, once the effects of age, years since injury and therapist homework review competence were accounted for, its statistical impact was reduced. Dunn et al. (2006) found alliance and homework compliance to be associated in CBT for psychosis, both early and late in therapy. Taft et al. (2003) found evidence to suggest that homework compliance may partially mediate the alliance-outcome relationship in group-CBT for partner-violent men. On the other hand, Weck et al. (2013) found no association between alliance and homework compliance, but suggested this was due to limited alliance score variance. While working alliance clearly has a significant impact on homework engagement, these findings suggest it was possibly less important relative to the combination of age, years since injury and therapist competence in reviewing homework in the current TBI sample.

5.6.4   Limitations and directions for future research.

Results of the current study are considered preliminary due to the small sample size. Therefore the non-statistically significant findings in relation to gender, education, premorbid IQ, PTA duration, cognitive functioning and therapist homework design/assign competency, may be due to either small sample size or the absence of a statistically significant relationship. Replication with larger sample sizes is clearly required.

In the current sample therapists did not include homework (or language used made relevant behaviour unobservable to raters) in 19.2% of sessions. Reasons for homework non-use are difficult to determine without direct therapist input. A survey of practicing psychologists ($n = 827$) found 68% reported "often" or "almost always" using homework assignments (Kazantzis, Lampropoulos, & Deane, 2005), indicating that homework use in every session is not necessarily clinically typical. Nonetheless the percentage of homework non-use in the current sample is large enough to warrant further research into whether specific TBI characteristics impacted therapist choice to not use homework.

Therapist competence in using homework was found to be variable in the current study. The HAACS is a relatively new scale developed with non-brain injured participants. While similar therapist behaviors (i.e., general therapist competence) may be relevant across different clinical populations, specific and unique strategies may be required for work with brain-injured clients. For example, it was anecdotally observed that in order to compensate for the client's cognitive deficits, therapists sometimes had to provide more direct instruction to clients and therefore decrease the very behaviors that would typically result in higher competency scores (e.g., collaboration, facilitating client autonomy and eliciting client thoughts/beliefs). HAACS rating guidelines did allow for the appropriateness of item non-adherence to be taken into consideration. Nevertheless, there exists a need for therapist behaviors that compensate for TBI-associated cognitive deficits to be operationalized and measured, so a more meaningful representation of therapist competence in using homework can be captured within the context of brain injury.

The significant association of greater time since injury may be representative of two constructs related to longer post-TBI recovery period: higher motivation levels due to increased insight, and more opportunity for clients to learn how to compensate for cognitive deficits. Neither of these factors was directly measured in the current study. An association between self-awareness and severity of psychological symptoms has been found in TBI samples (Malec, Testa, Rush, Brown, & Moessner, 2007; Schönberger, Humle, et al., 2006a). Little research has examined patient use of cognitive deficit compensatory strategies over time post-brain injury (Evans & Wilson, 1992; Wilson, 1991). Interestingly, a study by Evans, Wilson, Needham, and Brentnall (2003) found that those who were more recently injured actually used more memory aids/strategies. Taken together with the current findings, this highlights the importance of investigating insight/motivation and client use of cognitive deficit compensatory strategies as potential homework engagement predictors in future research.

Meta-analytic research has clearly established the importance of homework-outcome relations (Kazantzis et al., 2000; Kazantzis, Luong, et al., 2018; Kazantzis et al., 2010; Kazantzis et al., 2016; Mausbach et al., 2010). Whether this same pattern holds for people with TBI undertaking psychological therapy remains unclear. Research examining predictors of therapy outcome in the TBI population is needed. The current study identified older client age, more years since brain injury, a stronger working alliance and higher therapist competence in reviewing homework as contributors to higher levels of homework engagement. This indicates it is essential for CBT-ABI therapists to spend time fostering a strong working alliance and developing competencies in reviewing homework effectively, to maximize outcomes for TBI survivors experiencing depression and anxiety.

5.7   COMPLIANCE WITH ETHICAL STANDARDS

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. Ethics approved by Monash

University Human Research Ethics Committee – project no. 9670. The authors declare no conflict of interest.

5.8   ACKNOWLEDGMENTS

CHAPTER SIX

PREDICTORS OF ANXIETY AND DEPRESSION SYMPTOM IMPROVEMENT IN COGNITIVE BEHAVIOUR THERAPY ADAPTED FOR TRAUMATIC BRAIN INJURY: PRE/POST INJURY AND THERAPY PROCESS FACTORS

This chapter constitutes a manuscript submitted for publication to *Journal of the International Neuropsychological Society* in January 2019. It is presented according to the specific formatting requirements of the journal, with the sections renumbered for this doctoral thesis.

6.1   DECLARATION FOR THESIS CHAPTER SIX
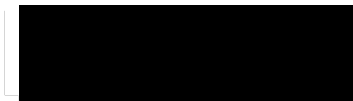
Declaration of the Candidate: In the case of Chapter Six, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution
Formulation of study design, data collection, data analyses and writing of the manuscript	70%

The following co-authors contributed to the work:

Name	Nature of contribution
Dana Wong	Consultation in formulation of study design, discussion of ideas expressed in manuscript and critical review of manuscript.
Nikolaos Kazantzis	Consultation in formulation of study design, discussion of ideas expressed in manuscript and critical review of manuscript.
Dean McKenzie	Consultation in data analyses and critical review of manuscript.
Marina Downing	Consultation in data analyses and critical review of manuscript.
Jennie Ponsford	Consultation in formulation of study design, discussion of ideas expressed in manuscript and critical review of manuscript.

Candidate's Signature:

Date: 04/02/2019

Declaration by Co-authors: The undersigned hereby certify that:

1. The above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
2. They meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
3. They take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
4. There are no other authors of the publication according to these criteria;
5. Potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
6. The original data are stored at <u>The Monash-Epworth Rehabilitation Research Centre, Epworth Hospital, Richmond</u>, and will be held for at least five years from the date indicated below:

Date:

Signature 1:

04/02/2019

Signature 2:

04/02/2019

Signature 3:

04/02/2019

Signature 4:

04/02/2019

Signature 5:

04/02/2019

6.2   ABSTRACT

Objective: The current study examined the association of demographic/pre-injury, injury-related and Cognitive Behaviour Therapy (CBT) process variables, with anxiety and depression symptom change in Traumatic Brain Injury (TBI) adapted CBT (CBT-ABI). Method: The audio-recordings of 177 CBT-ABI sessions representing 31 therapist-client dyads were assessed from the independent observer perspective on measures of working alliance, homework engagement and therapist competency in using homework. Results: Linear regressions showed that older client age, longer post-TBI recovery period, better executive functioning, higher levels of client homework engagement, as well as higher levels of therapist competence in reviewing homework, were associated with greater improvement in anxiety and/or depression symptoms. Conclusions: CBT-ABI is a promising treatment for post-TBI depression and anxiety. The current study highlights how therapists can enhance CBT-ABI effectiveness, specifically: comprehensive facilitation of client homework engagement with emphasis on homework review, and accommodation of executive deficits. Furthermore client age and length of post-TBI recovery period are factors to take into consideration when determining CBT-ABI treatment timing.

Keywords: Psychotherapeutic Processes; Treatment Outcome; Working Alliance; Homework; Therapist Competence; Head Injury; Mood Disorders

6.3   INTRODUCTION

Cognitive Behaviour Therapy (CBT) is currently considered best-placed for treatment of depression and anxiety post-TBI (Fann et al., 2009; Soo & Tate, 2007). Studies have adapted CBT to accommodate TBI specific cognitive needs (Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Ponsford et al., 2016), and its efficacy in reducing depression and/or anxiety symptoms has been demonstrated. However adapted CBT has not consistently shown a treatment effect (Ashman et al., 2014; Fann et al., 2015) and more research is needed to determine how CBT can be optimized in the TBI population.

Studies examining predictors of treatment response in TBI-adapted CBT are limited and have focused on client factors (Anson & Ponsford, 2006b; Hsieh, Ponsford, Wong, & McKay, 2012; Ponsford et al., 2016). The only pre-injury variable examined across these studies was premorbid IQ. The demographic variables of age at study entry, gender or education were not investigated. Anson and Ponsford (2006b) found higher premorbid IQ to be associated with greater improvement in depression symptoms in a CBT-based Coping Skills Group. Hsieh et al. (2012) found no significant correlation between change in anxiety symptoms and premorbid IQ in a CBT-based anxiety treatment. The same studies have also examined a variety of brain injury-related variables (e.g., time since injury, injury severity and cognitive functioning). Anson and Ponsford (2006b) found greater Post Traumatic Amnesia (PTA) duration, and better memory functioning, were associated with less improvement in depression symptoms. Time since injury was not associated with symptom change. Hsieh et al. (2012) found no significant correlation between greater anxiety reduction and executive functioning. However association with memory functioning and PTA duration approached significance ($p = .11$ and $p = .08$ respectively).

The influence of pre-treatment symptom severity has also been investigated. Anson and Ponsford (2006b) found less improvement in depression symptoms was associated with greater pre-intervention depression, whereas improvement in depression symptoms was associated with higher anxiety prior to intervention. Hsieh et al. (2012) found no significant correlation between anxiety

symptom change and baseline anxiety levels. Ponsford et al. (2016) found higher anxiety and depression levels at baseline to be significantly associated with a better treatment response.

Effective CBT is dependent upon numerous in-session processes, the most researched of which in non-brain-injured cohorts are the working alliance, homework compliance, and therapist competence. Consistent with previous meta-analyses, a recent meta-analytic synthesis by Flückiger et al. (2018) demonstrated a moderate and robust relationship between alliance and CBT outcome, accounting for approximately 8% of treatment response (Fluckiger et al., 2012; Horvath et al., 2011; Martin et al., 2000).

A robust relationship between homework compliance and CBT outcome has been established across a series of meta-analyses (Kazantzis, Luong, et al., 2018; Mausbach et al., 2010), and there is evidence for significant contributions of both homework quantity and quality (i.e., skill acquisition) to symptom reduction at post-CBT and follow-up (Kazantzis et al., 2016). Theoretically, various beliefs can potentially drive a client's level of homework quantity and quality (Kazantzis & L'Abate, 2005). Therefore an exclusive focus on homework compliance (i.e., quantity) provides a narrow representation of this complicated therapy process (Holdsworth et al., 2014). Arguably the study of CBT homework requires consideration of quantity, quality and client homework beliefs (e.g., perceptions of the difficulty and obstacles in completing the task) (Kazantzis, Deane, & Ronan, 2004). This combination of factors will be referred to as homework *engagement* henceforth, to be distinguished from homework compliance.

The relationship between CBT treatment outcome and therapist competence is relatively less clear. Although several studies have demonstrated significant relationships (Kuyken & Tsivrikos, 2008; Strunk et al., 2010), a meta-analytic review by Webb et al. (2010) showed therapist competence (measured as a broad construct by trained observer raters) was not related to patient psychotherapy outcome. Despite the evident homework-outcome relations in CBT, comparatively fewer studies have examined the specific relationship between therapist competence in using homework and symptom change (Willner-Reid et al., 2016). A study by Detweiler-Bedell and Whisman (2005) found that greater client involvement in the assignment of homework was

associated with lower depression levels at mid-therapy. Therapists' use of concrete goal setting for homework and provision of written reminders was also associated with lower depression levels and better functioning at post-treatment and follow up.

The only studies examining working alliance and therapy compliance (e.g., in-session participation, following therapist's advice) in brain-injured participants have been in the context of neuropsychological rehabilitation (Schönberger, Humle, et al., 2006a; Schönberger, Humle, Zeeman, et al., 2006; Sherer et al., 2007). CBT process research utilizing the observer perspective has not been undertaken in a TBI sample. Therefore, there is a gap in the evidence base to inform clinicians' effective delivery of TBI-adapted CBT.

The present study aimed to identify the association of: 1) demographic/pre-injury (i.e., gender, age at study entry, education level and premorbid IQ); 2) injury-related (i.e., years since injury, PTA duration, memory/executive functioning); and 3) CBT processes (i.e., working alliance, homework engagement and therapist competence in using homework) with depression and anxiety symptom change in patients undertaking TBI adapted CBT (CBT-ABI; Ponsford et al., 2016; Wong et al., in press). It was hypothesized that greater symptom improvement would be associated with 1) higher pre-morbid IQ; 2) more years since injury, shorter PTA duration and better performance on cognitive functioning tests; and 3) stronger working alliance and higher levels of homework engagement. The examination of gender, age at study entry, education and therapist competence in using homework was exploratory.

6.4 METHOD

6.4.1 Parent study.

A randomized controlled trial (RCT) by Ponsford et al. (2016) (i.e., parent RCT) examined motivational interviewing as a pre-intervention to CBT-ABI. The CBT-ABI treatment was manualised (Wong et al., in press) and delivered by psychologists over nine sessions. Seventy-five participants with TBI experiencing clinically significant depressive and/or anxiety symptoms were recruited in total.

A total of 177 CBT-ABI audio recordings, representing 31 client-therapist dyads from the parent RCT, were available for the current study. This was due to a subset being lost to technological failures. Therapists had no involvement in session selection. Corresponding participant demographic/pre-injury and injury related information collected in the parent RCT was also utilized in the current study. CBT-ABI sessions were distributed over each therapy stage as follows: sessions 1-3, $n = 65$; sessions 4-6, $n = 59$ and; sessions 7-9, $n = 53$.

6.4.2   Measures.

6.4.2.1   Outcome - anxiety and depression symptom change.

In the parent RCT anxiety levels were measured using the Hospital Anxiety and Depression Scale (HADS) – Anxiety subscale (Zigmond & Snaith, 1983). Depression levels were measured using the Depression Anxiety Stress Scales (DASS) – Depression subscale (Lovibond & Lovibond, 1995). These subscales were chosen because they have demonstrated the greatest sensitivity to anxiety and depression symptoms respectively in individuals with TBI (Dahm et al., 2013; Schönberger & Ponsford, 2010; Wong et al., 2013). Anxiety and depression symptoms were assessed at pre and post CBT-ABI.

The HADS-Anxiety subscale is a 7-item self-assessment scale (Zigmond & Snaith, 1983) scaled from 0 (*not at all/very little/definitely*) to 3 (*most of the time/very often/not at all*). The patient endorses items based on how they have been feeling in the past week. Higher scores indicate worse anxiety levels. The DASS-Depression subscale (Lovibond & Lovibond, 1995) is a 14-item self-assessment scale, scaled from 0 (*did not apply to me at all*) to (3 = *applied to me very much, or most of the time*). The patient rates the extent to which they have experienced each symptom over the past week. Higher scores indicate worse depression levels.

6.4.2.2   Predictors – demographic/pre-injury and injury-related.

Demographic/pre-injury (i.e., gender, age at study entry, years of education and pre-morbid IQ) and injury-related (i.e., years since injury, days in PTA and performance on memory/executive

functioning tests) variables were collected in the parent RCT at pre CBT-ABI. Pre-morbid IQ was measured using the National Adult Reading Test (NART; Nelson & Willison, 1991). Memory functioning was measured using total words recalled from trials 1-5 of the BIRT (Coughlan et al., 2007). Executive functioning was measured using response latency in seconds from section two of the Hayling Sentence Completion test (Burgess & Shallice, 1997).

6.4.2.3   Predictors - CBT processes.

Working alliance strength was measured using the Working Alliance Inventory – Short-Form Revised – Observer version (WAI-SR-O; Kazantzis, Cronin, Farchione, & Dobson, 2018). The WAI-SR-O has 12 items scaled from 1 (*always*) to 5 (*seldom*). Observer ratings were based on consideration of both the frequency and impact of missing relational elements over the entire CBT-ABI session. The total scale score was utilized in the current study (12 = strongest alliance, 60 = weakest alliance). Preliminary psychometric evaluation (Kazantzis, Cronin, et al., 2018) shows the scale has excellent internal consistency and reliability.

Client homework engagement was measured using the Homework Rating Scale-Revised (HRS-II; Kazantzis, Deane, Ronan, & L'Abate, 2005). This scale measures client's homework quantity, quality and beliefs. The HRS-II is a 12-item measure scaled from 0 (*not at all*) to 4 (*extensively/extremely/completely*). HRS-II total score was utilized in the current study (0 = no homework engagement, 48 = complete homework engagement). The HRS-II observer version has achieved excellent internal consistency (α = .86) and inter-rater reliability (ICC = .83) in preliminary psychometric evaluation (Kazantzis, Zelencich, et al., 2018), as have the client and therapist versions (Hara et al., 2015; A. C. Kelly & Carter, 2015; Sachsenweger et al., 2015).

Therapist competence in using homework was assessed with the Homework Adherence and Competence Scale (HAACS; Kazantzis et al., 2006). The HAACS is a 19-item measure, scaled from 0 (*non-adherent/extremely poor*) to 6 (*excellent*), comprised of three subscales that target specific therapist behaviors in homework review, design and assign. An overall competence score (i.e., 0 to 6) for each subscale was utilized in our study. Psychometric evaluation (Cummins, 2013;

Kazantzis et al., 2006; Sachsenweger et al., 2015) has shown excellent inter-rater reliability (ICC = 0.91) and internal consistency (α = .76 - .91).

6.4.3   Observer rater training.

Specialized training (approx. 41 hours) in all CBT process scales was delivered to the primary researcher (L.Z.), including didactic instruction and practice ratings. Inter-rater reliability was calculated for each practice session and rating guidance was provided throughout training. The Finn's r (Finn, 1970) statistic was utilized for reliability assessment to accommodate non-normally distributed data (Tinsley & Weiss, 2000; Whitehurst, 1984). A cut-off of Finn's $r \geq 0.80$ was considered adequate (Fleiss et al., 2013; Streiner et al., 2015).

The primary researcher assessed a selection of CBT-ABI sessions with the scales, which served as practice sessions for the purpose of co-rater training. The primary researcher delivered the same training to a co-rater (advanced psychology graduate). Raters were only permitted to proceed with main data collection when adequate inter-rater reliability (Finn's $r \geq 0.80$) was obtained for all scales.

6.4.4   Main data collection.

In the current study data was collected through observer coding of the audio-recorded CBT-ABI sessions. The primary researcher assessed all CBT-ABI sessions with the working alliance scale, and sessions involving homework with one or both of the homework scales. A randomly selected subset of sessions were co-rated and re-rated for inter-rater and within-rater reliability calculation. Re-ratings for this subset occurred at least 3 months after the original ratings.

6.4.5   Compliance with ethical standards.

All procedures performed were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual

participants included in the study. Ethics approved by Monash University Human Research Ethics Committee – project no. 9670.

6.4.6 Data analyses.

An average score for all CBT process variables was utilized in analyses (i.e., HRS-II total score, WAI-SR-O total score and HAACS total score of each subscale). To check for the possibility of multicollinearity, correlational analyses between pairs of predictors within each variable group were undertaken. Linear regressions with a robust Huber-White sandwich estimator (Huber, 1967; White, 1984) were then utilized. All statistical analyses were conducted in Stata 15.1 (StataCorp, 2017).

Interactions were investigated to ascertain whether predictor variables were differentially associated with time-point (i.e., pre and post CBT-ABI). Only predictor variables with a statistically significant ($p \leq .05$) time interaction, accompanied by comparatively lower Akaike Information Criterion (AIC) <u>and</u> Bayesian Information Criterion (BIC) values (Harrell, 2015), were investigated further (i.e., by conducting separate regressions for pre and post CBT-ABI symptom scores). Based on locally weighted scatterplot smoothing (Cleveland, 1979, 1993), appropriate terms were added to the regression models for those variables with a curvilinear trend (e.g., quadratic). AIC and BIC values of both linear and quadratic trends were then compared, with and without time-point interaction, to ascertain which model provided the best fit.

In the case of no time-point interaction, regressions with robust Huber-White sandwich estimator allowed modeling of the symptom change scores, whilst also taking the actual pre and post CBT-ABI symptom scores into account (Tabachnick & Fidell, 2013). Potential predictors were chosen using $p \leq .10$. This conservative p value (Hosmer Jr, Lemeshow, & Sturdivant, 2013) was chosen to limit final model variable numbers in the context of a relatively small sample size. Variables meeting that criterion were then entered together into a final model, in which statistical significance was re-defined as $p \leq .05$.

6.5 RESULTS

6.5.1 Session and participant characteristics.

The current sample was older and had slightly lower anxiety symptoms compared to those participants with unavailable audio recordings (see Table 6.1).

Table 6.1 *Comparison of participant characteristics at pre CBT-ABI, for both unavailable and available audio recorded CBT-ABI sessions*

Variable	Unavailable audio-recordings ($n = 44$)			Available audio-recordings (i.e., current study; $n = 31$)		
	M	*SD*	Range	*M*	*SD*	Range
Gender	75% male			71% male		
Age at study entry**	38.66	12.85	21-77	47.32	15.26	19-69
Education (years)	12.85	3.67	6-22	12.69	3.21	7-19
Years since injury	4.27	9.37	0-57	2.97	4.70	0-20
PTA duration (days)	22.00	25.15	0-120	22.08	20.51	0-65
HADS-Anxiety**	11.75	4.19	3-20	9.21	4.33	3-21
DASS-Depression	17.88	11.44	0-42	16.93	12.40	1-41

Note: DASS – Depression, Anxiety & Stress Scales; HADS – Hospital Anxiety & Depression Scale; PTA – Post-Traumatic Amnesia; **$p \leq .05$

Participants ($n = 31$) in the current study had an average pre-morbid IQ of 111.03 ($SD = 8.84$). An average Hayling section 2 response time (Burgess & Shallice, 1997) of 76.55 seconds ($SD = 61.95$) placed participants in the 'low' to 'moderate average' executive functioning range. An average total words recalled of 40.79 ($SD = 15.21$) on trials 1-5 of the Brain Injury Rehabilitation Trust Memory & Information Processing Battery (BIRT: Coughlan, Oddy, & Crawford, 2007) placed participant memory functioning in the 10th to 25th percentile, relative to the normative sample.

Anxiety symptoms at pre CBT-ABI ranged from normal to severe (M = 9.61, SD = 3.85; Min = 3 to Max = 17), and by post CBT-ABI were in the normal to moderate range (M = 8.24, SD = 3.63; Min = 1 to Max = 14). Depression symptoms ranged between normal and very severe at both pre (M = 17.23, SD = 9.89; Min = 2 to Max = 38) and post (M = 14.24, SD = 10.43; Min = 0 to Max = 38) CBT-ABI.

6.5.2   CBT process scale reliability.

All 177 audio-recorded CBT-ABI sessions were assessed with the WAI-SR-O. Over half (99; 55.9%) of the CBT-ABI sessions involved review of homework and were assessed with the HRS-II. A total of 143 (80.8%) of the recordings involved review and/or assignment of homework and were assessed with the HAACS. The co-rater assessed 15.3% of sessions with the WAI-SR-O, 7.1% with the HRS-II and 15.4% with the HAACS. The primary researcher re-rated 25.4% of sessions with the WAI-SR-O, 23.2% with the HRS-II, and 26.6% with the HAACS. Adequate within-rater and inter-rater reliability was achieved (Finn's $r \geq 0.80$) for all CBT process scales.

6.5.3   Preliminary analyses.

CBT process scale score descriptive statistics are presented in Table 6.2.

Table 6.2 *CBT process measure session mean range across 9 CBT-ABI sessions*

Measure	Min M (SD) to Max M (SD)	Min	Max
WAI-SR-O	19.20 (4.39) - 23.67 (6.97)	13	37
HRS-II	20.30 (7.06) - 25.08 (7.77)	5	38
HAACS-review	2.08 (1.31) - 3.38 (1.12)	0	5
HAACS-design	2.29 (1.07) - 3.38 (0.50)	0	5
HAACS-assign	1.21 (1.05) - 2.46 (0.66)	0	4

Note: WAI-SR-O – Working Alliance Inventory – Short-Form Revised – Observer version (12 = strongest alliance, 60 = weakest alliance); HRS-II – Homework Rating Scale – Revised (0 = no engagement, 48 = complete engagement); HAACS – Homework Adherence and Competence Scale (0 = extremely poor, 6 = excellent)

Correlational analyses found gender and age at study entry were significantly associated (t_{29} = -2.47, p < .05). Females (M = 57.11, SD = 13.82) were on average 13.79 years older than males (M = 43.32, SD = 14.22) at study entry. Years since injury and BIRT score were found to be significantly and positively correlated (r = 0.37, $p \leq$ .05), suggesting that a greater number of years since injury was associated with better memory functioning. WAI-SR-O and HRS-II scores were significantly negatively correlated (r = -0.51, $p \leq$ .05), suggesting that a higher level of homework engagement was associated with a stronger working alliance (i.e., lower alliance score).

6.5.4   Anxiety symptom change.

All anxiety symptom change analyses utilized linear regression with Huber-White robust estimation, without time interaction (see Table 6.3).

6.5.4.1   *Demographic/pre-injury variables.*

Only age at study entry was significantly associated with change in HADS-Anxiety score, $F(2, 29)$ = 3.42, $p \leq$ .05, and accounted for 12.8% of its variance. Specifically, older age was associated with greater improvement in anxiety symptoms by post CBT-ABI.

6.5.4.2   *Injury-related variables.*

Only executive functioning (i.e., Hayling response time) was significantly associated with change in HADS-Anxiety score, $F(2, 27)$ = 8.50, $p \leq$ .005, and accounted for 20.28% of variance. Specifically, poorer executive functioning was associated with less improvement in anxiety by post CBT-ABI.

6.5.4.3   *CBT process variables.*

Homework engagement (i.e., HRS-II score) was significantly associated with change in HADS-Anxiety, $F(2, 22)$ = 3.86, $p \leq$ .05, accounting for 15.10% of variance. Specifically, a higher level of homework engagement was associated with greater improvement in anxiety symptoms by post CBT-ABI.

Therapist competence in reviewing homework (i.e., HAACS-review score) was also significantly associated with change in HADS-Anxiety score, $F(2, 22) = 11.56$, $p \leq .005$, accounting for 28.27% of variance. Specifically, higher level of therapist competence in reviewing homework was associated with greater improvement in anxiety symptoms by post CBT-ABI.

6.5.4.4   *Final model.*

Linear regression was repeated and included age at study entry, Hayling response time, HRS-II and HAACS-review. This final model explained 44.09% of variance in change in HADS-Anxiety score, $F(5, 21) = 4.43$, $p \leq .05$. When entered into the final model together, only Hayling ($p \leq .05$) remained statistically significant. Mean HADS anxiety at pre CBT-ABI, adjusted for the final model, was 9.90, 95% CI = 7.86 to 11.95. Mean HADS anxiety at post CBT-ABI, adjusted for the final model, was 8.09, 95% CI = 6.98 to 9.20.

Table 6.3 *HADS-anxiety regressions for demographic/pre-injury, injury-related and CBT process variables*

Predictor Variables	Coeff.	95% CI	
Demographic/pre-injury group			
Gender[a]	0.23	-2.32	2.78
Age at study entry[a]	-0.09*	-0.18	-0.00
Education[a]	0.18	-0.13	0.48
Premorbid IQ[b]	-0.09	-0.29	0.10
Injury-related group			
Years since injury[a]	-0.00	-0.18	0.18
PTA[c]	0.02	-0.06	0.10
Hayling[d]	0.03**	0.01	0.04
BIRT[e]	0.02	-0.06	0.10
CBT process group			
WAI-SR-O[a]	0.11	-0.15	0.37
HRS-II[f]	-0.27^	-0.56	0.03
HAACS-review[f]	-3.38***	-5.26	-1.50
HAACS-design[b]	-0.72	-2.46	1.02
HAACS-assign[b]	0.17	-1.74	2.07
Final model[g]			
Time	-1.81^	-3.76	0.13
Age at study entry	-0.07	-0.17	0.03
Hayling	0.02*	-0.00	0.05
HRS-II	-0.13	-0.48	0.22
HAACS-review	-1.53	-4.43	1.37

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$; ^$p \leq 0.10$; Coeff. = unstandardized regression coefficient.; [a]n = 30; [b]n = 26; [c]n = 25; [d]n = 28; [e]n = 27; [f]n = 23; [g]n = 22

6.5.5 Depression symptom change.

All analyses of depression symptom change were conducted using linear regression, without time interaction (see Table 6.4), with the exception of age at study entry and BIRT score.

6.5.5.1   Demographic/pre-injury variables.

Quadratic regression, without time interaction, indicated that only age at study entry was significantly associated with change in DASS-Depression score $F(3, 29) = 4.81$, $p \leq .05$, accounting for 18.63% variance. Specifically, older age was associated with greater improvement in depression symptoms by post CBT-ABI.

6.5.5.2   Injury-related variables.

Years since injury was significantly associated with change in DASS-Depression score, $F(2, 29) = 5.04$, $p \leq .05$, accounting for 7.91% of variance. Specifically, longer duration since injury was associated with greater improvement in depression symptoms post CBT-ABI.

Executive functioning (i.e., Hayling response time) was also significantly associated with change in DASS-Depression score, $F(2, 27) = 2.42$, $p \leq .10$, accounting for 10.12% of variance. Specifically, poorer executive functioning was associated with less improvement in depression symptoms by post CBT-ABI.

The relationship between BIRT trials 1-5 score (i.e., memory functioning) and DASS-Depression score showed a statistically significant time-point interaction: $F(3, 26) = 3.08$, $p \leq .05$, accounting for 14.94% variance. Since this relationship was likely dependent upon time-point, separate regressions for pre CBT-ABI and post CBT-ABI were conducted. BIRT was found to be significantly associated with pre-CBT DASS-Depression score, $F(1, 24) = 5.59$, $p \leq .05$, accounting for 18.09% variance. Specifically, better performance on the BIRT at pre CBT-ABI was associated with lower levels of depression at pre CBT-ABI. However, BIRT score was not significantly associated with post CBT-ABI DASS-Depression score ($p \geq .10$).

6.5.5.3   CBT process variables.

Only homework engagement (i.e., HRS-II score) was significantly associated with change in DASS-Depression score, $F(2, 22) = 7.24$, $p \leq .005$, accounting for 20.69% of variance.

Specifically, a higher level of homework engagement was associated with greater improvement in depression symptoms by post CBT-ABI.

6.5.5.4 Final model.

Linear regression was repeated and included age at study entry, Hayling response time and HRS-II. This final model explained 35.73% of variance, $F(5, 21) = 4.11$, $p \leq .05$. When entered into the model together, only HRS-II remained statistically significant ($p \leq .05$). Mean DASS depression at pre CBT-ABI, adjusted for the final model, was 17.17, 95% CI = 11.74 to 22.60. Mean DASS depression at post CBT-ABI, adjusted for the final model, was 14.12, 95% CI = 10.69 to 17.54.

Table 6.4 *DASS-depression regressions for demographic/pre-injury, injury-related and CBT process variables*

Predictor Variables	Coeff.	95% CI	
Demographic/pre-injury group			
Gender[a]	-0.72	-9.57	8.13
Age at study entry (quadratic)[a]	-0.02**	-0.03	-0.00
Education[a]	-0.27	-1.50	0.96
Premorbid IQ[b]	-0.25	-0.78	0.28
Injury-related group			
Years since injury[a]	-0.54**	-0.92	-0.16
PTA[c]	0.02	-0.20	0.24
Hayling[d]	0.05^	-0.00	0.10
BIRT (with time interaction)[e]	0.45**	0.12	0.77
CBT process group			
WAI-SR-O[a]	0.54	-0.15	1.24
HRS-II[f]	-0.91**	-1.60	-0.23
HAACS-review[f]	-4.93	-11.20	1.34
HAACS-design[b]	-1.21	-4.83	2.41
HAACS-assign[b]	3.45	-1.93	8.83
Final model[g]			
Time	-3.05	-8.60	2.49
Age at study entry	0.49	-1.12	2.11
Age at study entry_quad	-0.01	-0.02	0.01
Hayling	0.05	-0.02	0.12
HRS-II	-0.81*	-1.52	-0.09

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$; ^$p \leq .10$; Coeff. - unstandardized regression coefficient; [a]n = 30; [b]n = 26; [c]n = 25; [d]n = 28; [e]n = 27; [f]n = 23; [g]n = 22

6.6   DISCUSSION

Variables individually associated ($p < .10$) with greater improvement in both anxiety and depression symptoms in CBT-ABI were older age, better executive functioning and higher levels of homework engagement. Higher level of therapist competence in homework review was associated with greater improvement in anxiety symptoms only. Longer post-TBI recovery period was associated with greater improvement in depression symptoms only. Once entered into a final model only Hayling response time and homework engagement remained significantly associated ($p < .05$) with anxiety and depression symptom change respectively. Pre-morbid IQ, PTA duration, memory functioning and working alliance were not associated with symptom change.

6.6.1   Association of demographic/pre-injury variables with symptom change.

Gender was not found to be associated, which suggests that both males and females can benefit from CBT-ABI. Older age was associated with greater improvement in both anxiety and depression symptoms. Previous studies of clients with cognitive impairment (Sherer et al., 2007; Thomas, Rossell, Farhall, Shawyer, & Castle, 2011) found no association of age with outcome. Therefore the current result may reflect a relationship unique to CBT-ABI in the treatment of depression and anxiety post-TBI. The finding suggests that older participants have capacity to apply a greater wealth of life experience to CBT-ABI engagement. For example, more evidence (i.e., life experience) to draw upon in order to challenge unhelpful thoughts and formulate effective alternate thoughts.

Education was not associated with symptom change, which is in keeping with findings from Sherer et al. (2007). Contrary to our prediction, pre-morbid IQ was also not associated with symptom change. A lack of association with anxiety symptoms is consistent with previous research (Anson & Ponsford, 2006b; Hsieh et al., 2012), however Anson and Ponsford (2006b) found higher premorbid IQ to be associated with improvement in depression symptoms in group CBT. This inconsistency may be related to Anson and Ponsford (2006b) having relatively more variability in

participant premorbid IQ scores. The current findings suggest that level of education and premorbid IQ do not necessarily pose an obstacle to symptom improvement in CBT-ABI.

6.6.2   Association of injury-related variables with symptom change.

A greater number of years post-injury was associated with greater improvement in depression symptoms by post CBT-ABI. This finding partially supported our hypothesis, as anxiety symptom change was not associated with time post-injury. More time post-injury possibly means greater potential for depression symptom reduction, due to the necessary role of time in the development of hopelessness. Indeed, Schönberger, Humle, et al. (2006b) found that improved awareness lead to increased depression during neuro-rehabilitation treatment for people with brain injury. It is possible this is less applicable to anxiety symptoms because over a longer timeframe ineffective anxiety coping strategies (i.e., avoidance) are actually likely to further contribute to depression symptomatology (i.e., social isolation and withdrawal from usual activities).

Contrary to our prediction, PTA duration was not associated with either anxiety or depression symptom change. A lack of association with anxiety symptoms is consistent with previous research (Anson & Ponsford, 2006b; Hsieh et al., 2012). The current finding is important as it suggests that greater injury severity does not necessarily pose an obstacle to anxiety and depression symptom improvement in CBT-ABI.

Unlike the current study, Anson and Ponsford (2006b) did not find an association of years post-injury and depression symptom change, but did find lower injury severity to be related to greater improvement in depression symptoms. Both inconsistencies with current findings may be related to the Anson and Ponsford (2006b) study having relatively less variability in participant years post-injury and more variability in PTA duration.

Poorer executive functioning was associated with less improvement in both anxiety and depression symptoms by post CBT-ABI, thereby supporting our hypothesis. In studies of CBT for older adults with Generalized Anxiety Disorder (Mohlman, 2013; Mohlman & Gorman, 2005), better executive functioning has been found to be associated with greater decrease in anxiety and

overall psychological distress. On the other hand Hsieh et al. (2012) did not find such a relationship utilizing Hayling error score, a skewed variable with limited variability. In using Hayling response time as the executive function measure, the current study had significantly more variability in scores, which likely increased sensitivity to detect a significant association. In keeping with the current study medical research has also found executive dysfunction to be a predictor of poor response to anti-depressant treatment (Pimontel et al., 2016). The current finding suggests that greater therapist efforts may be needed to circumvent or address executive impairments in therapy.

The current study showed better memory functioning (i.e., BIRT score) was only associated with pre CBT-ABI depression levels, not post CBT-ABI depression. This limits interpretation of the main effects between memory functioning and depression symptom change. This relationship requires further examination in future research.

6.6.3 Association of CBT processes with symptom change.

Contrary to our hypothesis, working alliance was not associated with anxiety or depression symptom change. This result is surprising, considering the consistency in alliance-outcome relations in prior psychotherapy research (Flückiger et al., 2018). Furthermore in the neuro-rehabilitation context, Schönberger, Humle, et al. (2006b) found that clients' experience of a good emotional bond mid-therapy was related to greater depression symptom reduction by post-treatment. However, Weck et al. (2013) found no association between alliance and homework compliance in maintenance Cognitive Therapy for depression, and identified lack of alliance score variance as a possible explanation. On average, alliance was strong and stable across CBT-ABI sessions in the current study, therefore it is possible there was not enough variance to predict symptom change.

A higher level of homework engagement was associated with greater improvement in both anxiety and depression symptoms by post CBT-ABI, thereby supporting our hypothesis. This is in keeping with meta-analyses examining homework-outcome relations in non-brain injured participants (Kazantzis et al., 2000; Kazantzis, Luong, et al., 2018; Kazantzis et al., 2010;

Kazantzis et al., 2016; Mausbach et al., 2010). Without homework new skills cannot be generalized to the client's life (J. S. Beck, 2011). Therefore for a therapist delivering CBT-ABI, facilitation of homework engagement is a treatment priority.

Therapist competence in designing or assigning homework was not associated with anxiety or depression symptom change. This is inconsistent with Detweiler-Bedell and Whisman (2005) who found several homework design and assign strategies to be associated with lower depression levels at post-treatment and follow up. In the current study higher therapist competence in reviewing homework was associated with greater improvement in anxiety symptoms by post CBT-ABI, but not in depression symptoms. Detweiler-Bedell and Whisman (2005) also found a trend, albeit non-significant, for more client involvement in homework review to be associated with better life functioning at follow-up (i.e., 2 years). However anxiety was not examined in their study.

There is an overall lack of research specifically examining the therapist homework competence-symptom change relationship, particularly in the treatment of anxiety. Even examination of the general competence-symptom change relationship involves less focus on anxiety, relative to depression (Webb et al., 2010). An exception is a study by Huppert, Barlow, Gorman, Shear, and Woods (2006) who found therapist CBT protocol adherence and client motivation interacted significantly to predict change in panic symptoms.

Therefore it is difficult to speculate as to why therapist competence in review of homework was associated with anxiety, but not depression, in the current study. According to the HAACS review items a competent therapist provides more positive reinforcement for the client's homework efforts, forms a greater understanding of homework related beliefs, and comprehensively problem-solves barriers to homework engagement. These behaviours likely reduce fears related to coping with tasks, and anxiety symptoms are possibly more responsive to this reassurance and empowerment.

6.6.4 Limitations and directions for future research.

Although 177 CBT-ABI sessions were utilized in the current study, results are considered preliminary as this represented a relatively small client sample ($n = 31$). Non-significant findings may be due to low statistical power or could indicate that certain variables do no impact symptom change in CBT-ABI. Replication with larger sample sizes is required.

All CBT process scales were relatively new and originally developed with non-brain injured clients. While they appear to have performed reliably in the current study, continued research is needed to verify the suitability of such scales in a brain-injured population. Furthermore, working alliance and homework engagement scale total scores were utilized in analyses. Future studies may consider further factor analytic evaluation of the scales and examination of association of subscale scores with symptom change. Indeed Schönberger, Humle, et al's. (2006b) signficant alliance-outcome finding was based on the emotional bond subscale of the WAI.

The significant association between more years post-TBI and greater depression symptom improvement could reflect the impact of increasing self-awareness over time post-injury. Anson and Ponsford (2006b) found that self-awareness of brain injury-related deficits contributed the greatest unique proportion of variance to change in depression following treatment, speculating that increased self-awareness drove client motivation for treatment. The current study did not assess participant self-awareness. Future research could further explore its association with symptom change in CBT adapted for cognitive deficits.

This study highlights the demographic and brain injury specific characteristics that are important to consider in determining suitability of CBT-ABI treatment timing. Specifically older age, a greater recovery period post-injury and better executive functioning were all associated with greater symptom improvement. Importantly, neither greater injury severity nor lower education or IQ impeded benefit from CBT-ABI. The current study reinforces the homework-outcome relationship, and demonstrates that this extends to CBT adapted for TBI. Findings highlight the

importance of therapists comprehensively attending to accommodation of executive deficits, and facilitation of client homework engagement, in order to maximize treatment effectiveness.

6.7　ACKNOWLEDGEMENTS

CHAPTER SEVEN

GENERAL DISCUSSION

7.1 THESIS OUTLINE AND AIMS

Traumatic brain injury (TBI) can have a devastating impact, resulting in a broad range of physical, cognitive, behavioural and emotional sequelae. Cognitive impairments in the domains of attention, memory and executive functioning appear to be the most debilitating, impacting participation in work or study, social and leisure activities, and relationships. Attempts by the person with TBI to integrate back into their previous life roles whilst experiencing these impairments can significantly challenge their sense of identity and social connectedness. This renders them vulnerable to the development of psychopathology, particularly anxiety and mood disorders. In people with TBI, these conditions present at rates higher than the general population, and disorder co-morbidity is common (Alway et al., 2016). Anxiety and depression have the potential to negatively impact quality of life, hinder rehabilitation efforts and increase suicide risk (Goldstein & Diaz-Arrastia, 2018; Madsen et al., 2018). Therefore effective treatment for these disorders post-TBI is essential.

Cognitive Behaviour Therapy (CBT) has been identified as having the strongest evidence for the treatment of psychological disorders following brain injury (Khan-Bourne & Brown, 2003; Fann et al., 2009; Klonoff, 2010; Ponsford, Sloan, & Snow, 2012). Several RCTs have found that CBT, reportedly adapted for brain-injury associated cognitive impairment, can reduce anxiety and/or depression symptoms (Bédard et al., 2014; Hodgson et al., 2005; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Ponsford et al., 2016; Tiersky et al., 2005). However findings are mixed (Ashman et al., 2014; Fann et al., 2015), and methodological issues across the small number of studies means interpretation of these results is limited.

Specifically, it is difficult to determine the impact of treatment as not all RCTs have delivered stand alone CBT. Furthermore the specific interventions delivered (e.g., relaxation, behavioural activation etc.) have generally not been reported. On the other hand adaptations to treatment delivery to accommodate brain injury associated cognitive deficits are often described, but with varying levels of detail. Most importantly, RCTs have not provided empirical support for

the implementation of both CBT interventions and the adaptations utilised to deliver them. Therefore what therapists deliver to clients and how it is adapted is currently unknown.

Studies examining predictors of treatment response in TBI-adapted CBT are very limited (Anson & Ponsford, 2006b; Hsieh et al., 2012; Ponsford et al., 2016). Furthermore no studies have examined the role of integral CBT processes. The working alliance has been consistently associated with CBT outcome (Flückiger et al., 2018), accounting for approximately 8% of treatment response. The homework-outcome relationship is also well established in CBT (Kazantzis, Luong, et al., 2018; Kazantzis et al., 2016). TBI associated cognitive and behavioural impairments have the potential to hinder these processes. Therefore examination of these processes could empower therapists with the knowledge needed to enhance client engagement with CBT, and ultimately CBT outcome.

There is a need to better understand the modifiable factors that may reduce anxiety and depression more effectively in the TBI population. This doctoral thesis had two overarching research questions: 1) How do therapists tailor CBT to people with TBI? 2) What are the factors that impact capacity to engage in and benefit from TBI adapted CBT?

7.2   1) HOW DO THERAPISTS TAILOR CBT TO PEOPLE WITH TBI?

A recent review by Gallagher et al. (2016) was the first to examine how recommended adaptations are reportedly being implemented in CBT for psychological issues post brain injury. The review identified numerous adaptations and the number of intervention studies in which they were reported. The authors acknowledged that it is currently impossible to determine how therapists actually interpret and apply adaptations in-session. Direct observation of therapist behaviour is necessary in order to address this research gap. However observation is currently impeded by the lack of an appropriate measure. Studies 1 and 2 sought to develop measures assessing which CBT interventions were delivered by therapists, and how delivery was adapted for TBI associated cognitive deficits in a recently conducted trial of TBI adapted CBT (CBT-ABI;

Wong et al., in press). Intervention and adaptation use was then explored in relation to client characteristics in order to identify how treatment was tailored to the participants.

7.2.1   Therapist CBT-ABI module use.

The parent RCT utilised a modular CBT-ABI program, with each module encompassing a different intervention. We aimed to: 1) create a checklist that could reliably measure CBT-ABI module use; 2) describe therapist module use in the parent RCT, and explore module use relationships with (a) clinical (i.e., presenting symptoms) and (b) TBI-related variables (i.e., years since brain injury, executive functioning, memory functioning and brain injury severity).

Checklist content selection was based directly on the parent RCT therapist manual for the trial. The Module Identification checklist assessed therapist use of the following modules: Module 1 - assessment feedback & psycho-education; 2 - relaxation; 3 - behavioural activation; 4 - thinking strategies; 5 - graded exposure; 6 - structured problem solving; 7 - mindfulness/acceptance, and; 8 - relapse prevention. Adequate inter-rater agreement was obtained during pilot testing for the checklist (86.5% overall).

Interventions delivered the most frequently and to the most participants were psycho-education, thinking strategies and relaxation. This indicates that therapists in the parent RCT spent the most time focused on brain injury and anxiety/depression related psycho-education, client cognitions and reducing client physiological arousal. Structured problem solving was delivered to more participants than behavioural activation, however behavioural activation was implemented in relatively more sessions. This indicates that behavioural activation was often used across several sessions for the same participant.

Kennard et al. (2009) found general therapy processes (i.e., psycho-education, reflecting on progress/therapy goals, and mood monitoring), cognitive restructuring, behavioural activation and emotion regulation (i.e., self-soothing and relaxation) were delivered to the most participants in a study of CBT for youths with Major Depressive Disorder. Percentage comparisons with the current

study showed very similar findings. This indicates that adaptations designed into the CBT-ABI therapist manual facilitated patterns of module use similar to that of a non brain-injured sample.

A trend was found for participants with primary anxiety symptoms to receive relaxation more, and thinking strategies less, compared to those with depression or a combination of anxiety and depression symptoms. However these differences were not statistically significant, and it is likely all clinical groups received a similar amount of each module. Better memory functioning was associated with greater therapist use of mindfulness/acceptance. Therapists may have been more inclined to use this module with those participants whose memory recall ability meant they had greater potential to utilise these strategies long term.

Poorer executive functioning was associated with less use of behavioural activation. The same trend was found for relaxation, but was not statistically significant. Both of these modules are behaviourally based, therefore this result is not in keeping with the recommended behavioural intervention emphasis for people with TBI. It is possible that associated homework tasks (i.e., possibly hourly/daily activity/relaxation monitoring) may have been perceived by therapists as requiring a level of organisational ability beyond the capacity of those with relatively poorer executive functioning.

7.2.2 Therapist cognitive deficit compensatory strategy use.

The parent RCT therapist manual provided guidance to therapists on how to accommodate for TBI associated cognitive deficits. We aimed to 1) create a checklist that could reliably measure therapist in-session behaviour that compensated for client cognitive deficits (i.e., cognitive deficit compensatory strategies), 2) describe therapist strategy use in the parent RCT, and 3) explore how strategy use was related to client TBI-related variables (i.e., years since brain injury, executive functioning, memory functioning and brain injury severity).

7.2.2.1   Conceptualising TBI-specific adaptations.

Gallagher et al. (2016) acknowledged that some reported adaptations in their review were "…*difficult to distinguish from 'competent' CBT that is being delivered in a dynamic and flexible fashion for people without brain injury*" (p. 15). Therefore it was important for the current study to develop a definition of adaptation that was brain injury specific. This resulted in the term 'cognitive deficit compensatory strategy' and the following definition: *A therapist behaviour that maximises the brain-injured client's opportunity to meaningfully engage with therapy interventions and processes, by compensating for a cognitive deficit.*

Within this definition compensation is considered one form of adaptation (Bäckman & Dixon, 1992; Berkel et al., 2011; Ferrer-Wreder et al., 2012; Kurtz, 2011). Furthermore strategies are conceptualised as existing on a frequency continuum, rather than categorical constructs (i.e., "adapted" vs "standard" CBT). For example a therapist can increase the use of a typical CBT session technique (e.g., session summary) in order to compensate for the client's cognitive deficits (e.g., memory difficulties). This definition contributed to conceptual clarity and specificity that had been lacking in previous research. Indeed three adaptations identified in the Gallagher et al. (2016) review did not meet the definition of cognitive deficit compensatory strategy utilised in the current study: incorporating cognitive assessment within client formulation, psycho-education, and modelling/generalisation of homework.

7.2.2.2   Cognitive Deficit Compensatory Strategy Checklist development and pilot testing.

Checklist content selection was guided by the definition stated above and based on expert recommendations from the brain injury literature, the CBT-ABI therapist manual and direct observation of therapist-client dialogue in CBT-ABI sessions. In total 25 strategies were operationalised incorporating repetition/summaries, concrete examples, analogies/metaphors, direct instruction/guidance, checking understanding, visual/external aids, modifying session duration, implementing strategies in vivo, internal memory strategies, provision of audio recording and

employment of cost-benefit analysis. Three adaptations identified in the Gallagher et al. (2016) review were unable to be assessed due to measurement constraints: increasing session frequency, presenting information more slowly and allowing extra time for client response. However overall the real life examples guiding strategy operationalisation throughout pilot testing were in keeping with expert recommendations.

Assessment of cognitive deficit compensatory strategy presence within a session obtained adequate inter-rater agreement ($\geq$ 75%) across majority of items (i.e., 86.7% of items). However assessment of strategy frequency within a session did not obtain adequate inter-rater agreement for nearly half of the items (i.e., 46.7% of items). This is discussed further in the Limitations and Directions for Future Research section.

The strategies utilised across the most sessions and/or at the highest frequencies were reference to a previous session(s), concrete examples, directive instructions/guidance, handouts and repetition. The most commonly occurring strategies in the parent RCT were not necessarily the most commonly reported in the broader literature. Likewise the most commonly reported strategies in the broader literature were not necessarily the most commonly occurring in the parent RCT (Ashman et al., 2014; Fann et al., 2015; Gallagher et al., 2016; Ponsford et al., 2016). In particular more than half (i.e., 17) of the checklist items were present on average less than once per session. However in keeping with previous research (Gallagher et al., 2016), the most commonly occurring strategies had the potential to compensate for memory deficits, executive dysfunction and communication problems. No associations were found with overall frequency of cognitive deficit compensatory strategy use and injury-related factors (i.e., years since injury, injury severity and cognitive functioning). While it may be the case that a relationship does not exist between these factors, it is more likely reflective of the small sample size (i.e., 30 CBT-ABI sessions over 17 participants). In particular the relationship between strategy use and cognitive functioning approached that of a moderate strength, therefore further investigation is warranted.

7.2.2.3   *Conclusion.*

Overall therapists tailored CBT-ABI to people with TBI by delivering modules flexibly and sometimes repeatedly. This was accompanied by a range of cognitive deficit compensatory strategies, which were primarily related to therapist verbal delivery, with the exception of program handouts. Notably, repetition was utilised both in regard to how often the same modules were delivered to the same receiving participants, and use of in-session repetition to increase opportunities for encoding associated module content. Therapist module use was associated with the cognitive functioning of the participant, suggesting that therapists emphasised and de-emphasised focus on certain interventions depending on the client's memory and executive functioning capacity. Studies 1 and 2 provide empirical support for therapist CBT intervention and cognitive deficit compensatory strategy use. This brings clarity to how CBT and/or TBI expert recommendations, and published RCT treatment descriptions, may actually be implemented in practice.

7.3   2) WHAT ARE THE FACTORS THAT IMPACT CAPACITY TO ENGAGE IN AND BENEFIT FROM CBT-ABI?

In order to establish a solid working alliance a client needs to contribute to the formation of therapy goals, engage in associated therapy tasks and develop an effective emotional attachment with the therapist (Bordin, 1979; Constantino et al., 2002). All of these capacities are potentially undermined in a person with TBI, due to associated cognitive deficits and behavioural issues (Fleming & Ownsworth, 2006; G. Kelly et al., 2008; Togher et al., 2014). Likewise the processes of homework review, design and assignment in CBT all involve cognitive demands that may pose a barrier to engagement for those with TBI (Leathem & Christianson, 2007). There are currently no studies examining the working alliance and homework engagement post-TBI in the psychotherapeutic context.

The question of which factors impact capacity to engage with CBT-ABI was addressed through Studies 3 (Chapter 4) and 4 (Chapter 5), which sought to identify the demographic, injury-

related and CBT process variables related to working alliance strength (Study 3) and level of client

homework engagement (Study 4) respectively. The associated question of which factors impacted

capacity to benefit from CBT-ABI was addressed through Study 5 (Chapter 6), which sought to

identify how the same demographic, injury-related and CBT process variables related to treatment

outcome, specifically the amount of change in anxiety and depression symptoms from pre to post
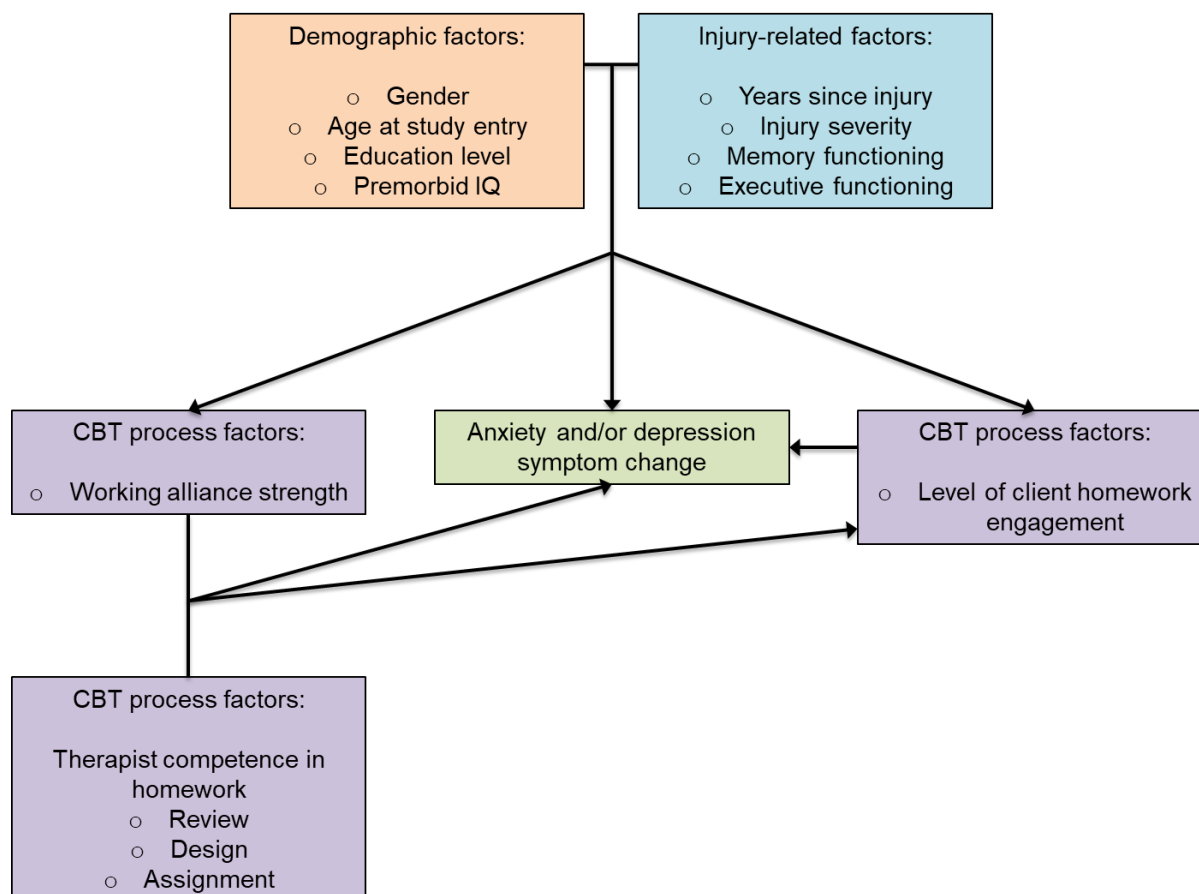
CBT-ABI.

Figure 7.1 provides a visual representation of the relationships examined.
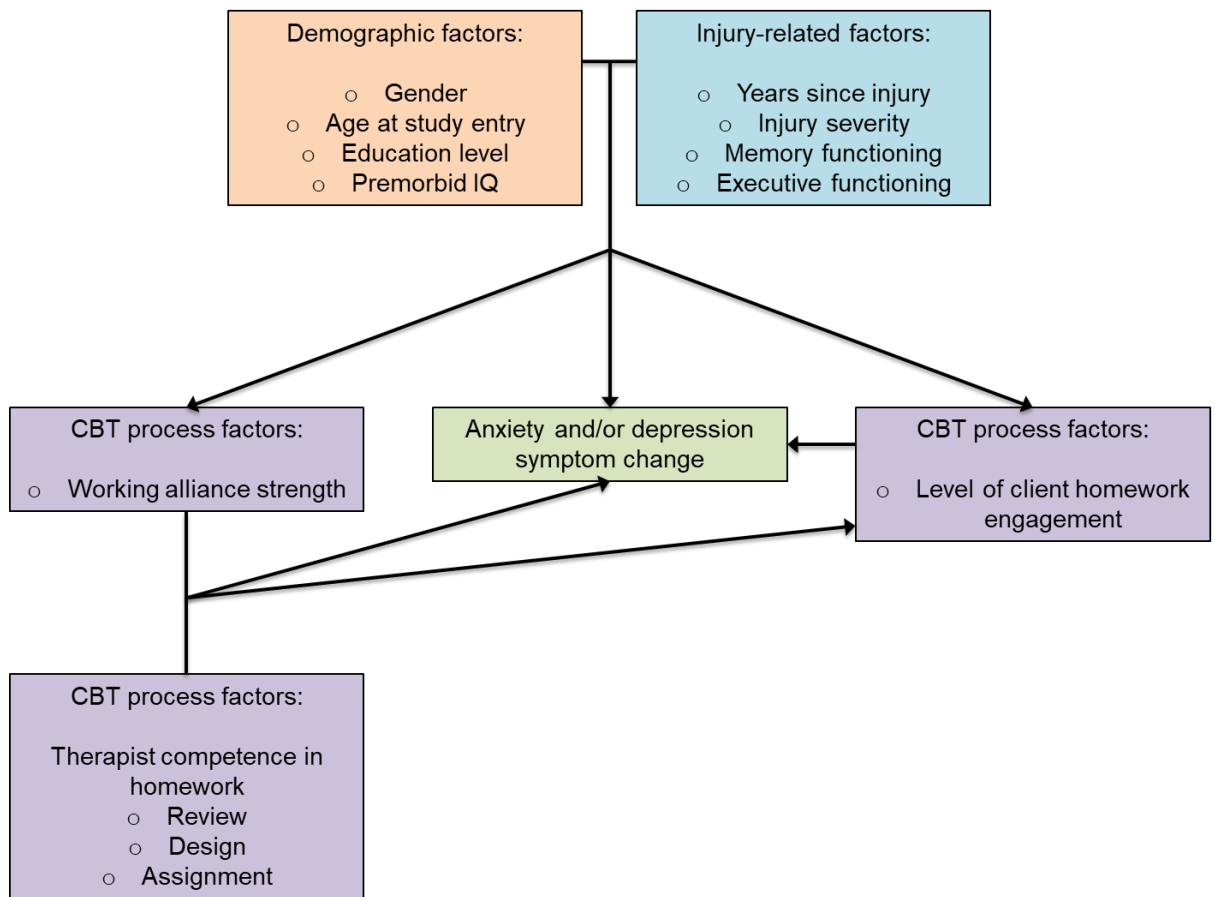
Figure 7.1 Relationships examined between predictor groups (orange, blue and purple) and with CBT-ABI outcome (green)

7.3.1 Role of demographic variables in client engagement and benefit from CBT-ABI.

Gender, education level and premorbid IQ were not associated with working alliance, homework engagement or symptom change. A large proportion of TBI patients are male (Bruns & Hauser, 2003) and TBI has been associated with lower socioeconomic status and education level (Kraus & McArthur, 1999; Rimel & Jane, 1984). This provides empirical support for the notion that adapted CBT can accommodate male clients with a low level of education and/or IQ, which is reassuring. This indicates that both integral CBT processes and treatment outcome are not necessarily impacted by the demographic characteristics that are often typical of this population.

Previous studies investigating the association of working alliance with demographic factors in the context of both neuro-rehabilitation and CBT with non-brain injured clients, have identified

statistically significant relationships with gender (Connors et al., 2000) and education (Connors et al., 2000; Sherer et al., 2007). However neither of these studies involved people with TBI in the psychotherapeutic context. Findings related to IQ are not unique to the current study (Anson & Ponsford, 2006b; Hsieh et al., 2012; Sherer et al., 2007). However higher premorbid IQ has been found to be associated with improvement in depression symptoms in previous group CBT research (Anson & Ponsford, 2006b). This could reflect greater variability in premorbid IQ scores relative to the current study. It may also be explained by the lowered capacity for group CBT to accommodate individual intellectual needs.

Study 5 found that older age was associated with greater improvement in both anxiety and depression symptoms following CBT-ABI. The same relationship was also found with homework engagement in Study 4. Those most likely to be impacted by a TBI are older people or adolescents/young adults. This finding indicates that a younger person may have reduced opportunity to engage in and benefit from adapted CBT.

The role of age in previous therapy process research has been mixed (Sherer et al., 2007; Thomas et al., 2011). Both younger (Knerr et al., 2011; Schönberger, Humle, et al., 2006a) and older age (Connors et al., 2000) has been associated with stronger working alliance. Older age has been associated with homework compliance (N. Schmidt & Woolaway-Bickel, 2000), however overall such a statistically significant association is rare (M. Bryant et al., 1999; Fehm & Mrose, 2008; Helbig & Fehm, 2004; Weck et al., 2013).

It may be that older clients take a more responsible approach to homework and have more life experience that can be applied to therapy tasks (e.g., more evidence on which to base helpful alternative thoughts). If this relationship were to obtain more empirical support, it would indicate that therapists might need to provide relatively more guidance to younger clients during therapy tasks, particularly homework. However this relationship first requires verification in future studies before age can be considered more influential relative to other factors within a client's formulation. Figure 2 provides a visual representation of the statistically significant associations with demographic variables.

7.3.2   Role of injury-related variables in client engagement and benefit from

CBT-ABI.

Studies 3 and 4 demonstrated that people with TBI are capable of developing a strong working alliance and engaging with CBT homework. Study findings suggested neither injury severity, nor associated cognitive functioning, impacted these processes. Furthermore injury severity was not associated with anxiety or depression symptom change. Psychological disorders post-TBI affect people with all levels of injury severity and it is vital that adapted CBT programs can accommodate this diversity. This provides empirical support for the inclusivity of the CBT-ABI program in this regard. It may be that the therapist adaptations described in Studies 1 and 2 compensated effectively for cognitive deficits and facilitated working alliance and engagement with the homework. The finding also indicates that clients with varying injury severities are capable of engaging in and benefiting from adapted CBT.

Client memory functioning was only associated with pre CBT-ABI depression levels, not post CBT-ABI depression levels. Therefore our capacity to interpret how this variable relates to symptom change from pre to post CBT-ABI is limited. Whether memory functioning impacts client capacity to benefit from adapted CBT is unknown, however study 3 and 4 indicate that it does not impact engagement with integral CBT processes. Rather this finding suggests that those beginning treatment with better memory functioning may have lower depression levels. In previous research better memory functioning has been associated with less improvement in depression symptoms (Anson & Ponsford, 2006b) and potentially greater improvement in anxiety symptoms (Hsieh et al., 2012). Taken together with the current findings, this shows that the role of memory functioning is particularly unclear and requires further investigation in future research.

Client executive functioning was associated with both anxiety and depression symptom change. This is interesting as it suggests client executive functioning does not impact capacity to engage with integral CBT processes, but does impact capacity to benefit from adapted CBT. It may be that therapist adaptations compensated effectively for executive deficits and facilitated immediate engagement with the working alliance and homework engagement. However clients

with poorer executive functioning may not have had the capacity to generalise what they had learnt to everyday life where therapists had minimal influence.

Studies 3 and 4 both found that more years since injury were associated with stronger working alliance and higher levels of homework engagement. In Study 5 this finding extended to depression, but not anxiety, symptom change. Therefore the length of TBI recovery appears to be an important factor in both engagement with and capacity to benefit from adapted CBT.

The drivers of change throughout a client's TBI recovery period are wide-ranging and this variable could reflect numerous factors. However self-awareness increases over time post injury (Fleming & Strong, 1999; Ownsworth et al., 2006; Richardson et al., 2015), and has been associated with depression in previous treatment research (Anson & Ponsford, 2006b; Schönberger, Humle, et al., 2006b). Self-awareness is likely a component of the social cognition and motivation (O'Callaghan et al., 2012) needed to develop an effective working alliance and persist with therapy tasks, including homework. Furthermore, a longer recovery period also provides more time to adapt to cognitive changes and find ways to compensate for them in everyday life.

As to why length of TBI recovery period was not related to anxiety symptom change, the necessary role of time in the development of hopelessness in depression could provide an explanation. It is possible this is less applicable to anxiety symptoms because over a longer time frame ineffective anxiety coping strategies (i.e., avoidance) are actually likely to further contribute to depression symptomatology (i.e., social isolation and withdrawal from usual activities). Therefore the potential for depression symptom change is possibly greater with more time post injury. Figure 3 provides a visual representation of the statistically significant associations with injury-related variables.

7.3.3 Role of CBT process variables in client engagement and benefit from CBT-ABI.

The alliance-outcome relationship is well established in non brain-injured populations. However Study 5 did not provide empirical support for extension of this relationship to a TBI

sample. It is possible this is unique to the TBI population and alliance does not influence CBT-ABI outcome. It is more likely however that a ceiling effect was found, as alliance was relatively strong and stable across all sessions. It is not uncommon for alliance ratings to have low variability (Schönberger, Humle, et al., 2006a; Weck et al., 2013). Therefore the current finding does not diminish support for therapists attending to the alliance to ensure treatment benefit. Rather it highlights one of the challenges researchers face when measuring the alliance, and demonstrates that this likely extends to the TBI population.

The homework-outcome relationship is also well established in non brain-injured samples. Study 5 provided empirical support for this relationship to extend to a TBI sample, for both anxiety and depression symptom change. This indicates that client capacity to benefit from adapted CBT is influenced by how much they engage with therapy homework. Higher levels of therapist competence in reviewing homework were associated with higher levels of homework engagement. However therapist competence in the designing and assigning of homework was not. This is in keeping with previous cognitive therapy research (M. Bryant et al., 1999; Weck et al., 2013). However Conklin et al. (2018) found the opposite (i.e., therapist assigning behaviour predicted homework engagement and review behaviour did not).

Study 5 found a relationship between higher levels of therapist competence in reviewing homework and greater improvement in anxiety symptoms. This indicates that client capacity to both engage in homework and benefit from adapted CBT is influenced by how effectively the therapist can facilitate the homework review process. There is an overall lack of research specifically examining the therapist homework competence-outcome relationship. Detweiler-Bedell and Whisman (2005) found a non-significant trend for more client involvement in homework review to be associated with better life functioning. Notably therapist homework review did not impact depression symptom change in the current study. Therapist homework review behaviours share a theme of reassurance and empowerment, to which anxiety symptoms are possibly more responsive. As comparison with previous research is limited, these relationships require further investigation in future research.

Therapist competence in designing or assigning homework was not associated with anxiety or depression symptom change. Detweiler-Bedell and Whisman (2005) found several homework design and assignment strategies to be associated with lower depression levels post-treatment. It is important to note that there is potential for the review and design processes to overlap, especially if the reviewed homework is revised and then re-assigned. Any therapist behaviour that facilitates homework engagement is arguably important in CBT-ABI. More research is needed before any aspect of the homework process can be considered relatively more influential. Figure 4 provides a visual representation of the statistically significant associations with CBT process variables.

7.3.4   Role of demographic, injury related and CBT process variables.

When variables were entered together into final regression models, client age, number of years since injury and therapist competence in reviewing homework, all remained statistically significant in their association with client homework engagement. Executive functioning remained statistically significant in its association with anxiety symptom change, and homework engagement remained statistically significant in its association with depression symptom change. This shows that even when accounting for a combination of demographic, injury-related and CBT process factors, the influence of these variables on client capacity to engage in or benefit from CBT-ABI was consistent. *Figure 7.2* provides a visual representation of the variables that remained statistically significant when entered into final models.
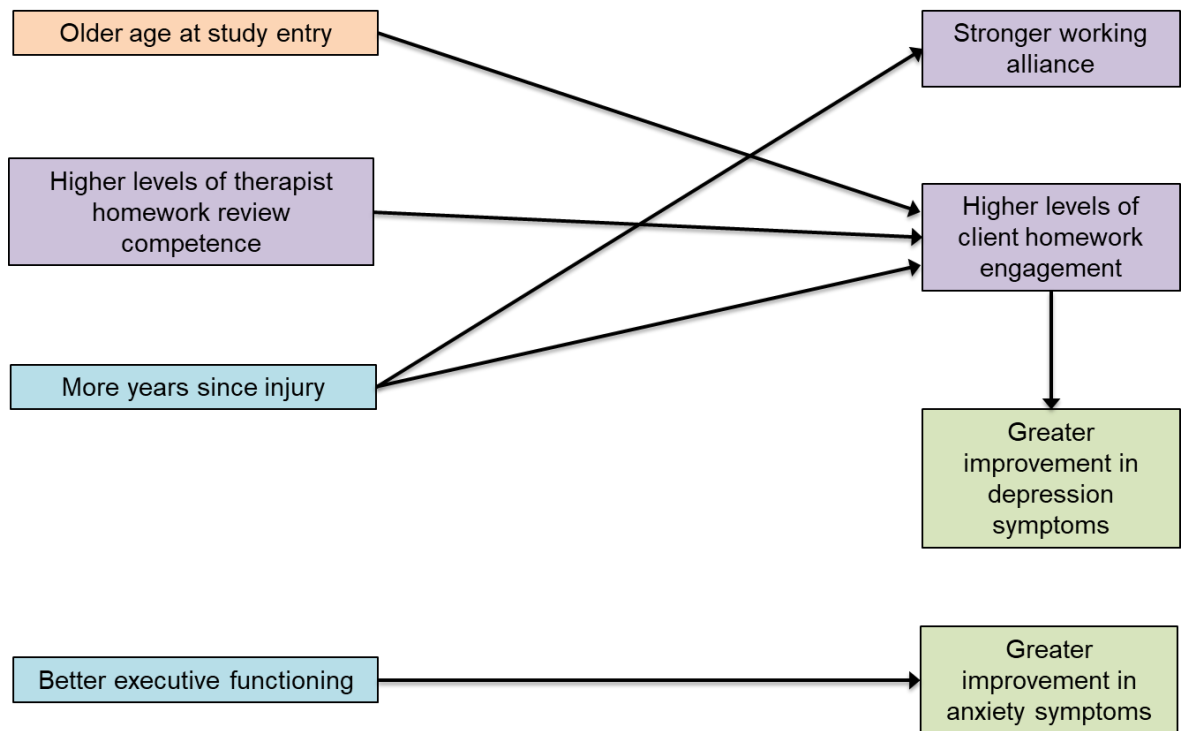
Figure 7.2 Statistically significant relationships ($p < .05$) found in final regression models combining client demographics (orange), injury-related variables (blue) and CBT processes (purple)

7.4   LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

7.4.1   CBT-ABI specific intervention.

The findings of this doctoral thesis are based on therapy audio recordings from the Ponsford et al. (2016) RCT. The CBT-ABI treatment manual was grounded in the principles espoused by A. T. Beck et al. (1979) and specifically designed to accommodate TBI associated cognitive impairments. Therefore it is important to acknowledge that findings may not generalise to other CBT interventions.

7.4.2   Sample size and variability.

Studies 1, 3, 4 and 5 involved coding of 177 CBT-ABI sessions ($n = 31$). Study 2 involved coding of 30 CBT-ABI sessions ($n = 17$). Results are considered preliminary as this large number of sessions represented relatively small client samples. Therefore non-significant findings may be

due to low statistical power. However they may also indicate that certain factors do not impact therapist CBT-ABI delivery or client capacity to engage in and benefit from CBT-ABI. Replication with a larger sample size is required.

The working alliance was consistently strong and this low variability may partly explain why it was not associated with treatment outcome. Alliance was also not associated with client demographics, injury severity and cognitive functioning. We cannot rule out that these variables actually do not hinder development of the solid alliance on which effective CBT depends. However low variability is also a probable explanation. The alliance measure utilised in the current study guides raters to operate from the initial assumption that the alliance is strong, and then modify this rating as ruptures and missing relational elements arise in-session. Combined with high quality therapist training and supervision, and therapist specialised knowledge of brain injury, a ceiling effect was probable.

Inconsistent findings with that of Anson and Ponsford (2006b) could also be explained by the current study having relatively less variability in premorbid IQ scores and PTA duration (i.e., injury severity). Likewise the current study had relatively more variability in the number of years post-injury and did find an association with treatment outcome, whereas Anson and Ponsford (2006b) did not. Finally, scores reflecting therapist competency in designing and assigning of homework also had lower variability relative to the scores reflecting competency in the review of homework.

7.4.3   Measures.

All studies involved development and/or utilisation of five measures altogether. Measure reliability was assessed through inter-rater and/or within rater reliability calculations throughout pilot testing and/or main data collection. Overall adequate reliability was obtained for the measures of module use, working alliance, homework engagement and therapist competence in using homework. Obtaining adequate reliability with the Cognitive Deficit Compensatory Strategy Checklist was more challenging. Therefore findings from the cognitive deficit compensatory

strategy frequency assessments need to be interpreted with caution, although they appear to corroborate strategy presence/absence assessments, which were generally reliable.

The capacity to reliably measure individual strategy frequency is of particular importance. The current study conceptualised cognitive deficit compensatory strategies as existing on a frequency continuum, as therapist increasing/decreasing of behaviour has the potential to add compensatory value. Furthermore considerably larger variability in strategy in-session frequency, compared to strategy presence across sessions, also demonstrates potentially greater measure sensitivity. Reliable assessment of strategy frequency would facilitate future comparison of therapist cognitive deficit compensatory strategy use in TBI and non-TBI samples.

However before this can be undertaken further pilot testing is needed to better address the sources of non-agreement identified: 1) ambiguous wording in item operationalisation, 2) potentially insufficient co-rater training and total number of pilot testing sessions, 3) dialogue source (i.e., audio recordings vs transcriptions), and 4) strategy absence or low frequency. Difficulties obtaining adequate reliability in observer-rated measures of therapist competence have been found in previous studies (Barber et al., 2003; Blackburn et al., 2001; Muse & McManus, 2013). However research has also demonstrated that reaching adequate inter-rater reliability in such measures is possible (Kazantzis, Clayton, et al., 2018; Sachsenweger et al., 2015). Therefore the question of whether or not a majority of cognitive deficit compensatory strategies can be reliably measured warrants further investigation.

Although the CBT process measures appeared to perform reliably throughout studies, they are relatively new and were developed in non brain-injured samples. As this thesis has highlighted, specific and unique strategies may be needed to assist people with TBI to engage in CBT interventions and processes. It was anecdotally observed that in order to accommodate client cognitive deficits during review and assignment of homework, therapists sometimes had to decrease the very behaviours that would typically result in higher competency scores (e.g., collaboration, facilitating client autonomy and eliciting client thoughts/beliefs). Therefore future research may consider complementing therapist competence assessment with measures such as the

Cognitive Deficit Compensatory Strategy Checklist, so a more meaningful representation of therapist competence in using homework can be captured within the context of brain injury. Finally, working alliance and homework engagement scale total scores were utilised in analyses. Future studies may consider further factor analytic evaluation of the scales and examination of the relationship between subscale scores and symptom change. Indeed Schönberger, Humle, et al's. (2006b) significant alliance-outcome finding was based on the emotional bond subscale of the Working Alliance Inventory.

7.4.4　　　Future research.

Longer TBI recovery period length was associated with stronger working alliance, higher levels of homework engagement and greater improvement in depression symptoms. It is possible that a longer recovery period is reflective of increased self-awareness and adjustment to cognitive deficits (i.e., adoption of everyday cognitive deficit compensatory strategies). The inclusion of measures of these factors in future research could clarify reasons for the influence of time since injury. Poorer executive functioning was associated with less improvement in anxiety and depression symptoms, but not homework engagement. This highlights the potential to distinguish between client engagement with homework assigned in-session, and client-initiated therapeutic activities between-session. It may be that clients with poorer executive functioning are unable to generalise homework tasks without therapist facilitation. Therefore the potential for executive functioning to moderate the homework-outcome relationship in people with TBI warrants exploration in future research.

Meta-analytic research has found sudden therapeutic gains throughout treatment to be associated with CBT outcome, for both anxiety and depression symptoms (Aderka, Nickerson, Bøe, & Hofmann, 2012). In the parent RCT anxiety and depression symptoms were assessed at pre- and post- CBT-ABI. Therefore session-to-session symptom change could not be incorporated into analyses in the current study. In order to determine whether the sudden gain-outcome relationship extends to people with brain injury, more frequent symptom assessments are necessary in future

studies of brain injury adapted CBT. Such research could also determine whether sudden gains have any influence on the relationships examined in the current study.

7.5   IMPLICATIONS FOR CLINICAL PRACTICE

This doctoral thesis has several important implications for clinical practice. The notion that people with varying TBI severities are capable of engaging in integral CBT processes, and experiencing the associated benefit of CBT, now has empirical support. Therapists can be confident that TBI does not automatically preclude a person from engaging with and benefitting from CBT.

Module use in the parent RCT indicates that with simplification of the cognitive restructuring process, emphasis on behavioural interventions may not be necessary in brain injury adapted CBT. Thinking strategies was the most utilised intervention, and behavioural activation was actually utilised with fewer participants compared to a previous study in a non brain-injured sample (Kennard et al., 2009). Poorer executive functioning was associated with less use of behavioural activation. It is possible that behaviourally focused interventions still have the potential to be demanding of the client's executive capacity, depending on associated therapy tasks. Although emphasis on behavioural interventions is recommended, therapists need to weigh up both the level of abstraction within related concepts and organisational demands of corresponding tasks, both of which are impacted by executive functioning.

Client engagement with and benefit from CBT is potentially dependent on several factors within therapists' control. Both client homework engagement and therapist competence in reviewing homework were associated with treatment outcome, and with each other. A stronger working alliance was also associated with higher levels of homework engagement. This reinforces the importance of therapists developing and maintaining a solid alliance, and ensuring comprehensive facilitation of homework engagement includes the review process.

In those without brain injury a solid alliance is more likely to develop and be maintained when therapy involves the following: therapy decisions made collaboratively and with mutual agreement; clear rationale and prioritisation of therapy goals and associated tasks; explicit

connection between tasks and therapy goals; client perception of tasks as specific and beneficial; mutual liking; and respect. Likewise homework review in people without brain injury is more likely to be effective with the following: verbally reinforcing client effort; exploring beliefs related to homework completion and non-completion; problem-solving barriers to completion; and synthesising associated learning.

It is important that brain-injury specific needs and cognitive deficit compensatory strategies are incorporated into therapist training in such competencies. While there is likely large overlap in what constitutes effective CBT processes across clinical presentations, there are also key differences in the needs of those with brain injury. For example in order to maintain a solid alliance, at times therapists may need to be directive, rather than collaborative. Connection between tasks and therapy goals may need to be represented visually. Therapist appreciation of the client may need to be expressed explicitly at each session due to memory deficits. In the case of homework review, it may be necessary to involve a close other in order to explore client homework-related beliefs. Memory aids, or direct contact from the therapist during the week, may be necessary to aid homework completion. Verbal reinforcement for homework completion may need to be written down so clients can more easily recall therapist encouragement.

Poorer executive functioning was associated with less improvement in both anxiety and depression symptoms, yet was not associated with alliance or homework engagement. This highlights the potential for such clients to struggle with generalising homework tasks and maintaining therapy gains independently. Therefore therapists may need to focus more effort on circumventing executive impairments in order to generalise skills learned within homework tasks. In the parent RCT therapists accommodated for executive impairments by providing concrete examples of abstract concepts, direct instruction/corrections, potential response options, therapy folder/dividers, re-focusing the client when necessary and implementing strategies in vivo. The cognitive deficit compensatory strategy-outcome relationship is yet to be examined; however these adaptations were integrated in the context of a successful RCT.

A longer post-TBI recovery period was associated with working alliance, homework engagement and treatment outcome. More research is needed to determine what aspect of client functioning this variable may represent. Nonetheless it is helpful for therapists to be aware that with less time post-injury, clients may have more limited opportunity to benefit from CBT. Comprehensive neuropsychological and clinical assessment should primarily guide decision-making regarding client suitability for CBT treatment.

7.6   CONCLUSION

This thesis includes the first studies to undertake CBT process research in a TBI sample. Examination utilised direct and independent observation of client-therapist interactions across all therapy stages. This research brought some clarity to the questions of 1) how therapists tailor CBT-ABI to people with TBI, and 2) which factors impact client capacity to engage in and benefit from CBT-ABI. This represents the first step in empowering therapists with the empirically based knowledge that can better guide clinical decision-making. In combination with further research, this will increase the likelihood that people with TBI are relieved of the additional suffering associated with anxiety and depression, and consequently have improved quality of life.

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APPENDIX A   MODULE IDENTIFICATION CHECKLIST RATING FORM

Indicate the **presence/absence** of each module in the session by writing '1' or '0' in column '1. Present/Absent'. Indicate whether each module is **present/absent** as a primary module in column '2. Primary Module(s)'. Indicate whether each module is **present/absent** as a secondary module in column '3. Secondary Module(s)'. **1 = Present**; **0 = Absent**.

'Primary Module(s)': Focus of discussion for majority of the session; More than one module can be coded as present.

'Secondary Module(s)': <u>Discussed</u> briefly by client and therapist; More than one module can be coded as present; Example: 5-10 minute review of homework at beginning of session only.

Module	Label	1. Present /Absent	2. Primary Module(s)	3. Secondary Module(s)
1	*Assessment Feedback & Education*			
2	*Anxiety Management (Relaxation)*			
3	*Behavioural Activation*			
4	*Thinking Strategies*			
5	*Graded Exposure*			
6	*Structured Problem Solving*			
7	*Self-Soothing Strategies*			
8	*Relapse Prevention**			

*Record below previous modules referred to in the context of 'Module 8 – Relapse Prevention' (do not rate as secondary modules):

If module corresponding to session content is unclear or therapist is clearly non-adherent to CBT protocol please tick <u>one</u> of the options below:

Unclear (provide best estimate of module identification in section above)

Non-adherent (eg. therapist providing supportive counseling only/simply chatting with client)

APPENDIX B   COGNITIVE DEFICIT COMPENSATORY STRATEGY (CDCS) CHECKLIST

Please note: There are instances of session content that can be coded as more than one compensatory strategy and these are detailed below in the item descriptions. All other relevant session content should be coded as <u>one</u> item only.

1.   **<u>Repetition of Psycho-education</u>**
- Therapist repetition of generic <u>psycho-education</u>
- Aims to consolidate client understanding by providing an additional opportunity for client to encode that specific psycho-education component again
- Code each repetition <u>following</u> expression of the initial psycho-education component
- Repetitions must refer <u>back</u> to psycho-education components that the <u>therapist</u> (not the client) has already verbalised in-session
- 'Generic' psycho-education refers to education of the client rather than application of the psycho-education component to the client's specific situation (e.g., do not rate if therapist is applying the CBT model to the client's situation, however rate if therapist is describing the CBT model to the client again)
- Rate this item exclusively, if in doubt do not code

Example:

- *"As I said before, this ABC model is identifying the consequences of having that thought…"*
- *"Anxiety is a normal emotion that keeps us safe…"*
- *"Yeah, that's right, after a TBI we would expect people are easily fatigued…"*
- *"In CBT we focus on thoughts because…"*

2.   **<u>Therapist reference to previous session</u>**
- <u>Any</u> reference, by the therapist, to the session <u>content</u> of a previous session

Example:

- *"We talked at the beginning of the program about how anxiety is a natural thing we all experience"*
- *"I think you've mentioned it's really hard for you in shopping centres" (clear this has not been referred to before in the current session)*

3.   **<u>Therapist sourced examples</u>**
- Therapist provision of a concrete instance of an abstract concept
- <u>Fully</u> sourced from therapist based on discussion in the <u>current</u> session
- Client has not contributed in anyway to providing the example in the <u>current</u> session
- Code <u>each</u> example provided by therapist
- Rate this item inclusively, if in doubt code as present
- If therapist provides an example in question form, and the question includes an "or" with two or more potential answers for the client to choose from, code as 'Item 7. Therapist Provision of Potential Responses'

Examples:

- *"To help us complete this form, go back to your experience of speaking at a conference" = 1 instance*
- *"Another way to challenge the thought could be to say…"I'm doing the best I can", "I'm doing all that I can" or "I'm giving it my best shot" = 3 instances*

3a. Repetition of a therapist sourced example

- Code each repetition of an example fully sourced by the therapist
- Repetitions must refer <u>back</u> to examples already verbalised in-session by the therapist

4. Homework Summary

- Therapist bringing together two or more key points from homework design/assign discussion and restating these to the client (eg. what they need to do between sessions, why they are doing it, how it links to their therapy goals etc.)
- Must refer <u>back</u> to two or more key points from homework design that have already been verbalised in-session by the <u>therapist</u>
- **Do not** code instances of paraphrasing (ie. re-phrasing what the client has verbalised)
- If a full session summary is provided leading up to the end of the session, code as "17. Verbalised session summary"

Example:

- *"So use the alternative thoughts and slowed breathing at each stage of entering and shopping in the department store this week, because that will help bring your stress levels from a high 10 to a medium 5"*

5. Analogies/Metaphors

- Therapist comparison of different concepts to emphasise their similarity (eg. "it's like…", "it's kind of similar too…")
- Aids in therapist explanation of therapy related concepts and aims to extend the client's learning or understanding of these in some way
- **Do not** code colloquial sayings
- Code even if therapist utilises analogy/metaphor originally sourced from client
- Code as "Analogy/Metaphors" only if client and therapist are NOT viewing a corresponding program manual handout, ie. code as "Item 6. Introduction of Handouts" if analogy/metaphor is:

1) Already incorporated into program manual handouts

AND

2) Therapist refers to this analogy while viewing the corresponding handout with the client

- Consider coding as both "Item 11. Visual aid" AND "Analogy/metaphor" if appropriate (refer to "Item 11. Visual aid")

Examples:

– *"We are driving a bus and our emotions are the passengers…anxiety kicks us out of the drivers seat."*
– *"So a thought is like a cloud, clouds pass"*

Non-examples:

– *"This structured problem solving approach works like a dream"*
– *"That's when your anxiety can sky rocket"*

5a. Repetition of Analogies/Metaphors

- Code each repetition of an analogy/metaphor
- Repetitions must refer <u>back</u> to analogies/metaphors that the <u>therapist</u> (not the client) has already verbalised in-session

6. Introduction of Handouts

- Use of existing handouts provided or derived from program manual <u>only</u>
- Must be reasonably clear that the client can see the handout in-session in order to code as present

Example:

– *"This is in your book, the ABC model is outlined right here"*

6a. Repetition of Handouts

- Code each time therapist draws client's visual attention back to the same handout after its initial introduction
- Rate this item exclusively, if in doubt do not code (ie. rely on content of therapist dialogue only)

Example:

– *"So now that you have provided me with a really good overview of the situation itself, lets write down what went through your mind in <u>this column here</u>" [therapist and client have already used same handout to record client emotions in same situation]*
– *"After going through the ABC model you then look at what you can change in <u>these boxes</u>"*

7. Therapist provision of potential responses

- Therapist provision of two or more potential answers from which the client can choose in order to accomplish a response (i.e. range of possible answers must be included in therapist question)
- Code regardless of whether client actually chooses one of the potential responses provided by the therapist
- Code all therapist <u>questions</u> that include the word "or" and two or more potential responses
- Rate this item inclusively, if in doubt code as present

Examples –

– *"Was your anxiety low, medium or high?"*

- *"Does that make you worried or nervous?"*
- *"Does it make a difference if you'll see that person again or not?"*

7a. Repetition of potential responses

- Code each repetition of the potential responses question by the therapist
- Repetitions must refer <u>back</u> to a question the <u>therapist</u> has already verbalised in-session

8.   Therapist Directive Instruction/Corrections

- Provision of direct instruction or correction by the therapist to the client
- **Do not** code the multiple directives provided in order for therapist to teach client a relaxation exercise through in-session practice. However a directive can be coded if client has already learnt the relaxation exercise (*Example – "Do your deep breathing exercise for a few minutes now"*)
- Directives may be provided in question form or using a tentative tone, therefore take into consideration the client's actions in response to the therapist's dialogue (eg. Depending on therapist tone, "do you want to write that down"? could be considered either a directive or simply a question. If the client proceeds to note-take following this dialogue it would be coded as 'Item 8. Therapist Directive Instruction/Correction' as the client is meeting an implied therapist expectation through their actions)
- Take into consideration whether in-session or between session tasks are designed with client agreement or collaboration (ie. agreement only, indicates therapist may have directed client to complete the task)
- If client has become tangential or lost focus consider coding as 'Item 15. Re-focusing client' if appropriate

Example:

- *"I'm going to ask again and this time I want you to answer by referring to the accident that happened to you, rather than you being responsible for doing something wrong."*
- *"So flip the page over and write down what we've said"*
- *"Leave two lines and write the homework summary"*
- *"That's a thought, but we want a feeling, what were you feeling?"*
- *"They are the behavioural strategies, but what could you say to yourself to reduce the anxiety?"*

8a. Repetition of Directive Instruction/Correction

- Code each repetition of an instruction/correction
- Repetitions must refer <u>back</u> to an instruction/correction that the <u>therapist</u> has already verbalised in-session

9.   Note-taking or therapy diary

- <u>Therapist</u> incorporation of note-taking, <u>created</u> in-session
- Notes can be written by client or therapist, but must be initiated by therapist
- Must be reasonably clear that the client can see the notes in-session

- If client and therapist move onto a different/new therapeutic task and notes are incorporated once more, this is considered a separate instance of note-taking (eg. if notes are taken on the same handout this is considered 1 instance of note-taking, as soon as note-taking begins on a new/different handout this would be considered the second instance)
- **Be careful** not to over-code item by literally coding each time therapist can be heard writing or therapist directs client to write, consider whether the note-taking is related to the same handout/task or a new/different handout/task
- If therapist directs client to write notes, initially code as both "Item 8. Therapist Directive Instruction/Correction" AND "Note-Taking" (*Example – "Write that down"*)
- Any further instructions from the therapist regarding writing notes for the same therapeutic task is coded as "Item 8. Therapist Directive Instruction/Correction" only (*Example – "Leave two lines and then write this…"*)
- **Do not** code therapist personal note-taking

10. <u>Checking understanding</u>

- Therapist checking client understanding of session content
- Can be expressed in question form, or as a request for the client to paraphrase/summarise session content or apply knowledge in-session
- **Do not** code if objective of therapist is to prompt client reflection on entire session content and/or elicit a client session summary, rather code as "Verbalised session summary" if appropriate

Examples:

– *"Does that make sense what we've been doing here to try and change the way you think about things?"*
– *"Can you say to me what the plan is for your homework this week?"*

11. <u>Visual aids</u>

- Therapist translation of verbal content into visual form, <u>created</u> in-session (exception to this is therapist's incorporation of photos in-session)
- Must be reasonably clear that the client can see the visual aid in-session
- Code as "Item 6. Introduction of Handouts" if therapist visual aid is derived in anyway from program manual handouts
- Consider coding as both "Visual aid" AND "Analogy/metaphor" if appropriate

Example:

– *"A thought is like a seed, if we keep watering it it'll grow bigger [therapist can be heard drawing while explaining]"*

11a. Repetition of Visual Aids

- Code each time therapist draws client's visual attention back to visual aid after attention has been removed

Example:

– *"So if we look again at the seed I've drawn here, do you think the thoughts you were having watered it more or less?"*

12. <u>Reminders</u>

- Therapist incorporation of external memory strategies in current session
- Aim to promote client memory recall in relation to therapy appointments or between-session therapy tasks
- Examples include calendars, alarms, text messages, physical reminders etc.

13. <u>Internal memory strategies</u>

- Therapist implementation of internal memory strategies to assist client memory recall in relation to therapy-related concepts/tasks
- Examples include imagery, mental rehearsal, mental association etc.

14. <u>Re-focusing client</u>

- Therapist provision of verbalisations which re-focus client to in-session content
- Therapist must re-focus client from unrelated or minimally related subject matter

Example:

– *"You're jumping ahead a bit…just coming back to what we're doing"*

15. <u>Written session summaries</u>

- Therapist synthesis of session main points/key messages in written format
- Can be provided by therapist, or client (following therapist prompting), at the end of the session or after the session

16. <u>Verbalised session summary</u>

- Synthesis of session main points/key messages
- Verbalised in the lead up to the end of the session
- Can be provided by therapist, or client (following therapist prompting)
- **Do not** code if therapist provides homework summary only, rather code as "Item 4. Homework Summary" if appropriate

17. <u>Cue cards</u>

- Therapist incorporation of portable notes containing words and/or pictures
- Include the actual content of the thought(s)/behaviour(s) to be referred to/carried out by client between-session
- Kept on the client's person, and therefore easily accessible, between-session
- **Do not** code lists of coping statements as "Cue Cards", rather code as "Introduction of Handouts"

18. <u>Providing session audio recording</u>

- Therapist provision of session audio recording to client at the end of session
- **Do not** code therapist provision of audio recordings for relaxation exercise purposes between-session

19. Handout folder/dividers
- Therapist facilitation of handout folders/divider use by client
- Aims to assist client in organisation of therapy material

20. Inclusion of co-therapist
- Inclusion of close other, to assist client in carrying out therapeutic tasks
- Applies to both in-session and between-session

21. Modification of session duration
- Shortening of session duration
- Expressed through overt discussion with client and therapist, or, overt instruction by therapist
- Code therapist's attempt to modify session duration (i.e. code even if client does not accept the offer of modification to the session duration)

Example:

– *"I've noticed it's almost an hour and you're tired, so let's wrap up"*

22. Session breaks
- Suspension of the therapy session at any point for a limited duration
- Aims to contribute to client's cognitive capacity to continue with remainder of session through management of mental fatigue
- Code therapist's attempt to incorporate session breaks, (i.e. code even if client does not accept the offer of a session break)

23. Employment of cost-benefit analyses
- Therapist use of cost-benefit analysis in-session
- Aims to address client low motivation or difficulty in initiating therapeutic activities

24. Implementing strategies in vivo
- Therapist implementation of therapeutic strategies in the real world environments in which the problem exists for the client
- Includes therapist involvement of other health professionals to assist in undertaking strategies in real world environments
- Must be overtly referred to by client and therapist in-session