Single Event Paediatric Trauma: Sample Representation and the Efficacy of Response-Focused Exposure and EMDR

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Declaration

I declare that thesis is my own account of my research and contains as its main content work which has not previously been submitted for a degree at any tertiary education institution.

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Abstract

This thesis focused on paediatric populations who had been exposed to single event trauma such as motor vehicle accidents, burns, falls, animal bites, anaphylaxis and near drowning. The planning for the thesis commenced 16 years ago and the related PhD candidature commenced a few years later[1]. Since then, the volume of research investigating child trauma and, more specifically, treatments for child trauma has increased markedly.

The aims of the thesis were to determine: i) the efficacy of EMDR compared to a waitlist control condition in children aged 6 to 12 years following a motor vehicle accident, ii) if those who participated in a trauma study were representative of the population compared to those who did not participate in a trauma study; iii) if an assessment involving additional exposure to response focused trauma memories (based on Lang's 1977, 1979, 1983 bio-informational theory) facilitated recovery, and if so iv) compare the efficacy of a treatment based on response-focused exposure to an established treatment condition such as EMDR. These aims were met by the following four studies.

Study one compared four EMDR sessions to a six week wait-list control condition amongst 27 children (aged 6 to 12 years) suffering from persistent PTSD

[1] The extended period of time taken to complete this thesis was the result of several factors: i) the candidate required a 20 month period of leave due to ill-health, ii) a period of eight months was required to obtain approval from the two ethics committees involved in the projects (Murdoch University and Princess Margaret Hospital for Children Ethics), iii) the commencement of study 2 was delayed by four months due to a review by the metropolitan health service of all research utilising emergency patients, iv) the recruitment process for all four studies took six years to complete, and v) the treatment studies (and related follow up assessments) took a further two years to complete.

symptoms after a motor vehicle accident. The efficacy of EMDR was confirmed. In comparison to the wait list condition, EMDR was superior on primary outcome measures including the Child Post Traumatic Stress – Reaction Index and clinician rated diagnostic criteria for PTSD. EDMR was also superior on process measures including Subjective Units of Disturbance and Validity of Cognition scales. Notably, 100% of participants in both groups met two or more PTSD criteria at pre-treatment. At post treatment, this remained unchanged in the wait-list group, but decreased to 25% in the EMDR group. These therapeutic gains were maintained at three and 12 month follow-up.

Study two compared 211 participants with 2333 non-participants in a trauma study on several measures of trauma and injury severity such as duration of hospital visit, heart rate in the emergency department, emergency transport to hospital, admission to hospital, injury severity score, and triage code. Participants were exposed to more severe trauma or injury than non-participants and within the non-participant group, those who had requested further information about the study (N = 573) were exposed to more severe trauma or injury than other non-participants (N = 1760). These findings were contrary to the view that non-participants could be more severely traumatised than participants, and the discovery of a gradient effect within non-participants suggests that participation or greater interest in participation may be associated with greater trauma and injury severity.

In study three, 52 of the children and adolescents from study two with at least moderate PTSD symptoms completed a standard assessment one month after their trauma. A random sample of 22 of these completed an additional response focused assessment task based on Lang's (1977, 1979, 1983) bio-informational theory which involved the detailed recall of five components of their trauma memory. The stimulus component consisted of visual and auditory memories, whereas the response

information consisted of four domains: verbal (words, sounds, thoughts and feelings), somato-motor (head and body position, gross body actions), visceral or autonomic (changes in heart rate, sweating or hot flushes), and processor (mental processes such as dream-like perceptions, racing or muddled thoughts). The response focused assessment resulted in an accelerated rate of recovery in avoidance symptoms from one week to two months later. There was also a reduction in the proportion of participants meeting the PTSD (DSM-IV) criterion for avoidance and a decrease in parent ratings of their child's somatic complaints.

Study four compared Eye Movement Desensitisation and Reprocessing (EMDR) to a Response Focused Exposure Therapy condition based on the assessment utilised in study three. A total of 28 children and adolescents (aged six to 16 years) who continued to experience persistent PTSD symptoms three months after their trauma were recruited from study two. The EMDR protocol was consistent with the protocol used in study one and the detailed protocol described by Tinker and Wilson (1999). The Response Focused Exposure Therapy condition henceforth referred to as "exposure therapy" involved the repeated and detailed exposure to information from the five components of the trauma memory (as per study three), including one stimulus component (e.g., visual and auditory memories) and four response components (verbal, somato-motor, visceral or autonomic and processor). Both treatment conditions resulted in robust improvements in child, parent and clinician rated PTSD measures and child and parent rated non-PTSD measures. Whilst there was no difference in the duration of treatment sessions between the EMDR and exposure group, the exposure condition involved fewer exposure periods than the EMDR condition [4.8 ($\pm$2.1) versus 17.8 ($\pm$6.4), $p<.001$] but longer periods of exposure [157.7 ($\pm$58.3) versus 23.5 ($\pm$4.7) seconds, $p<.001$] and a greater total duration of exposure in each session [12.3 ($\pm$8.0) versus 7.0 ($\pm$3.2) minutes, $p<.05$].

This result provides support for the efficiency of EMDR, although more research is necessary. The efficacy of both treatments is best explained by the use of vivid and repeated exposure to the trauma memory in a safe environment along with other non-specific elements common to both treatments.

Publications

Refereed articles

Kemp, M., Drummond P., & McDermott, B. (2010). A wait list controlled pilot study of eye movement desensitization and reprocessing (EMDR) for children with posttraumatic stress disorder (PTSD) symptoms from motor vehicle accidents. C*linical Child Psychology and Psychiatry*; *15*(1), 5-25. doi: 10.1177/1359104509339086. Epub 2009 Nov 18.

Kemp, M., & Drummond, P.D. (2013). Sample representation in a psychological treatment study after single event paediatric trauma. *Journal of Child and Adolescent Trauma, 6*(1), 41-56. doi: 10.1080/19361521.2013.753971

Submitted articles

Kemp, M., & Drummond, P.D. (2014). Does Increased Exposure During an Initial Assessment Improve Paediatric PTSD Symptoms Following a Single Event Trauma?

Kemp, M., & Drummond P.D. (2014). Eye Movement Desensitisation and Reprocessing (EMDR) versus Exposure Therapy for Paediatric Posttraumatic Stress Disorder (PTSD) Symptoms from a Single Event Trauma.

These articles are reproduced in the thesis in their full, original state (see Chapters 2, 3, 4 and 5), and for this reason there is a degree of repetition and some variation in formatting.

Author Contributions

In line with doctoral research regulations, this is a statement explaining my part in the research work involved in this thesis. The first publication from this thesis was co-authored by Professor Brett McDermott (my field supervisor at Princess Margaret Hospital) and Professor Peter Drummond (my PhD supervisor throughout this project). Peter Drummond also co-authored the second publication and the two articles that have been submitted for publication.

The design of study one was completed in consultation with Brett McDermott. Peter Drummond was also consulted in relation to the design and implementation of study one and the three subsequent studies. After obtaining a small grant from the hospital, three part time research assistants were employed on a casual basis to assist with the recruitment of participants for studies two and three given the large number of patients who had to be contacted. Apart from a small number of screening assessments for study three that were completed by research assistants I completed all of the assessments, treatment, data analysis and initial drafts for all four studies. The data analysis was overseen by Peter Drummond, and independent clinicians with expertise in the treatment of children and adolescents provided treatment fidelity ratings for studies one and four.

Brett McDermott provided consultation and support for study one and without his involvement, and the subsequent involvement of Professor David Forbes, this research would not have been possible within the setting of a tertiary hospital. Peter Drummond provided invaluable consultation and support throughout the research project.

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I am particularly grateful for the expert clinical supervision and training from Leslie Tunnecliffe, who provided considerable time, energy and support in the early years of this project.

It has been a privilege to conduct my research at Princess Margaret Hospital and I am very grateful for the early involvement and support of my field supervisor, Professor Brett McDermott without whom my goal of conducting clinical research within a paediatric hospital would not have been possible. Following the departure of Brett McDermott, the continuation of my research would also not have been possible without the ongoing support and guidance of Professor David Forbes. The assistance of Andrew Hiskins, the Injury Surveillance Officer in the emergency department, and the staff in patient records was much appreciated. Funding from the hospital in the form of a Small Grant was helpful for the purchase of resources and short term employment of research assistants who conducted much of the recruitment, coding and data entry for studies two and three. I wish to thank the research assistants, particularly Rebecca, Hayley and Sharon. More recently, I have appreciated the support of my colleagues, Lisa, Justine and Nick.

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CHAPTER 1

Introduction to Child and Adolescent PTSD

1.1 Preamble

The Diagnostic and Statistical Manual of Mental Disorders (DSM) was first published in 1952 (American Psychiatric Association, APA) and Posttraumatic Stress Disorder (PTSD) was not included in the manual until the third edition, 28 years later (i.e., DSM-III, APA, 1980). A revision of DSM-III several years later (i.e., DSM-III-R, APA, 1987) recognised the unique way in which some PTSD symptoms can present in children, particularly young children, compared to adults.

Coinciding with the recognition of childhood PTSD, there was an increase in research activity investigating the aetiology, assessment, prevention and treatment of children exposed to trauma. A substantial proportion of the research has focused on children exposed to sexual abuse, no doubt because of the abhorrent nature of this type of trauma and the discovery of the pervasive and debilitating sequelae for some children. Exposure to violence, war, terrorism and natural disasters (e.g., hurricanes, earthquakes and volcanic eruptions) also attracted early research interest, but research into common, 'every day' trauma such as motor vehicle accidents, paediatric injuries (e.g., fractures, lacerations, burns, animal bites) and other single traumatic incidents (e.g., anaphylaxis, near drowning, witnessing severe injury) has remained limited.

An increased research focus for single event trauma is important because of the relatively high frequency of this type of trauma exposure and the large number of children involved. With this in mind, there is a need to develop efficient and effective treatments to alleviate the suffering of this substantial population of children. The other key reason for researching single event trauma is that this type of trauma exposure is less complicated than trauma associated with childhood sexual

abuse or war which is more likely to involve repeated exposure over time. Chronic trauma exposure of this type is also likely to result in secondary consequences such as comorbidity, mood dysregulation and maladaptive interpersonal and other behaviours. Research with populations exposed to complex trauma is thus likely to involve more confounding variables. Hence populations exposed to single event trauma are therefore best suited to test the fundamental trauma-related constructs and treatment models.

Aside from the deliberate research of chronically traumatised populations, it is noteworthy that researchers often mix populations of children exposed to simple and complex trauma in the development of trauma related constructs. The view espoused here is that subsequent to testing models with those exposed to single event trauma, research can then investigate how these models are altered by exposure to more complicated trauma. The influence of various factors (e.g., the influence of multiple trauma exposure, serious injury to significant others, death of loved ones, and widespread death and destruction) on the development and treatment of PTSD is worthy of further research using this approach. Alternatively, the deliberate contrast between the extremes of trauma complexity within the same sample may provide an incremental model of how PTSD develops and interacts with other factors (e.g., the developmental, neurological and cognitive consequences of trauma exposure). In the meantime, due to the paucity of treatment studies which contrast the treatment of single and complex trauma, we are yet to determine the fundamental question of whether PTSD symptoms from exposure to single trauma can be treated more rapidly than symptoms associated with complex trauma.

In the process of investigating various aspects of PTSD along a continuum of complexity, it will be important to determine the degree to which the populations are prepared to participate in research. The recruitment of representative samples is

important because findings can then be generalised to the wider population. The obvious concern with PTSD research is that the avoidance component of the disorder may result in unrepresentative samples due to non-participation.

Aside from investigating sample representation, Lang's (1977, 1979, 1983) bio-informational theory was examined in this thesis in the context of treatment for single event trauma. After observing that one particular treatment for PTSD (i.e., eye movement desensitisation and reprocessing) seemed to incorporate Lang's theory very effectively, the author was interested in exploring the efficacy of this intervention with children. An intervention was developed which was ultimately compared to Eye Movement Desensitization and Reprocessing (EMDR).

Before proceeding with the initial investigation of EMDR, chapter 1 provides background information about the diagnostic criteria for PTSD; the way in which particular criteria can manifest in young children, and the prevalence rates of the disorder amongst children. The chapter continues with a broad review of the trauma and PTSD treatment literature beginning with adults, and then children. This is followed by a discussion about the relevance of single event trauma and a description of the search strategy and criteria utilised to identifying single event treatment studies. The chapter concludes with a review of these studies, with a particular focus on EMDR and a review of treatment studies conducted after the publication of the first study in this thesis.

1.2 Definition of Posttraumatic Stress Disorder (PTSD)

Posttraumatic Stress Disorder is a recognised psychiatric or psychological disorder which occurs as a consequence of exposure to a traumatic event, likely to have caused serious harm or death to the self or others. Two recognised diagnostic systems used for the diagnosis of conditions such as PTSD are the International Classification of Diseases – 10th Revision (ICD-10) (World Health Organization,

2008) and the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) (American Psychiatric Association (APA), 1994). However, in relation to PTSD, the concordance between ICD-10 and DSM- IV diagnostic criteria is low (Andrews, Slade & Peters, 1999). More importantly, the DSM-IV diagnosis is typically used in clinical research and this system has a higher threshold for PTSD diagnosis. To meet the DSM-IV criteria for PTSD, the following six criteria (A to F) must be met:

Criterion A. The person has been exposed to a traumatic event in which both of the following are present:

(1) the person experienced, witnessed, or was confronted with an event or events that involved the actual or threatened death or serious injury, or a threat to the physical integrity of self or others,

(2) the person's response involved intense fear, helplessness, or horror. **Note:** In children, this may be expressed instead by disorganised or agitated behaviour.

Criterion B. The traumatic event is persistently re-experienced in one (or more) of the following ways:

(1) recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. **Note:** In young children, repetitive play may occur in which themes or aspects of the trauma are expressed,

(2) recurrent distressing dreams of the event. **Note:** In children, there may be frightening dreams without recognisable content,

(3) acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, delusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated). **Note:** In young children, trauma specific re-enactment may occur,

(4) intense psychological distress at exposure to internal or external cues that symbolise or resemble an aspect of the traumatic event,

(5) physiological reactivity on exposure to internal or external cues that symbolise or resemble an aspect of the traumatic event.

Criterion C. Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the following:

(1) efforts to avoid thoughts, feelings, or conversations associated with the trauma,

(2) efforts to avoid activities, places, or people that arouse recollections of the trauma,

(3) inability to recall an important aspect of the trauma,

(4) markedly diminished interest or participation in significant activities,

(5) feeling of detachment or estrangement from others,

(6) restricted range of affect (e.g., unable to have loving feelings),

(7) sense of a foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal lifespan).

Criterion D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following:

(1) difficulty falling or staying asleep,

(2) irritability or outbursts of anger,

(3) difficulty concentrating,

(4) hypervigilance,

(5) exaggerated startle response.

Criterion E. Duration of the disturbance (symptoms in criteria B, C, and D) is more than one month.

Criterion F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

(American Psychiatric Association, 1994, p. 427-429)

Whilst the assessment of PTSD throughout this thesis was based on DSM-IV criteria, technical changes to the diagnosis of PTSD have been made in the recently published DSM-5 (APA, 2013)[2]. In broad terms, criterion A(2) has been eliminated, criterion C has been simplified to include just the avoidance items, and the remaining items have been included in an additional criterion (Criterion D), which relates to "negative alterations in cognitions and mood". This additional criterion has resulted in the arousal criterion moving from D to E; similarly, criterion E, F and G, are now criterion F, G and H (APA, 2013).

[2] A major change in DSM-5 is the addition of a Preschool Subtype of PTSD (APA, 2013) which differs from that of adults and children over six years. Specifically, only one symptom is required from Criterion C (Avoidance) or D (Negative Cognitions and Mood) instead of one and two respectively. In addition, the first three of seven symptoms were eliminated from Criterion D because they were uncommon in young children or difficult to detect (i.e., difficult recalling key features of the traumatic event, persistent negative beliefs/expectations about oneself and the world, and persistent distorted blame of self and others for causing the traumatic event). The diminished interest item changed from, "markedly diminished interest in (pre-traumatic) significant activities" to "diminished interest in significant activities, including constriction of play" and the detachment/estrangement item changed from "feeling alienated from others (e.g., detachment or estrangement)" to "socially withdrawn behaviour".

1.3 PTSD in Children and Adolescents

The term 'children' will be used throughout this thesis to refer to both 'children and adolescents' aged from six to 17 years. Where there is a need to refer to children, the age range will be specified (aged six to 12 years) or the term 'primary school aged children' will be used. Alternatively, the term 'adolescents' will refer to children aged 13 to 17 years.

As detailed above, the DSM-IV (APA, 1994) criteria for PTSD specified the way in which Criteria A2, B1, B2 and B3 can manifest differently in children compared to adults.

1.4 Type I and Type II Trauma

The distinction between type I and II trauma was first described by Terr (1991) and refers to both the nature and impact of the trauma exposure. Type I trauma refers to a single, unexpected traumatic event which results in typical PTSD symptoms. Type II trauma, on the other hand, refers to complicated or repeated trauma (e.g., violence, abuse and neglect), the response to which is more likely to involve "massive denial, psychic numbing, self-anesthesias or personality problems" (Terr, 1991, p. 327). Terr (1991) also noted that type I trauma involving the death of a parent, homelessness, permanent impairment or disfigurement, prolonged hospitalisation and pain was more characteristic of type II trauma (Terr, 1991). Terminal illness such as cancer should also be classed as type II trauma (Kira, 2001).

1.5 Prevalence of PTSD

It is estimated that between 4% and 12% of children will develop PTSD in their lifetime (Salmon & Bryant, 2002). Whilst the prevalence of PTSD ranges from 13% to 45% following exposure to trauma, the incidence varies depending on the nature of the traumatic event. Specifically, higher prevalence rates (30-58%) are reported following physical and sexual abuse, and war trauma (Makley & Falcone,

2010; Tufnell & DeJong, 2009). Comparatively lower prevalence rates of approximately 23-30% are reported following exposure to motor vehicle or traffic accidents (Aaron, Zaglul, & Emery, 1999; Makley & Falcone, 2010; Tufnell & DeJong, 2009). In reporting these prevalence rates, it is important to acknowledge that developmental and contextual factors may compromise the assessment of PTSD symptoms, particularly in younger children (Salmon & Bryant, 2002). However, as noted in Section 1.2., the addition of the Preschool Subtype of PTSD in the DSM-5 (APA, 2013) has alleviated some of the challenges with assessing younger children.

1.6 Comorbidity, Psychosocial Sequelae and Prognosis for PTSD

PTSD in children and adults is associated with high rates of comorbidity particularly in regard to anxiety and mood disorders (e.g., major depressive disorder) (Creamer, Burgess & McFarlane 2001; Davis & Siegel, 2000; Reed, Anthony & Breslau, 2007). Whilst preschool aged children are not the focus of this thesis, this age group is more likely to suffer from separation anxiety and behavioural disorders such as attention deficit hyperactivity and oppositional defiant disorder (Scheeringa, Zeanah, Myers & Putnam, 2003). At the other end of the age spectrum, the adolescent age group reports a higher incidence of comorbid substance abuse and suicidal ideation (Reed, Anthony & Breslau, 2007) which is more in line with the adult PTSD population.

Of note, even those who do not meet full criteria for PTSD have been shown to suffer from comorbid psychiatric disorders, reduced quality of life and poorer health (Graham-Bermann & Seng, 2005; McDermott & Cvitanovich, 2000).

There is a lack of longitudinal studies which track the prognosis of children with PTSD over periods longer than a few years, but the existing evidence indicates that for the majority, the condition is chronic and could persist well into adulthood (Morgan, Scourfield, Williams, Jasper & Lewis, 2003; Yule et al., 2000).

1.7 Treatments for Childhood Trauma and PTSD

A number of psychological (and pharmacotherapy) treatment modalities have been applied to the alleviation of childhood trauma and PTSD symptoms and the efficacy of these are reviewed below (see sections 1.9 and 1.10). Amongst the non-CBT treatment modalities are art therapy, client parent psychotherapy, imagery rehearsal therapy, psychodynamic therapy and psychological debriefing. However, it has proved difficult to determine the efficacy of many of these because they have not used a standard (manual-based) treatment protocol, or have not been tested in randomised and controlled treatment trials. Protocols for Cognitive Behaviour Therapy have also varied, but typically consist of core elements that are well established in the treatment literature. Indeed, the established techniques and efficacy of CBT, and more recently EMDR, has made them appealing (with appropriate adaptation) for use with children.

In very broad terms, the main components of CBT are derived from the term itself. Behaviour therapy involves the application of behavioural principles such as desensitisation, habituation, extinction and learning theory in the form or classical and operant conditioning. Self-monitoring and skills training could also be considered important behavioural components of CBT. Cognitive therapy involves the reappraisal of persistent maladaptive interpretations associated with the traumatic experience (e.g., the belief that the world is unsafe, that they are defective in some way, somehow responsible for the trauma or should not have survived).

The most established and empirically supported treatment for childhood trauma is a particular type of CBT termed Trauma-Focused Cognitive Behaviour Therapy (TF-CBT) which was developed over a couple of decades by Cohen and colleagues to assist those with PTSD from sexual abuse and loss (Cohen, Mannarino,

Deblinger, 2006). TF-CBT is a highly structured and manualised protocol consisting of eight core components as follows (i.e., as per the acronym, "PRACTICE"):

Psycho-education – the nature of trauma symptoms and the rationale for their treatment is explained to parents and children (using age appropriate language) and, to ensure that they understand, further explanation is provided if necessary throughout the treatment. Whilst the development of therapeutic rapport is not unique to CBT, the approach is collaborative and requires the active participation of the client in the therapeutic techniques,

Relaxation – slow breathing techniques or progressive muscle relaxation,

Affective modulation skills – identification of negative mood states and coping strategies, positive self-talk, problem solving, thought stopping,

Cognitive coping – application of standard cognitive therapy including thought monitoring and the identification of more constructive and helpful thinking styles,

Trauma narrative development and processing – identifies the child's specific trauma related negative thoughts and applies cognitive therapy to these,

In vivo exposure – graded exposure to trauma-related fear stimuli to bring about desensitisation,

Conjoint parent/child sessions – involves the sharing of the child's trauma narrative with their parents and the discussion and remedy of family issues, and

Enhancing safety/ future development – addresses the risk of further trauma to the child and assists them to reinstate their normal functioning and developmental milestones. (Cohen, Mannarino, Deblinger, 2012)

Amongst the non-CBT approaches, EMDR has been the focus of increasing research interest with child populations over the past decade and the protocol is best

described as an eclectic therapy consisting of eight treatment phases some of which incorporate the novel use of rapid side to side (saccadic) eye movements (Shapiro, 1995, 2001). The procedure will not be described here because a detailed protocol is provided in the appendix of chapter 2. However, in summary, the key elements of the protocol involve the establishment of a safe place (e.g., through pleasant or relaxing imagery), psycho-education, the identification of a trauma memory, desensitisation to the trauma memory and techniques to generalise therapeutic gains and enhance future coping. It is noteworthy that some of these elements are synonymous with those utilised in TF-CBT.

1.8 Treatment Efficacy for Trauma and PTSD in Adults

There is good empirical support for the treatment of anxiety, depression and other mental health problems with cognitive behavioural therapy (Butler, Chapman, Forman & Beck, 2006) and amongst the anxiety disorders, the efficacy of cognitive behaviour therapy for the treatment of PTSD is strong (Norton & Price, 2007). Furthermore, in line with the increasing number of treatment studies over the past decade or so, several reviews and meta-analyses of CBT and other therapies for PTSD have been conducted (e.g., Benish, Imel & Wampold, 2007; Bisson et al., 2007, Bradley, Greene, Russ, Dutra & Western, 2005; Chemtob, Tolin, van der Kolk & Pitman, 2000; Cukor, Spitalnick, Difede, Rizzo & Rothbaum, 2009; Davidson & Parker, 2001; Maxfield, 1999; Maxfield & Hyer, 2002; Seidler & Wagner, 2006; Shapiro, 2001; Sherman, 1998; Van Etten &Taylor, 1998). With one notable exception (Benish et al., 2007) based on flawed methodology (Ehlers et al., 2010), the consensus view is that trauma-focused cognitive behaviour therapy and Eye Movement Desensitisation and Reprocessing (EMDR) have similar and superior efficacy compared to other treatments. Consistent with this conclusion, a number of international medical and mental health agencies have endorsed these as the

treatments of choice or first line therapies. For example, the American Psychiatric Association, 2004; Department of Veterans Affairs & Department of Defense, 2004; Dutch National Steering Committee Guidelines Mental Health Care, 2003 and the National Institute for Clinical Excellence, 2005. Australia also adopted guidelines for the treatment of adults with PTSD (Forbes et al., 2007) which recommended trauma-focused Cognitive Behaviour Therapy or Eye Movement Desensitisation and Reprocessing (EMDR) with additional in vivo exposure. More recently, the Australian treatment guidelines (Australian Centre for Posttraumatic Mental Health, 2013) have excluded the need for additional in vivo exposure for EMDR treatment.

Since the establishment of the above treatment guidelines, the strongest and most recent support for the superiority of CBT and EMDR comes from a comprehensive meta-analysis (Cloitre, 2009) and extensive review of the international treatment literature by the Centre for Military & Veterans' Health in Australia (Pietrzak, 2011). Cloitre (2009) examined 57 treatment studies, 46 of which examined four categories of cognitive behavioural type treatments: i) exposure therapy and/or cognitive therapy, ii) anxiety management and problem solving, iii) EMDR, and iv) cognitive behavioural and emotion focused treatment (including skills training) for chronic interpersonal violence. Cloitre (2009) concluded that exposure therapy plus cognitive therapy, and EMDR were superior to other treatments and that cognitive behaviour therapy (exposure and cognitive therapy combined) was superior to either exposure or cognitive therapy alone. The more recent review by Pietrzak (2011) included three additional meta-analyses and eight randomised controlled trials, but no changes to the Australian treatment guidelines were indicated. It should be noted that the Australian guidelines for the treatment of PTSD also stated that when psychotropic medication is required (e.g., if psychological treatment is refused or if there is inadequate benefit from

psychological treatment), selective serotonin reuptake inhibitors should be the first choice of medication.

1.9 Treatment Efficacy for Trauma and PTSD in Children

Over the past decade, there has been a marked increase in the volume of empirical research investigating psychological (and pharmacological) treatments for child and adolescent PTSD symptoms. Therefore, it is not surprising that during the past decade there have been seven reviews (Cary & McMillen, 2012; Flemming, 2012; Huemer, Erhart & Steiner, 2010; Peltonen & Punamaki, 2010; Stamatakos & Campo, 2010; Strawn, Keeshin, DelBello, Geracioti & Putnam, 2010; Wethington et al., 2008) and six meta-analyses (Harvey & Taylor, 2010; Kowalik, Weller, Venter & Drachman; 2011; Rodenburg, Benjamin, de Roos, Meijer & Stams, 2009; Rolfsnes & Idsoe, 2011; Silverman et al., 2008; Trask, Walsh & DiLillo, 2011) investigating the efficacy of treatment for children. The findings from the reviews are presented in Table 1 and summarised in section 1.6.1, and the findings from the meta-analyses are presented in Table 2 and summarised in section 1.6.2.

1.9.1 Findings from reviews.

As summarized in Table 1, the review by Wethington et al. (2008) supported the efficacy of Cognitive Behaviour Therapy (CBT) above any other treatment modality for a range of trauma exposed populations (regardless of whether they were delivered in an individual or group format). The review by Cary and McMillen (2012) investigated the efficacy of different types of CBT for children who were predominantly afflicted by interpersonal violence and terrorism. In general, the efficacy of CBT for both PTSD and non-PTSD symptoms was supported, and Trauma Focused CBT in particular proved superior for PTSD symptoms at 12 month follow-up. Fleming's (2012) findings supported the efficacy of EMDR for single event (i.e., type I) trauma and there was some indication that EMDR may be more

efficient than CBT. In contrast, the support for the efficacy of EMDR for chronic or repeated (i.e., type II) trauma was considered preliminary; hence, further research is required.

In three separate reviews (see Table 1), it was concluded that there is little evidence to support the efficacy of pharmacotherapy (e.g., sertraline, imipramine and divalproex sodium) for PTSD symptoms in children. Strawn et al. (2010) concluded that the findings do not support further investigation of pharmacological treatments for PTSD symptoms. On the other hand, Stamatakos and Campo (2010) reported that significant comorbidity and the lack of access to evidence based psychological treatment supported continuing research efforts into appropriate pharmacotherapy. They proposed that the most appropriate future research would examine the efficacy for Selective Serotonin Reuptake Inhibitors (SSRI's) in the treatment of youth with PTSD and comorbid depression because the efficacy of SSRI's for youth depression has been confirmed.

Whilst there was general support for the psychological treatment of those exposed to armed conflict (see Table 1), there have not been enough controlled studies to determine the effectiveness of treatments for this population (Peltonen & Punamaki, 2010).

Table 1
Reviews investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Wethington, Hahn, Fuqua-Whitley, Sipe, Crosby et al., (2008) 30 studies (21 randomised; 3 quasi randomised) **No (%) of studies/ treat type:** CBT 21 (70%) Play therapy 4 (13%) Art Therapy 1 (3%) Psychodynamic – 1 (3%) Pharmacotherapy – 2 (7%) Psychological Debriefing – 1 (3%)	Reviewed seven types of interventions commonly used to treat youth (included children, adolescents and young adults ≤ 21 years of age).	**Effect size for PTSD measures** Based on fixed (or random*) standard mean difference: Individual CBT: Overall PTSD measures: g = .34 Compared to untreated comparison: g = .86 Compared to treatment comparison: g = .25 Sexual abuse: g = .29 Various Trauma types: g = .36 Group CBT Overall PTSD measures: g = .56* Compared to untreated comparison: g = .93* Compared to treatment comparison: g = .07 Community violence: g = .87* Natural disasters: g = 1.01* Sexual abuse: g = .04 Suicide of family member: g = .10 **Effect size for Non-PTSD measures** Effect size for anxiety, depression, externalizing & internalizing respectively Individual CBT Regardless of type of comparison group: g = .31, .19*, .23*, .13* Compared to an untreated comparison group: g = .70, .87, .61, .58 Compared to a treated comparison group: g = .26, .01, .19*, .01* Individual CBT by type of trauma Sexual abuse: g = -.23, -.03, N/A, N/A Various Trauma Types: g = -.48, -.41, N/A, N/A Group CBT Compared to an untreated comparison group: g = .88, .53, N/A, N/A Compared to a treated comparison group: g = .10, .14, N/A, N/A Group CBT by type of trauma Community violence: g = N/A, 46, N/A, N/A Natural disasters: g = N/A, 1.08, N/A, N/A Sexual abuse: g = N/A, -.14, N/A, N/A Suicide of family: g = N/A, .38, N/A, N/A	**Purpose of study** Examined the efficacy of a broad range of interventions commonly used to reduce the psychological harm resulting from exposure to traumatic events. **Type of trauma exposure** Included "individual/mass, intentional/unintentional, or manmade/natural traumatic exposures" (p287) such as sexual and physical abuse, community and domestic violence, war, cancer, pediatric trauma, burns, motor vehicle accidents and natural disasters. **Treatment types** "Individual cognitive-behavioral therapy, group cognitive behavioral therapy, play therapy, art therapy, psychodynamic therapy, pharmacologic therapy and psychological debriefing". (p287). **Key findings** • Cognitive behavior therapy (CBT) proved to be the most effect treatment regardless of the mode of delivery (i.e., individual or group). There was limited support for pharmacotherapy, psychodynamic and play therapy and no support for art therapy or psychological debriefing. • Evidence based treatments such as individual and group CBT should be used to treat trauma exposed youth. • Further research is required to determine the efficacy of some treatments. **Methodological issues** • Apart from age and type of trauma exposure, the studies involved a diverse range of measures, lack of information about sample characteristics, treatment settings, treatment content and validity. The implication of these findings is therefore rather broad. • The CBT studies related to populations from high income countries. **Comments** • Seven studies were quasi- or non-randomized (one at a group level and six at an individual level) and three of these included at least some children outside the 6-17 year age range. • The majority of children in six of the studies were outside the 6 to 17 year age range.

Table 1 cont..
Reviews investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Cary & McMillen (2012) 10 studies (all randomised) **No (%) of studies/ treat type:** CBT 10 (100%) (TF-CBT: 3 & CBT: 7)	Comparison of Trauma-Focused Cognitive – Behavioural Therapy, CBT, and other treatments.	**Pooled effect size for PTSD measures:** At post treatment compared to an inactive control condition Branded TF-CBT: *d* = .41 (sig) TF-CBT (5 components): *d* = .49 (sig) TF-CBT (4 components): *d* = .67 (sig) Compared to an active treatment condition (child cognitive behaviour therapy): Branded TF-CBT: N/A (there were no comparisons with active treatments) TF-CBT (5 components): *d* = .10 (non-sig) TF-CBT (4 components): N/A (there were no comparisons with active treatments) At 12 month follow up: Branded TF-CBT: *d* = .35 (sig) TF-CBT (5 components): *d* = .39 (sig) TF-CBT (4 components): N/A (there were no studies that included a 12 month follow up) **Pooled effect size for non-PTSD measures (depression & problem behaviours respectively)** Compared to an inactive control condition at post treatment for: Branded TF-CBT: *d* = .32 (sig), .20 (sig) TF-CBT (5 components): *d* = .36 (sig), .24(sig) TF-CBT (4 components): *d* = .38 (sig), .25(sig) Compared to an active treatment condition (child cognitive behaviour therapy): Branded TF-CBT: N/A (there were no comparisons with active treatments) TF-CBT (5 components): *d* = .04 (non-sig), .33 (non-sig) TF-CBT (4 components): N/A (there were no comparisons with active treatments) Pooled effect size at 12 month follow up: Branded TF-CBT: *d* = .17 (non sig) *d* = .09 (non sig) TF-CBT (5 components): *d* = .17 (non sig) *d* = .15 (non sig) TF-CBT (4 components): N/A (there were no studies that included a 12 month follow up)	**Purpose of study** Compared the efficacy of "Branded Trauma-Focused Cognitive Behaviour Therapy" (i.e., TF-CBT*) with three levels of unbranded TF-CBT (i.e., those sharing all 5, 4 and 3 of the core components) **TF-CBT (Cohen, Mannarino & Deblinger, 2006) is a manualised and widely disseminated treatment protocol consisting of eight treatment components (delivered with some flexibility) over sequential 90 minute treatment sessions. The eight treatment components include: psycho-education and parenting skills, relaxation, affect expression and regulation, cognitive coping, trauma narrative development and processing, in vivo gradual exposure, conjoint child/parent sessions and safety enhancement/future development.* **Type of trauma exposure** All but two of the studies were limited to children and youth exposed to interpersonal violence or terrorism **Key Findings** • Compared to inactive control conditions (i.e., wait-list, attention and standard community care) TF-CBT was more effective for reducing problem behaviour, PTSD and depressive symptoms at post treatment, but at the 12 month follow up, the superiority of TF-CBT was only maintained for PTSD symptoms. • TF-CBT was no more effective than the other active treatment conditions (child cognitive behaviour therapy) probably because the latter included core components of the TF-CBT protocol (e.g., exposure and cognitive reframing). (p756) **Strengths** • All of the studies included in this review were randomized and controlled. **Methodological issues** • The authors acknowledged that this review of 10 studies was substantial in the field of child trauma, but was a relatively small number of studies for a meta-analysis. • Due to the above, the review did not explore, "mediating and moderating effects of the intervention component" (p756). • There were no studies which compared TF-CBT with an alternative treatment condition and longer term follow-ups were lacking for comparisons of TF-CBT and CBT (without all the TF-CBT components). • The sample sizes were relatively small and a few studies involved moderate to high attrition rates or the quality of blind assessment was unclear (potentially absent). **Comments** • Three of the studies consisted of relatively small sample sizes (N = 24 to 32) and it was not possible to identify the factors which mediated or moderated treatment effects. • The majority of children in one of the studies were below the 6 to 17 year age range.

Table 1 cont..
Reviews investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Fleming (2012) 16 studies (6 randomised) **No (%) of studies/ treat type:** EMDR (100%)	Reviewed the Effectiveness of Eye Movement Desensitization and Reprocessing in the Treatment of Traumatized Children and Youth.	**Effect size for PTSD measures:** Not reported. **Effect size for Non-PTSD measures:** Not reported.	**Purpose of study** To review the efficacy of EMDR for children and youth following Type 1 and Type 11 traumas. **Type of trauma exposure** Type I - Hurricane, MVA, Earthquake and explosion of fireworks factory. Type II - sexual abuse, maltreatment, war and witnessing unnatural death **Key Findings** • There is good support for the efficacy of EMDR for the treatment of comorbid PTSD (anxiety, depression and behavioural) symptoms from Type I trauma and results are maintained at long-term follow up. • There was preliminary support for the efficacy of modified EMDR with pre-school aged children. • Whilst EMDR and CBT were equally effective, EMDR may be more efficient than CBT because results were achieved in fewer sessions (de Roos et al., 2011; Jaberghaderi et al., 2004). • There was only preliminary evidence from one study of the efficacy of EMDR for the treatment of Type II traumas (i.e., Jaberghaderi et al., 2004), and for chronic trauma such as sexual abuse, it was suggested that EMDR could be integrated with family therapy. • The more substantial improvement in re-experiencing compared to avoidance and hyperarousal symptoms with EMDR supports the suggestion that combined EMDR and CBT treatment could result in maximum benefit. • In summary, the results are promising, but more research is required for children suffering repeated interpersonal traumas. **Strengths** • Details the findings from all investigation, including several single cases and a case series. **Methodological issues** • The authors acknowledged that a number of the studies were not randomized. **Comments** • This paper is important in the context of this thesis because it highlights the need to consider the broad type of trauma exposure in the context of treatment.

Table 1 cont..

Reviews investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Peltonen & Punamaki (2010) 19 studies (3 randomised; 1 quasi-randomised) **No (%) of studies/ treat type:** CBT 12 (63%) Non-specific therapy – 6 (32%) CISM (Critical Incident Stress Management) – 1 (5%)	Review of treatments for children traumatised by armed conflict	**Effect size for PTSD measures:** The overall effect sizes for four treatment studies (2 non-randomised): *d* = .56 **Effect size for Non-PTSD measures:** Not reported.	**Purpose of study** Examined the effectiveness of psychosocial interventions (prevention and treatment) for preventing and improving psychological functioning in children exposed to armed conflict. **Type of trauma exposure** Armed conflict. **Key Findings** • This study highlighted the paucity of controlled treatment studies for war and terror exposed children. • Due to the small number of controlled studies a meta-analysis was not possible. However, CBT-based interventions were the most effective. • Whilst the results of these studies supported the role of psychosocial prevention and intervention in alleviating PTSD and other symptoms, the efficacy of these interventions is yet to be determined and further extensive research is required. **Methodological issues** • Most of the studies were non-randomised and half did not involve a control group hence, positive results were undermined by a lack of methodological rigor. • Whilst most treatments were based on CBT , a wide range of treatment components were included. • Most of the preventive therapy (i.e., almost two thirds the studies) focused on trauma-related negations emotions (e.g., guilt, fear, anger), and a third of the studies targeted improved social interaction as a primary outcome. • Only a few studies targeted the combined impact of traumatisation in the context of developmental processes. • Only 25% of the studies included a follow-up. **Comments** • As noted above, this review was largely descriptive. Four studies did not report participant characteristics and the majority of children in one of the studies were below the 6 to 17 year age range. • Six studies utilised sample sizes less than 12 and the majority of studies were non-randomised hence it is not possible confirm the role of treatment for this type of trauma

Table 1 cont..
Reviews investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Heumer, Erhart, & Steiner (2010) 10 studies (3 randomised) **No (%) of studies/ treat type:** Pharmacotherapy (100%)	Review of pharmacotherapy for PTSD	**Effect size for PTSD measures:** Not reported **Effect size for Non-PTSD measures:** Not reported	**Purpose of study** Review the efficacy of psychopharmacotherapy for child and adolescent PTSD. **Type of trauma exposure** Mixed. **Key Findings** • There are a limited number of randomised controlled treatment trials. • A developmental approach to the assessment of PTSD was presented along with "a model quenching and kindling in the context of stress exposure" (p624). • The use of medication is not supported by the results of randomised controlled trials. • The completion of further clinical trials is limited by important ethical considerations (e.g., lack of efficacy, concern about side effects and the potential for some medications to increase the risk of self-harm). • **Methodological issues** • Only three medications were evaluated in random clinical trials. • The literature search was limited to one database (i.e., Pubmed) and a few key publications • The majority of studies consisted of small sample sizes, were non-randomised, uncontrolled, and did not include a follow-up. **Comments** • Despite the lack of evidence supporting the use of pharmacotherapy, the potentially widespread use of pharmacotherapy by psychiatrists was acknowledged (particularly selective serotonin reuptake inhibitors and alpha-adrenergic agonists). • Further research is necessary to investigate the discordance between evidence and practice.

Table 1 cont..

Reviews investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Stamatakos & Campo (2010) 15 studies (3 randomised) **No (%) of studies/ treat type:** Pharmacotherapy (100%)	Review of pharmacotherapy for child and adolescent PTSD		**Purpose of study** Examined the efficacy of pharmacotherapy for the treatment of child and adolescent PTSD. **Type of trauma exposure** Mixed. **Key Findings** • Due to the limited number of studies, support for pharmacotherapy was sparse. • Selective Serotonin Reuptake Inhibitors were considered the most promising focus of future research because of their potential benefit for comorbid disorders (e.g., sleep disorders). **Methodological issues** • Only three randomized controlled trials were identified. **Comments** • Further research is necessary to determine if pharmacotherapy for children with comorbid PTSD can be of benefit.
Strawn, Brooks, Keeshin, DelBello et al., (2010) 19 studies (3 randomised) **No (%) of studies/ treat type:** Pharmacotherapy (100%)	Review of pharmacotherapy for PTSD	**Effect size for PTSD measures:** Not reported **Effect size for Non-PTSD measures:** Not reported	**Purpose of study** To summarize the evidence for psychopharmacological interventions for youth with PTSD given the limited volume of research and conflicting results. **Type of trauma exposure** Mixed **Key Findings** • The findings did not support the use of SSRI's as a first line treatment, and amongst the range of agents which have been used in case studies or open trials none appear to offer clear and consistent benefits. • SSRI's "may have a treatment role" in (p936) patients with PTSD and comorbid disorders and there is some evidence for the potential benefit of other classes of medications (e.g., antiadrenergic agents and second generation antipsychotics). • Given the limited overall evidence for pharmacotherapy, future research should examined the complimentary role of SSRI's and other pharmacotherapy agents in conjunction with evidence based psychological therapies. **Methodological issues** • There were only four randomized controlled trials were reviewed and one of these involved participants with acute stress rather than PTSD. • All studies featured a number of methodological problems (e.g., limited treatment duration, inadequate measures of PTSD and lack of follow up data). **Comments** • Most of the non-randomised studies were single case or pre to post designs with small sample sizes (i.e., N < 12) and three studies used adjunctive pharmacotherapy. • The contrast between the lack of empirical evidence and psychiatric practice was acknowledged

1.9.2 Findings from meta-analyses.

A meta-analysis of various psychological treatments by Silverman et al. (2008) confirmed the superiority of CBT compared to non-CBT treatments for PTSD in children (see Table 2). However, the lack of methodological detail, limited range of non-CBT treatment modalities and lack of longer term follow-up, made it difficult to accurately determine the efficacy of the non-CBT treatments.

Kowalik et al. (2011) compared CBT to various treatments, but only in relation to one non-trauma outcome measure (i.e., the Child Behaviour Checklist) (see Table 2). CBT was more effective than other (active and inactive) treatments on total problems and internalising, but other treatments were more effective for externalising and total competence.

In their meta-analysis, Rodenburg et al. (2009) examined the incremental efficacy of EMDR, first in comparison to wait list control studies, then treatment as usual, followed by CBT (see Table 2). Significant and moderate effect sizes were observed in favour of EMDR compared to inactive treatments such as wait list control and treatment as usual. EMDR also proved more efficacious than CBT, but the effect size was small.

In addition to reviewing the sexual abuse literature, both Harvey and Taylor (2010) and Trask et al. (2011) also examined moderator variables (see Table 2). Five pre to post treatment studies yielded a moderate effect size which was non-significant, most likely because of the impact of an outlier study (i.e., effect size = -0.18) (Trask et al., 2011). Apart from this anomaly, there was support for the efficacy of psychological treatment for alleviating trauma and non-trauma symptoms. Treatment gains were generally maintained over follow-up periods from one to six months (Harvey & Taylor, 2010) although Trask et al. (2011) did not report follow-up data. In regard to moderator variables, longer interventions were more effective

(Trask et al., 2011), but the best mode of delivery was unclear. Harvey and Taylor (2010) reported that family and individual approaches were better than group treatment; whilst Trask et al. (2011) found that there was no difference between individual and group treatments. Not surprisingly, experimental designs, manualised treatments, and treatments which included homework, were more effective that those without these features (Harvey & Taylor, 2010).

Rolfsnes and Idsoe (2011) confirmed the efficacy of school based psychosocial intervention (particularly CBT) (see Table 2). A total of 19 studies from nine countries were included in the analysis and there was good support for school based intervention to alleviate PTSD. Furthermore, there was some evidence for higher completion rates for school based compared to clinic based treatment. The most common treatment modality was CBT, which showed moderate to large effect sizes. Three non-CBT treatments showed promise, but further replication is required. Conclusions about the degree to which outcomes were maintained over time and could be generalised to other populations were limited by methodological issues such as the low proportion of randomized studies, lack of manualised treatment protocols, multimodal measures, blind/independent outcome ratings and follow-up assessment.

Table 2

Meta-analyses investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Silverman, Oritz, Viswesvaran, Burns, Kolko et al., (2008) 21 studies (all randomised) **No (%) of studies/ treat type:** CBT 13 (62%) Resilient Peer Treatment – 2 (10%) EMDR – 1 (5%) Client Parent Psychotherapy – 1 (5%) Standard Group Therapy – 1 (5%) Recovery From Abuse Program – 1 (5%) Individual + Carer Support – 1 (5%) Psychological Debriefing – 1 (5%)	Investigated the efficacy of psychosocial treatments for children afflicted by trauma	**Effect size for PTSD measures:** Overall mean weighted effect size: d = .43 CBT: d = .50 Non-CBT: d = .19 Other treatments: d = .38 Treatments for Sexual Abuse: d = .46 Child-Only Treatments: d = .44 Child + Parent Treatments: d = .42 **Effect size for Non-PTSD measures** Overall mean weighted effect size for anxiety, depression and externalizing respectively: d = .09; .24, .22 CBT: d = .15; .29; .24 Non-CBT: d = -.05; .08; .02 Other treatments: d = .05; .19; .28 Treatments for Sexual Abuse: d = .10; .30; .19 Child-Only Treatments: d = .-.01; .25; .34 Child + Parent Treatments: d = 16; .19; .14	**Purpose of study** Examined the efficacy of psychosocial treatments for children and adolescents exposed to trauma. Outcomes included both trauma and non-trauma measures. **Type of trauma exposure** Mixed including Sexual abuse **Key Findings** • In comparison to non-CBT, CBT treatments were more effective in reducing PTSD and non-PTSD symptoms (including depression and externalizing behaviours, and to a lesser extent, anxiety). • Effect sizes did not differ between active treatments involving the child only, and child plus parent. • Compared to other types of trauma, treatments for sexual abuse were more effective in reducing PTSD symptoms and depression. Treatments for other types of trauma were however more effective in reducing externalising behaviour. **Strengths** • All of the studies were randomized and controlled; six studies involved a waitlist control and the remainder consisted of an alternative treatment condition. • More the half of the studies were conducted in community or hospital settings **Methodological issues** • Only eight (38%) of the studies included a follow up beyond three months hence the longer terms maintenance of therapeutic gains is unclear. • The studies included in this meta-analysis used a wide range of outcome measures which make it difficult to generalize findings. • There was a lack of treatment fidelity monitoring and ratings, and a lack of detail in the studies in regard to how they adapted treatments for different age and ethnic groups. • There were a limited number of studies in the 'non-CBT' and 'other' treatment categories (e.g., EMDR), and these treatments varied markedly in their approach. The potential benefit of such treatments was therefore likely to have been understated. • The variation in the severity of PTSD symptom across studies might explain the generally low treatment effect sizes. **Comments** • The majority of children in six (29%) studies were outside the 6 to 17 year age range.

Table 2 cont..

Meta-analyses investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Kowalik, Weller, Venter & Drachman (2011) 8 studies (all randomised) **No (%) of studies/ treat type:** CBT 10 (100%)	Compared the efficacy of CBT to other interventions	**Effect size for PTSD measures:** Not reported **Effect size for Non-PTSD measures:** CBCL Effect sizes: total competency: g = .05 (non sig*) total problems: g = .33 (sig) internalising: g = .31 (sig) externalising: g = .19 (sig*) *Fail safe N indicated poor effect validity	**Purpose of study** Examined the efficacy of CBT compared to active treatment controls such as supportive and non-directive psychotherapy, community treatment, client centered therapy, parent training for child behaviour management and communication, and parent only or child and parent treatment. All studies utilised the Child Behaviour Checklist (CBCL) as an outcome measure. **Type of trauma exposure** Sexual abuse **Key Findings** • The efficacy of CBT for the treatment of pediatric PTSD was supported in comparison to other active comparison treatments. Treatment effects were significant for CBCL measures of total problems and internalizing (e.g., anxiety and depression), but not for externalizing (e.g., aggression and rule breaking behaviour) and total competence. **Strengths** • Only high quality randomized studies were included in this meta-analysis and all studies involved an active treatment comparisons condition. • Treatment outcomes on the primary measure (CBLC) suggest that CBT treatments do not adequately address externalizing and competence behaviours, and these dimensions of behaviour appear relevant to the impact of sexual abuse. • The authors' calculation of a fail-safe N of four studies for total problems and internalizing confirmed that neither a publication bias or the limited number of studies compromised the validity of the effect sizes for these measures. **Methodological issues** • The authors acknowledged the limited number of studies and all of them related to populations of children exposed to sexual abuse. The findings could not be generalized to the treatment of children exposed to different types of trauma. • "There was an absence of randomized control group designs" (p411) • A wide range of measures were used making comparison across studies difficult. In addition, only half of the studies utilised all of the CBCL outcome measures and only two included a PTSD outcome measure. ? • The authors acknowledged that the calculation of a Fail-safe N of zero for externalizing problems and total competence was indicative of invalid effects sizes for these measures. • The type or content of CBT treatment, and duration and number of treatment sessions varied between studies. • No follow up data was reported so it is unclear whether treatment gains were maintained over time. **Comments** • More than half of the studies compared CBT to an inactive treatment control. • The majority of children in one of the studies were below the 6 to 17 year age range. • Dismantling studies would help to identify the most potent components of CBT.

Table 2 cont..

Meta-analyses investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Rodenburg, Benjamin, et al., (2009) 7 studies (all randomised) **No (%) of studies/ treat type:** EMDR 7 (100%)	Investigated the incremental efficacy of EMDR	**Effect size for PTSD measures:** Overall effect size: *d* = .56 Mean comparison effect sizes: vs waitlist, *d* = .69 vs treatment as usual: *d* = .66 vs CBT: *d* = .29 **Effect size for Non-PTSD measures:** Not reported.	**Purpose of study** Examined the efficacy of EMDR from an incremental perspective. EMDR was compared to waitlist (3 studies), treatment as usual (2 studies), and then to CBT (2 studies). **Type of trauma exposure** Mixed **Key Findings** • The efficacy of EMDR was supported with a moderate (*d* = .56) overall effect size when EMDR was compared to wait-list or treatment as usual and small when EMDR was compared to CBT. • Further comparison studies with active treatment conditions are needed. • Whilst there were too few studies to investigate the impact of type of trauma on treatment outcome, the authors referred to their initial moderator analysis which indicated that EMDR was effective for type 1 trauma. • The effect size was larger for studies involving fewer treatment sessions. • The effect size was smaller for girls compared to boys, and the authors considered that this may be due to their stronger trauma reactions. • Smaller effect sizes were observed for studies conducted more recently and those with higher completion rates. **Strengths** • All studies were randomized and controlled and compared EMDR to a control group. • The studies involved children exposed to a broad range of traumatic events. **Methodological issues** • The authors acknowledged that the small number of studies limited the degree to which findings could be generalized. • No non-trauma measures or follow up data was reported therefore it is unclear if treatment gains were maintained over time. • Compared to studies using parent and child measures, those using only child self-report showed smaller effect sizes. • There small number of studies (7) and sample sizes (N = 14 to 39) and the clinical significance of outcomes was not reported. **Comments** • Only two of the studies reported PTSD diagnosis. • The authors note the need for important role of parent reported data for the assessment of the child's post trauma behaviours, feelings and emotions.

Table 2 cont..

Meta-analyses investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Harvey & Taylor (2010) 39 studies (18 randomised) **No (%) of studies/ treat type:** Group 21(54%) CBT 11 (28%) Play Therapy – 3 (8%) Recovery From Abuse Program – 1 (3%) Imagery rehearsal therapy – 1 (3%) Art Therapy – 1 (3%)	Investigated the efficacy of treatments for sexual abuse and moderator variables	**Effect size for PTSD measures:** Overall mean weighted effect size: g = 1.12 Overall follow up effect sizes: 1-3 months post treatment g = .71 4-6 months post treatment g = 1.39 6+ months post treatment g = 2.18 **Effect size for Non-PTSD measures:** Effect sizes at 1-3; 4-6, & 6+ months follow up: Global outcomes: g = 1.37 (.54; NA; 3.02) Internalising: g = .74 (.46; .82; .67) Self-concept/self-esteem: g = .63 (.54; .69; .82) Externalising: g = .52 (.35; .64; .55) Sexualised behaviour: g = .49 (.57; .32; .44) Coping/functioning: g = .44 (1.14; NA; NA) Caregiver's overall functioning: g = .43 (.20; .57; .55) Social skills/competence: g = .39 (.21; .03; -.12)	**Purpose of study** To examine the efficacy of treatment outcome studies for sexual abuse and investigated moderator variables. **Type of trauma exposure** Sexual abuse **Key Findings** • Results indicated that psychotherapy for sexual abuse was effective in reducing child and adolescent PTSD and other symptoms (e.g., internalising, externalising, sexualised behaviour, self-concept/self-esteem, social skills/competence, coping/functioning, global outcome) and overall functioning for the non-offending caregiver. • Effects were generally maintained over follow up periods ranging from one to six months with a third of studies showing maintenance effects over periods greater than six months. • The variable benefits of psychotherapy across a range of outcome measures and the identification of several moderator variables for trauma and other outcome measures highlighted the need for treatments which match the needs of a given population. • In regard to moderator variables for PTSD or trauma measures, family and individual approaches were better than group treatment, and CBT and insight orientated therapy was more effective that eclectic type treatments. • Compared to quasi-experimental study designs, experimental designs provided greater improvement; so too did manualised treatments, and treatment which included homework. **Strengths** • This was a detailed examination of psychotherapy for sexual abuse. **Methodological issues** • Most (83-90%) of the participants were girls, hence there is a problem with generalizing findings to boys. • Non randomized studies accounted for two of the six independent studies and 26 of the 48 repeated measures and results for these were not delineated from the controlled studies. • The inclusion of these small, non-randomised studies reduced the degree to which findings can be generalized to the wider population of children exposed to sexual abuse. • Few studies consistently reported participant characteristics. **Comments** • 15 of the studies included sample sizes less than 20 (i.e., nine studies with N < 10 and six with N < 20).

Table 2 cont..

Meta-analyses investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Trask, Walsh & DiLillo (2011) 34 studies (14 randomised; 5 quasi-randomised) **No (%) of studies/ treat type:** CBT 13 (38%) Other 20 (59%)	Investigated the efficacy of treatments for children afflicted for children traumatised by sexual abuse.	**Effect size for PTSD measures:** Five pre-post studies: *d* = .51 Six between group studies: *d* = .63 **Effect size for Non-PTSD measures:** Not reported	**Purpose of study** Examined the efficacy of psychosocial treatments to address the impact of sexual abuse (i.e., PTSD and other symptoms). Also examined the moderating effect of treatment and participant characteristics **Type of trauma exposure** Sexual abuse **Key Findings** • The efficacy of psychosocial treatments for reducing PTSD and other symptoms was confirmed, although the medium effect size for the improvement in PTSD symptoms was not significant for pre post studies, perhaps due to the impact of an outlier study (i.e. this involved only five participants and yielded an effect size of -.18). • Longer interventions proved more effective and there was no difference between individual and group (including caregiver) treatments. • For pre-to post treatment studies, CBT resulted in significantly larger effect sizes compared to other treatment modalities. • For between group treatment studies, effect sizes increased with age, for samples that were predominantly boys, and for child only treatment conditions. **Strengths** • This study explored multiple treatment modalities and aimed to include a wide range of studies (i.e., those not included in prior meta-analyses) hence selection bias was reduced and the sample of studies reflected the broad range of clinical settings and treatment approaches which have been utilised in the wider community. **Methodological issues** • Only one quarter of the studies (9/35) were randomized and controlled. Of the non-randomised studies, 19 were pre-post designs and 6 were quasi-experimental. • The review focused on non-PTSD outcomes, specifically internalizing and externalizing behaviours (as measured by the Child Behaviour Checklist); hence only 10 studies reported PTSD outcome measures. • Although qualitative data supported the maintenance of treatment gains in a few studies, the maintenance of treatment effects could not be determined due to the lack if follow-up data. **Comments** • There is an obvious need for greater methodological rigor in comparative treatment studies for children exposed to sexual abuse. There is also a need for the inclusion of PTSD and non-trauma measures, and the routine assessment of treatment and participant characteristics so the impact of moderator variables can be better assessed.

Table 2 cont..

Meta-analyses investigating the treatment of child PTSD symptoms

Author/s	Description of Study	Effect size for PTSD and non-trauma symptoms	Summary
Rolfsnes & Idsoe (2011) 19 studies (11 randomised; 8 quasi-randomised) **No (%) of studies/ treat type:** CBT 17 (89%) Other 1 (5%) Mind Body – 1 (5%)	Review and meta-analysis of school-based intervention programs for PTSD symptoms	**Effect size for PTSD measures:** Overall mean weighted effect size: d = .68 (± .41) For randomised studies as follows: d = 1.08, .72, .23, 1.82, .85, including: Play/art/expressive therapy: d = .76 EMDR: d = 2.04 Mind-Body Skills: η^2 = .282 **Effect size for Non-PTSD measures:** Not reported.	**Purpose of study** To examine the nature and efficacy of school based psychosocial interventions for PTSD **Key Findings** • The efficacy of school based intervention (particularly CBT) was supported and the majority of the CBT studies showed moderate to large effects sizes for PTSD and comorbid symptoms. • Whilst the effectiveness of the three non-CBT treatments was encouraging, conclusions could not be drawn about the efficacy of these interventions because of the lack of replication. • Manualised interventions were recommended to enhance the consistency of treatment which was often delivered by trained school personnel (e.g., social worker). • Some evidence was found for higher completion rates in school based compared to clinic based treatment. • Findings suggest that school personnel are able to deliver effective intervention for traumatized children. **Strengths** • The studies included in this meta-analysis came from nine countries and samples included those exposed to both type I & II trauma. • All but three of the studies utilised cognitive behaviour therapy. **Methodological issues** • The studies were lacking randomization, manualised treatment protocols, multimodal measures, blind/independent outcome ratings and follow up assessment. • Samples sizes were small, included those with mild symptoms and consisted of a wide age range. **Comments** • Unfortunately, more than half the studies were non-randomised.

1.9.3 Conclusion: Treatment efficacy for trauma and PTSD in children.

The reviews and meta-analyses, summarised in Tables 1 and 2, confirmed the general efficacy of psychological treatment for PTSD and non-PTSD symptoms (e.g., anxiety, depression and behavioural problems) in children. More than half of the studies compared Cognitive Behaviour Therapy (CBT) to alternate treatment modalities, and the superiority of CBT over other treatment modalities was supported by two reviews (Cary & McMillen, 2012; Wethington et al., 2008) and three meta-analyses (Kowalik et al., 2011; Rolfsnes & Idsoe, 2011; Silverman et al., 2008). Two meta-analyses indicated that CBT had similar efficacy to insight orientated therapy (Harvey & Taylor, 2010) and EMDR (Rodenburg et al., 2009). Despite the effectiveness of CBT, some methodological issues must be considered when generalising these findings to other populations. Most notably, 70% of the CBT studies consisted of children exposed to sexual and physical abuse, neglect or violence (including armed conflict), and the bulk of studies included in the meta-analyses (i.e., 62%) for the treatment for sexual abuse and school based interventions were non-randomised (Harvey & Taylor, 2010; Rolfsnes & Idsoe, 2011; Trask et al., 2011). Furthermore, almost half the studies included in the review of treatments for children exposed to diverse traumatic events (i.e., cancer, pediatric trauma, burns and motor vehicle accidents in addition to sexual and physical abuse, neglect or violence) (Wethington et al., 2008) were non-randomised or involved children outside the 6 to 17 year age range. Most of the studies in the meta-analysis by Kowalik et al. (2011) measured only non-PTSD symptoms and no follow-up data was reported.

The findings from the meta-analysis by Silverman et al. (2008) are most generalisable to the wider population of children exposed to a diverse range of traumatic events (including sexual abuse). However, similar to other meta-analyses, the inclusion of a limited number of non-CBT treatments was likely to result in the

efficacy of these treatments being understated. Furthermore, whilst the findings of the review by Cary and McMillen (2012) may not generalise very well to the wider community (i.e., most participants were exposed to interpersonal violence and terrorism) the comparison of branded trauma-focused CBT (TF-CBT) and CBT was informative because it demonstrated that some, but not all components of TF-CBT are required for treatment efficacy.

Whilst non-CBT treatment modalities were under represented, 'insight orientated therapy' and CBT were shown to be superior to eclectic therapies, and EMDR was found to be equivalent, if not superior, to CBT. A range of other non-CBT therapies such as pharmacotherapy, play therapy, art therapy and psychodynamic therapy were not supported. There was some evidence that EMDR is more efficient than CBT (i.e., de Roos et al., 2011; Jaberghaderi, 2004). However, further studies are required which address the methodological limitations of these two studies (e.g., larger sample sizes from more diverse trauma exposed populations; the use of well validated outcome measures and adequate follow-up periods).

1.10 Treatment of Single Event Child Trauma

Adler-Nevo and Manassis (2005) highlighted the lack of treatment studies for children afflicted by single event (type I) trauma and, for this reason, the present thesis focused on this population. In line with the exposure criteria (DSM-IV) for PTSD, this thesis focused on single event (type I) paediatric trauma which resulted in attendance at the emergency department of Princess Margaret Hospital for Children in Perth, Western Australia. The intention of restricting the population sample to single event trauma was to contribute to the small treatment literature in this field. It was also considered important from a practical and ethical standpoint to investigate the efficacy of relatively new interventions for children with uncomplicated trauma.

1.10.1 Relevance of single event trauma.

In the past two decades there has been a prolific increase in the volume of research into PTSD, most of which has focused on adult populations whilst research into child populations has lagged behind. Furthermore, child research has often focused on populations afflicted by sexual abuse or natural disasters. Common single traumatic events, such as motor vehicle accidents, have attracted less research attention, even though large numbers of children are involved in motor vehicle accidents each year. For example, based on various population estimates (Butler, Moffic & Turkal, 1999; Harrison, 1999; Keppel-Benson, Ollendick & Benson, 2002), between 9,000 and 22,000 Australian children up to 14 years of age are likely to suffer from motor vehicle accident-related PTSD each year. This is likely to be an underestimate of accident-related psychological suffering for two reasons. First, even children with PTSD symptoms below the diagnostic criteria suffer from higher rates of psychopathology and functional impairment than the normal population (McDermott & Cvitinovich, 2000; Carrion, Weems, Ray & Reiss, 2002). Second, differential or comorbid psychiatric disorders such as acute stress disorder, major depression and simple phobia (Harrison, 1999) add to the prevalence and impact of psychological suffering.

1.10.2 Identification of single event treatment studies.

The 144 studies included in the reviews and meta-analyses (see Tables 1 & 2) covered all but four of the studies identified by Adler-Nevo and Manassis (2005). A further 32 studies were included in two recent white papers relevant to single event trauma (Gillies, Taylor, Gray, O'Brien & D'Abrew, 2012; Forman-Hoffman et al., 2013) and a further 54 studies were identified from a search of electronic databases (Medline, PsycArticles, PsycInfo, ProQuest health & medical complete, ProQuest psychology journals and Psychiatry Online). Search terms included: treatment, child,

adolescent, PTSD, trauma, controlled trial, single event, motor vehicle accident, accident, accidental injury, paediatric injury and unintentional injury.

Of the 230 studies that were identified, 117 were randomised (or quasi-randomised), 14 related to early intervention (i.e., treatment commenced within one month of the traumatic event) and three involved samples outside the desired 6 to 18 year age range. Of the remaining 100 randomised studies, 67 (67%) involved exposure to type II trauma such as sexual abuse or maltreatment (54%), war (11%) and political violence (2%). The remaining 33 were reviewed against the following four inclusion criteria: i) participants were drawn from a community sample and the type of trauma exposure was adequately described, ii) at least 50% of participants were exposed to a single traumatic event which did not involve the type II characteristics described by Terr (1991) and Kira (2001) (e.g., a terminal illness or death of a parent), iii) participants were suffering from PTSD symptoms and there was at least one PTSD outcome measure, and iv) treatment commenced at least one month post trauma.

Twenty of these studies were excluded from the review as follows. Four involved exposure to multiple traumatic events such as violence (Kataoka et al., 2003; Stein et al., 2003) or natural disasters which featured 'numerous aftershocks' in the case of an earthquake (Shen, 2002) and 'a series' of volcanic eruptions (Ronan & Johnston, 1999). Three did not mention the nature of the trauma exposure (Ahrens & Rexford, 2002; Soberman, Greenwald & Rule, 2002; Steiner et al., 2007). Four were unpublished or unavailable (Brown, Pearlman & Goodman, 2003; Chapman, Morabito, Ladakakos, Schrier, & Knudson, 2001; Wang, Yang, Wang, Gao & Qian, 2011; Jeffres, 2004). Three involved exposure to chronic trauma such as ongoing violence (Jordans et al., 2010), childhood cancer (Kazak et al., 2004) and severe burns (Stoddard et al., 2011). The latter also featured a small sample size in the

placebo condition (i.e., n = 7). Two involved significant loss due to an earthquake or suicide (Pfeffer, Jiang, Kakuma, Hwang &Metsch, 2002; Shooshtary, Panaghi & Moghadam, 2008). Two focused on selected samples such as psychiatric inpatients (Lyshak-Selzar, Singer, St John & Chemtob, 2011) and children with anxiety in the context of community violence (Cooley- Strickland, Griffin, Darney, Otte & Ko, 2011). One involved a highly culturally specific intervention, "spiritual-hypnosis assisted treatment" (p.27, Lesmana, Suryani, Jensen & Tiliopoulos, 2009), and another involved unconventional treatment in the form of massage therapy (Field, Seligman, Scafedi & Schanberg, 1996), which was likely to be inappropriate for the majority of traumatised children and their parents.

1.10.3 Review of single event treatment studies.

Prior to the publication of the first study in this thesis, Adler-Nevo and Manassis (2005) highlighted the limited volume of single event treatment studies and of the 10 studies they identified, only three were randomised and controlled (Chemtob, Nakashinma, & Hamada, 2002a, Chemtob, Nakashima & Carlson, 2002b; Stein et al., 2003). Fortunately, a search of the literature (see section 1.10.2) shows that researchers have responded to the deficit in this area to the extent that 12[3] randomised or quasi-randomised studies were identified for this review (Chemtob et al., 2002a, 2002b; de Roos et al., 2011; Giannopoulou, Dikaiakou & Yule, 2006; Gilboa-Schectman et al., 2010; Goenjian et al., 1997, 2005; Jaycox et al., 2009, 2010; Nixon, Sterk, & Pearce, 2012; Robb, Cueva, Sporn, Yang, Vanderburg, 2010; Salloum & Overstreet, 2008; Smith et al., 2007). These studies are summarised in detail in Table 3; which consists of Part A and Part B due to the large number of columns.

[3] There were a total of 13 studies, but the publication of study one (Kemp, Drummond & Mc Dermott, 2010) was not included.

1.10.4. Review of pre-publication studies.

A review of the seven studies (see Table 3, Part A) available prior to the publication of study one shows that two involved exposure to violence (Jaycox et al., 2009; Smith et al., 2007) or a motor vehicle accident (Smith et al., 2007) and five involved exposure to natural disasters (Chemtob et al., 2002a, 2002b; Giannopoulou et al., 2006; Goenjian et al., 1997, 2005; Salloum & Overstreet, 2008). With the exception of Chemtob et al. (2002b), treatment consisted of CBT or a variant of CBT (Salloum & Overstreet, 2008) which was mostly delivered in school settings, particularly in the context of large scale natural disasters. School settings are obviously well suited to the provision of convenient and cost effective treatment and monitoring (Chemtob et al., 2002a). Participants may also experience less stigma in a school setting compared to a community mental health clinic. However, the degree to which school based treatments are effective for children afflicted by single event trauma other than natural disasters is unknown.

As shown in Table 3, Part B, small to moderate effect sizes or modest improvements in mean PTSD symptoms were reported at post treatment for half of the CBT studies (Goenjian et al., 1997, 2005; Jaycox et al., 2009; Salloum & Overstreet, 2008). Furthermore, these interventions (see Table 3, Part B), along with the investigation of Trauma Focused CBT by Smith et al. (2007) involved participants exposed to trauma with type II characteristics such as high levels of psychiatric comorbidity (Smith et al., 2007), some exposure to multiple past traumatic events, including domestic violence (Salloum & Overstreet, 2008; Smith et al., 2007) or the death of a family member (i.e., not necessarily a parent) (Giannopoulou et al., 2006; Goenjian et al., 1997, 2005; Salloum & Overstreet, 2008). These complicating factors might explain why most of the interventions (except for Goenjian et al., 1997, 2005) were of longer duration (7.5 to 12 hours)

than the three to four hours utilised by Chemtob and colleagues (Chemtob et al., 2002a, 2002b). Furthermore, the remaining brief intervention (i.e., four to six hours) by Goenjian et al. (1997, 2005) seems to have involved an inadequate number of sessions because the degree of clinically significant improvement was limited and the untreated group showed an improvement in PTSD symptoms at six month follow-up (i.e., 5 years post-earthquake). The modest improvement in symptoms seems best explained by the type II characteristics of the participant sample (loss of family and friends and widespread homelessness after the earthquake). Their study also featured several methodological issues. For example, the six week intervention program was implemented 1.5 years after the traumatic event (Armenian Earthquake) and the post treatment assessment was not completed until approximately 18 months later. Treatment fidelity and reviews of school practices were not conducted; hence, treatment effects could be explained by deliberate or unintended interventions at the school level (e.g., discussions about the earthquake and related matters, recreation and social events). The authors acknowledged that the absence of a grief measure was unhelpful because a relationship between grief and depression was likely to play a role in recovery.

In summary, this review of the pre-publication literature favoured the two brief randomised and controlled interventions conducted by Chemtob et al., (2002a, 2002b). These investigations had focused on the treatment of participants exposed to uncomplicated single event (Type I) trauma. Both involved the treatment of 6 to 12 year old children exposed to Hurricane Iniki in Hawaii. One compared EMDR to a waitlist, and the other compared a manual-based CBT protocol in a group (school) setting with individual treatment. All three active treatment conditions proved efficacious; however, the modest effect sizes in the CBT comparison study (Chemtob

et al., 2002a) and the potential efficiency of EMDR (Rodenburg et al., 2009) made the latter the preferred treatment.

Pre-Publication – Single Event Treatment Studies

Table 3 (Part A)
Treatment of PTSD following Single Event Trauma

Author/s & Location	Trauma Type (Sample N)	Age & Gender	PTSD or PTSS	Participant Characteristics	Treatment	Number of sessions
Chemtob, Nakashima & Carlson (2002b) Location: Hawaii (Island of Kauai) *Randomised Study*	Natural Disaster (Hurricane Iniki) N = 32	6-12yrs Girls: 22 (68.8%)	PTSD (100%)	Participants came from seven schools exposed to hurricane Iniki and were of diverse ethnicity; almost half were on low incomes. They had received prior treatment (i.e., 3 session school-based CBT) (Chemtob, Nakashima & Hamada, 2002a), but were identified as non-responders to this treatment at a one year follow up. **Loss of Significant Other/s:** No **Damage to Home:** Yes - 70% said their homes had a lot of damage, had been unlivable or we still uninhabitable **Comorbidity:** Not reported **Past Trauma:** Not reported	EMDR N=17 Versus Wait-List N=15	3 x sessions **Results** - During the Waitlist there was no change in PTSD or other symptoms - EMDR and Delayed EMDR reduced PTSD and other symptoms. **Results maintained at 6 month follow up**
Chemtob, Nakashima & Hamada (2002a) Location: Hawaii (Island of Kauai) *Randomised Study*	Natural Disaster (Hurricane Iniki) N = 248	6-12yrs Girls: 151 (61%)	PTSD (88%) PTSS (12%)	Participants came from 10 public schools and the treatment eligible children were poorer than the general population. **Loss of Significant Other/s:** No **Damage to Home:** Yes (details not reported) **Comorbidity:** Not reported **Past Trauma:** Not reported	Manual based Group (School-based) Treatment N=176 Versus Manual based Individual Treatment N=73	4 x weekly sessions **Results** - Both group and individual treatment. reduced PTSD symptoms **Results maintained at 1 year follow up**
Giannopoulou, Dikaiakou, & Yule (2006) Location: Greece *Quasi- randomised Study*	Natural Disaster (Earthquake) N = 20	8-12 years Girls: 11 (55%)	PTSD (7.4%) PTSS (92.6%)	**Loss of Significant Other/s:** Yes **Damage to Home:** Yes **Comorbidity:** Nil history of mental health treatment **Past Trauma:** Nil	CBT Treatment at 2 months post-earthquake N=10 Versus CBT Treatment at 4 months post-earthquake N=7	6 x weekly sessions for 2 hours **Results** - During the Waitlist there was no change in PTSD - Both CBT and delayed CBT reduced PTSD symptoms. **Results improved further at 18 month follow up and maintained at 4 year follow up**

Pre-Publication – Single Event Treatment Studies (cont..)

Table 3 (Part A)
Treatment of PTSD following Single Event Trauma

Author/s & Location	Trauma Type (Sample N)	Sample Age & Gender	PTSD or PTSS	Participant Characteristics	T1 Treatment vs T2 Control	Number of sessions
Goenjian Karayan, Pynoos, et al., (1997) & 5 year follow-up study: Goenjian, et al. (2005) Location: Armenia *Quasi-randomised Study*	Natural Disaster (Earthquake) N = 64	Mean age 13.2 ±1.3yrs Girls: 42 (66%)	PTSD (7.4%) PTSS (92.6%)	Participants were recruited 1.5 years after the earthquake. **Loss of Significant Other/s:** Yes (details not reported) **Damage to Home:** Yes (details not reported) **Comorbidity:** Nil history of mental health treatment **Past Trauma:** Nil	Classroom & Individual psychotherapy N=35 Versus No treatment N=29	4 x 60 minute sessions. plus 2-4 x 1hr individual sessions over 6 weeks depending on symptom levels. **Results** - Compared to no treatment, both Classroom & Individual psychotherapy reduced PTSD symptoms and prevented the deterioration of depressive symptoms. **Results maintained at 18 and 24 month follow up**. However, at the latter follow up, the untreated group also showed significant improvement in PTSD symptoms but scores remained in the clinical range.
Jaycox, Langley, Stein, Wong, Sharma, Scott, & Schonlau (2009) Location: USA *Randomised Study*	Severe Violence (Victim or Witness of one or more violent episodes) N = 76	6th to 7th grade Mean age 11.5 ±0.7yrs Girls: 39 (51%)	PTSD (100%)	Participants had experienced one or more episodes of violence involving a gun or knife in the past year. Participants were predominantly (96%) Latino and came from two large over crowded middle schools in urban Los Angeles and were from lower socioeconomic households (family income less than $25 000 and 85% were eligible for the free lunch program). Parents had an average 8th grade education. A classroom incentive of $50 was offered for the return of 70% of consent forms (whether consenting or refusing). **Loss of Significant Other/s:** Not reported **Damage to Home:** Not applicable **Comorbidity:** Not reported **Past Trauma:** Not reported other than for the past year	Support for Students Exposed to Trauma (adapted from Cognitive Behavioural Intervention for Schools) N=39 Versus Wait-list N=37	10 x 45 minute sessions. **Results** - Depressive symptoms (but not PTSD or other non-trauma symptoms) improved for the SSET group but not the waitlist group. This result was likely to be insignificant when experimentwise error was taken into account. Improvements in PTSD and non-PTSD scores were observed when comparisons were repeated for those with high scores in both the SSET and Delayed SSET groups, but the delayed group showed more modest improvement. **No follow up data were reported.**

Pre-Publication – Single Event Treatment Studies (cont..)

Table 3 (Part A)
Treatment of PTSD following Single Event Trauma

Author/s & Location	Trauma Type (Sample N)	Sample Age & Gender	PTSD or PTSS	Participant Characteristics	T1 Treatment vs T2 Control	Number of sessions
Salloum & Overstreet (2008) Location: USA *Randomised Study*	Natural Disaster (Hurricane) N = 56	Age: 7-12yrs Girls: 21(38%)	PTSS (at least moderate levels)	Participants were from several schools in a non-flooded area of New Orleans. The intervention was provided as part of an afterschool program except one school added the program to their in-school mental health service. **Loss of Significant Other/s:** Yes - 68% (N=38) of participants had experienced the death of a family member or someone close **Damage to Home:** Yes - 41% (23) could not live in their house because of damage; 16% (9) had lost a family member or someone close who was still missing. **Comorbidity:** Based on the reports of 41 (73%) of parents, 17% of participants had received prior mental health treatment and 1 (2.4%) was receiving counseling for anger management during the intervention. **Past Trauma:** These parents also reported that 34.1% of participants had witnessed domestic violence, 29.3% had witnessed a shooting or stabbing and 7.3% had experience some form of abuse.	Group grief and Trauma Focused Intervention N=28 Versus Individual grief and Trauma Focused Intervention N=28	10 sessions of intervention plus a parent meeting **Results** - Both the group and individual interventions reduced PTSD and other symptoms **Results maintained at 3 week follow up** 10 sessions of intervention plus a parent meeting
Smith, Yule, Perrin, Tranah, et al. (2007) Location: UK *Randomised Study*	Accident/Injury (MVA, assault or witnessed violence) N = 38	Age: 8-18yrs Girls: 15 (39%)	PTSD (100%) PTSS (0%)	Of the 34 participants63% had attended ED and 26% had been admitted. After drop out & screening for PTSD, only 24 out of 38 were randomised to treatment; 50 % of participants had experienced a motor vehicle accident and 50% had experienced or witnessed violence. **Loss of Significant Other/s:** Not reported **Damage to Home:** Not applicable **Comorbidity:** 76% had a comorbid condition; 34% had an ongoing legal case and 26% had a psychiatric history. **Past Trauma:** 29% of participants had experienced prior trauma.	Trauma Focused Cognitive Behaviour Therapy (TF-CBT) N=12 Versus Wait-List N=12	TF- CBT consisting of 10 x weekly individual sessions. Parents were always seen after session (if available) and conjoint sessions were conducted as necessary. **Results** - In comparison to the Waitlist, TF-CBT reduced PTSD symptoms **Results maintained at 6 month follow up**

Pre-Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
Chemtob, Nakashima & Carlson (2002a)	**B** **C - 2/3** Clinician Other (visits to school nurse)	× Clinicians had weekly supervision	<u>Baseline to Pre-treatment</u> There was no change in CPTS-RI scores in the wait-list group <u>Pre- to post treatment for both the EMDR & Waitlist groups combined</u> CRI *d = 1.55* Percentage above cut of score of 12 100% -----> 43.7% <u>Pre-treatment to six month follow up</u> CRI *d = 2.04*	<u>Baseline to Pre-treatment</u> There was no change in RCMAS & CDI scores in the waitlist group <u>Pre- to post treatment for both the EMDR & Waitlist groups combined</u> RCMAS & CDI *d = 0.78 & 0.54* ANNUAL VISITS TO SCHOOL NURSE *d = 0.61* <u>Pre-treatment to six month follow up</u> RCMAS & CDI *d = 1.07 & 0.69*	**Key Findings (EMDR versus Waitlist/Delayed EMDR)** There was no improvement in PTSD symptoms from pre to post wait list. EMDR and delayed EMDR were effective in alleviating PTSD (Children's Reaction Index), anxiety (Revised Children's Manifest Anxiety Scale), depression (Children's Depression Inventory) and visits to the school nurse for non-responders to a prior treatment (3 year earlier). Improvements in non-trauma compared to trauma symptoms were modest. Therapeutic gains were maintained at six month follow-up. **Methodological issues** The authors acknowledged the lack of diagnostic assessment and an active treatment comparison condition. However, they noted the need for sensitivity (limiting intrusion and any sense of exploitation). Whilst potential demand characteristics were acknowledged these were reduced by the treatment of treatment resistant (non-responders). **Comments** The authors acknowledged that parents were not included in the intervention and this may have been beneficial. Furthermore, they reported that the influence of demand characteristics was mitigated by the treatment of non-responders to previous treatment. On the other hand, this prior treatment may have had a priming effect, given the willingness of these non-responders to attempt an alternative intervention.

Pre-Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
Chemtob, Nakashima & Hamada (2002b)	**B** **C – 1/3** Clinician	✕ No fidelity ratings but there was extensive supervision and reviews of treatment videos	<u>Pre to post treatment</u> Effect size (Cohen's *d*) for: Kauai Recovery Index (KRI). Effect size *d = .50 (Treatment completers: N=214)*. A random subsample of treated (n=21) and untreated (n=16) children completed the Children's Reaction Index. The mean score for treated children was significantly lower. Effect size (Cohen's *d*) = *.76* There were more non-completers in the individual than group intervention 14.6% versus 5.1% <u>1 year follow up</u> Treatment effects were maintained. There was no significant difference in KRI scores from post treatment to 1 year follow up.	There were no non-trauma measures	**Key Findings (Group/School Based versus Individual Treatment)** Group and individual treatment were equivalent and therapeutic gains were maintained at 1 year follow-up. A random subsample of the population confirmed that treated children were less symptomatic than untreated children. **Methodological issues** The authors noted that a wait-list or untreated control group was lacking due to ethical constraints. However, they compensated for this in two ways. First, they compared the pre-treatment scores across three groups (waves) where each group commenced treatment in consecutive months. They also compared slightly less symptomatic children over two assessment points and no change in symptoms was evident due to the passage of time or repeated testing. The KRI was unable to be completed by all participants at each assessment due to sensitivity about unnecessary intrusiveness upon participants for the mere purpose of research. **Comments** The authors noted that this school-based community-wide approach to screening and intervention appeared to be effective for the treatment of those exposed to large scale disasters whilst meeting the need for ethical restraints in this context. Due to the lack of non-trauma measures it is not possible to determine whether the improvement in PTSD symptoms generalised to non-trauma symptoms such as anxiety and depression.

Pre-Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
Giannopoulou, Dikaiakou, & Yule (2006)	**B** **C - 1/3** Parent	×	<u>Pre to post treatment Means (SD)</u> CRIES: The scores for the Delayed CBT group refer to pre to post baseline. CBT: 37.10 (8.39) to ~13.0* Delayed CBT (Waitlist): 39.57 (8.62) to 41.57 (4.47) CBT & Delayed CBT (combined): 39.47(7.32) to 14.93(5.27) <u>18 month to 4 year follow up</u> CRIES: Means (SD) CBT & Delayed CBT (combined): 3.53(1.6) to 2.93(1.67) *Denotes estimated data; value has been estimated from Figure 1 (p551) therefore the SD is unknown.	<u>Pre to post treatment Means (SD)</u> DSRS: CBT & Delayed CBT (combined): 11.4(3.52) to 4.6(2.29) SDQ impact: CBT & Delayed CBT (combined): 5.6 (1.71) to 1.90(1.01) <u>18 month to 4yr follow up Means(SD)</u> DSRS: 4.73(1.71) to 5.46(2.20) SDQ impact N/A	**Key Findings (CBT versus Waitlist/Delayed CBT)** There was no improvement in PTSD symptoms from pre to post wait list. CBT and Delayed CBT alleviated PTSD (intrusion, avoidance and arousal) and depressive symptoms and improved everyday functioning. There was further improvement at 18 month follow-up and treatment gains were maintained at 4 year follow-up. **Methodological issues** The authors acknowledged the issues of sample size, lack of a control group and inclusion of participants with only mild to moderate PTSD symptoms, hence findings may not generalise to the wider clinical population. **Comments** The authors note that brief group CBT in clinical settings may be useful when there are limited resources and those in most need could subsequently continue with individual treatment. The authors also acknowledged that there was a lack of ongoing assessment during the intervention which precluded the evaluation of treatment components. They also noted that the inclusion of a parallel treatment group for parents was preferred to maximised the therapeutic benefit. There does not appear to have been a direct statistical comparison between the groups from pre to post treatment (versus pre to post waitlist). There was also a lack of blind assessment and collateral data (i.e., the follow up assessment did not include the only collateral measure) and a structured clinical interview for PTSD was not used.

BDS, CBCL CRIES, CROPS, CUCLA, DSRS, MASC, PROPS, PUCLA, SDQ impact,

Pre-Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
Goenjian Karayan, Pynoos, et al., (1997) & 5 year follow-up study: Goenjian, et al. (2005) (Quasi-randomised)	**C - 1/3** Other (trained professionals)	×	Post treatment (was conducted 18 months post treatment which was 3 years post trauma.) Probable PTSD decreased as follows C&IT: 60% -> 28% Untreated: 52% -> 69% CPTS-RI C&IT: significantly decreased. Untreated: significantly increased. Scores for the C&IT group were significantly lower than those for the untreated group C&IT: M - 32.2 (SD = 12.1) Untreated: M – 47.2 (SD = 11.1) d = 1.29 5 year follow up CPTSD-RI Scores for the C&IT group were significantly lower than the those for the untreated group C&IT: M – 28.1 (SD = 10.3) Untreated: M – 35.7 (SD = 11.8) d = .69 The post treatment assessment was conducted 18 months post treatment (i.e., 3 yrs post trauma)	Pre-treatment to 3.5 year follow up DSRS (Mean change scores) C&IT: scores showed a decreasing trend. Untreated: scores significantly increased. C&IT: M -16.3 (SD = 13.0) Untreated: M -5.4 (SD = 11.0) d = .89 Probable Depression C&IT: 46% -> 46% Untreated: 35% -> 75% 3 year follow up DSRS Scores for the C&IT group were significantly lower than those for the untreated group C&IT: M – 16.0 (SD = 5.0) Untreated: M – 20.2 (SD = 5.6) d = .80 Pre-treatment to 5 year follow up DSRS C&IT: mean change in scores showed a decreasing trend. Untreated: mean change in scores significantly increased. C&IT: M -1.7 (SD = 5.4) Untreted: M +2.7 (SD = 6.7) d = .73 5 year follow up DSRS: Differences between the C&IT and untreated group scores were not significant C&IT: M – 15.2 (SD = 4.0) Untreated: M – 16.8 (SD = 6.1)	**Key Findings (Classroom plus Individual Psychotherapy versus No treatment)** Trauma/grief-focused brief psychotherapy was effective in reducing the severity of PTSD symptoms and in preventing the worsening of depressive symptoms in adolescents exposed to a major disaster. Untreated adolescents exposed to severe trauma are at risk for chronic PTSD and depression and could be at risk of psychosocial maladaptation. **Methodological issues** Despite the statistical improvement in symptoms, participants remained symptomatic hence additional intervention was likely to be beneficial. Outcome measures were limited to self-report. Factors such as school milieu or teacher responsiveness may have played a role in recovery. Grief reactions were not measured in this study. **Comments** The authors acknowledged that earlier intervention (before 1.5 years post - earthquake) should be undertaken and evaluated. Participants may also have benefited from longer-term multi modal school-based intervention.

Pre-Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
Jaycox, Langley, Stein, Wong, Sharma, Scott, & Schonlau (2009)	**C - 2/3** Parent Teacher	✓	Pre to Post treatment PTSD T to T2 Difference -0.23	Depression -0.32 Parent reported behaviour problems -0.10 Teacher reported behaviour problems -0.28	**Key Findings (Support for Students Exposed to Trauma versus Waitlist)** Students in the SSET programme showed a small reduction in self-reported PTSD, depression symptoms and teacher (but not parent) reported behaviour problems. There was a high degree of treatment fidelity even though the program was delivered by non-clinicians and both parents and children reported a high level of satisfaction with the program. On the other hand, some procedural inconsistencies with one of the teachers, highlighted the inherent demands of implementing a school based program (i.e., there is an additional burden on the teacher). **Methodological issues** The participants were predominantly Latino hence the results may not generalise to other ethnic groups or the wider student or school community. Securing consent for participation in the SSET group was challenging (e.g., it was extremely difficult to contact parents and for them to return signed consent forms). The recruitment and consent rate was low despite the use of some financial incentive. The treatment was also delivered by non-clinicians and there was no long term follow up. **Comments** The lack of longer term follow up is particularly important because the frequent incidence of violence reported in this population could heighten the risk of re-traumatisation. The authors note that SSET is a viable intervention for student exposed to violence from low income urban populations. They also acknowledged that the appeal of SSET would be strengthened by improved school behaviour and academic outcomes.

Pre-Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
Salloum & Overstreet (2008)	**B** **C - 1/3** Clinician	✓	Pre to Post treatment respectively UCLA Individual 44.3 (13.03) 28.28 (13.61) Group 42.32 (9.58) 31.32 (12.43) Follow up UCLA Individual 22.43 (12.28) Group 21.85 (11.77) Combined Data In clinical range for PTSD (for both groups combined) Pre-treatment 53% Post treatment 13% Follow up 4%	Pre to Post treatment respectively Mood and feeling Individual 25.48 (9.17) 16.91 (9.94) Group 23.41 (11.34) 20.46 (12.85) Traumatic Grief Scale Individual 11.33 (4.5) 8.80 (4.87) Group 11.27 (4.94) 7.00 (5.08) Global Distress Individual 3.13 (1.39) 2.74 (1.32) Group 3.23 (1.23) 2.73 (1.37) 3 Week Follow up Mood and feeling Individual 13.00 (9.36) Group 14.23 (9.51) Traumatic Grief Scale Individual 7.20 (5.65) Group 4.40 (3.50) Global Distress Individual 2.83 (1.40) Group 1.95 (1.32) Combined Data Above cut off score for depression (for both groups combined) Pre-treatment 40% Post treatment 20% Follow up 4%	**Key Findings (Group Grief and Trauma-Focused Intervention versus Individual Grief and Trauma Focused Intervention)** Both group and individual treatment with grief and trauma focused intervention resulted in a significant improvements in PTSD, depression and traumatic grief and distress which were maintained at 3 week follow up. There was no difference in outcomes between those who received group or individual treatment. **Methodological issues** The authors acknowledged that a longer follow up period was necessary to determine the degree to which treatment gains are maintained over time. They also noted the importance of the timing to facilitate such follow up and treatment continuity. There was a lack of collateral data (e.g., from parents and teachers regarding the child's symptoms or daily functioning). **Comments** The authors noted that the explicit focus on grief issues may facilitate the processing of trauma and improvement in PTSD symptoms. Therefore they recommended further comparison studies with alternative grief and trauma focused treatments. The also suggest that comparative studies should examine the effect of including parents in the intervention.

Pre-Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
Smith, Yule, Perrin, Tranah, et al. (2007)	**B** **C - 1/3** Clinician	✓	Pre to post treatment CPSS, RIES, CAPS Compared to the waitlist group, CBT resulted in significant decreases on all trauma measures. Pre-Treat Post-Treat PTSD Diagnosis CBT: 100% -> *8%* Waitlist: 100% -> *58%* CPSS, CBT: 28.1 (8.8) 3.0 (5.4) Waitlist: 28.3 (10.5) 25.2 (11.5) RIES, CBT: 47.5 (11.5) 8.5 (9.4) Waitlist: 41.6 (11.7) 35.3 (14.5) CAPS CBT: 60.9 (9.6) 12.0 (17.4) Waitlist: 54.7 (14.6) 40.3 (18.3) 6 Month Follow up CPSS, RIES, CAPS CBT: 2.3 (2.9); 6.2 (7.0); 6.8 (7.6) PTSD Diagnosis CBT: *0%*	Pre to post treatment RCMAS, DSRS: Compared to the waitlist group, CBT resulted in significant decreases in anxiety and depression scores. Pre-Treat Post-Treat RCMAS CBT: 19.8 (5.6) 7.4 (9.2) Waitlist: 16.3 (5.7) 16.5 (7.3) DSRS, CBT: 18.3 (5.2) 8.0 (8.7) Waitlist: 13.9 (5.6) 13.3 (5.4) 6 Month Follow up RCMAS, DSRS, CBT: 6.2 (7.4), 6.3 (5.2) Pre to post treatment Compared to Waitlist, CBT resulted in significant decreases in child, parent and assessor rated disability. Pre-Treat Post-Treat Child-rated Disability CBT: 6.3 (1.6) 1.6 (2.0) Waitlist: 6.9 (2.6) 5.8 (2.9) Parent-rated Disability CBT: 5.2 (1.7) 1.0 (1.4) Waitlist: 5.3 (1.4) 4.4 (2.4) Assessor-rated Disability CBT: 2.5 (0.5) 0.8 (0.8) Waitlist: 2.2 (0.4) 1.9 (0.8) 6 Month Follow up Child-rated, Parent-rated & Assessor-rated Disability CBT: 0.8 (1.7); 1.1 (1.3); 0.8 (1.1)	**Key Findings (Trauma Focused Cognitive Behaviour Therapy versus Waitlist)** Compared to the waitlist, the CBT group showed significant improvement in PTSD, anxiety, depression and general functioning and gains were maintained at six month follow up. In keeping with cognitive models of PTSD, the changes in the CBT group were mediated by negative trauma-related cognitions. **Methodological issues** The sample size was relatively small The authors acknowledged the substantial improvement in the rate of PTSD in the wait list group (i.e., 42% reduction in the rate of PTSD) which they noted could be explained by the passage of time, spontaneous recovery or repeated assessment, particularly in the first six months following a trauma. They noted that there was a lack of statistical power to test whether this improvement was inversely related to the time elapsed since the trauma). The wait-list group did not progress to treatment. **Comments** The authors acknowledged that one third of the sample had experienced past trauma and they noted that additional sessions may be required for treating populations exposed to multiple trauma. They suggest that a stepped care approach which incorporates brief individual CBT may be best suited to managing paediatric populations suffering from mild symptoms following uncomplicated single event trauma.

Post Publication – Single Event Treatment Studies

Table 3 (Part A)
Treatment of PTSD following Single Event Trauma

Author/s & Location	Trauma Type (Sample N)	Age & Gender	PTSD or PTSS	Participant Characteristics	Treatment	Number of sessions
de Roos, Greenwald, et al. (2011) Location: Netherlands *Randomised Study*	Accident/Injury (Fireworks Explosion) N = 52	4-18yrs Girls: 23 (44.2%)	PTSD (17.3%) PTSS (82.7%)	Participants were recruited six months after explosion of fireworks factory **Loss of Significant Other/s:** Yes; 2 (3.8%) had lost a family member **Damage to Home:** 59.6% of participants **Comorbidity:** Not reported **Past Trauma:** 42.3% of participants reported exposure to two or more past traumatic events and 25% reported were exposed to at least one past trauma.	CBT N=26 Versus EMDR N=26	1-4 sessions of individual treatment over 4-8 weeks Plus 0 -4 sessions of parent guidance **Results** - Both EMDR and CBT reduced PTSD symptoms **Results maintained at 3 month follow up**
Gilboa-Schechtman et al., (2010) Location: Israel *Randomised Study* This study intentionally treated participants exposed to a single event trauma	Mixed Single Event N = 38 MVA (42%) Sexual assault (21%) Terrorist attack (13% Other (18%)	12-18yrs Girls: 24 (63%)	PTSD (100%)	Participants had fluency in Hebrew and 47% lived with both their biological parents, **Loss of Significant Other/s:** Not applicable **Damage to Home:** Not applicable **Comorbidity:** 81% had at least one comorbid disorder and 13% were on a stable psychiatric medication regime. **Past Trauma:** Not reported	Prolonged Exposure (PE-A) N=19 Versus Dynamic Therapy (TLDP-A) N= 19	12-15 (mean 13.42) weekly sessions x 60-90 mins (shorter for young children and those with ADHD). **Results** - Both PE-A and Dynamic Therapy reduced PTSD and other symptoms **Results maintained at 6 and 17 month follow up** 15-18 (mean 16.90) x 50 min sessions
Jaycox, Cohen, Mannarino, et al. (2010) Location: USA *Randomised Study*	Natural Disaster (Hurricane Katrina) N = 195	(4th to 8th grade) Girls: 109 (55.9%)	PTSD (60.5%) PTSS (39.5%)	Participants were from 3 schools (4th to 8th grade) recruited 15 months post trauma. **Loss of Significant Other/s:** Not reported **Damage to Home:** Yes (but details not reported) **Comorbidity:** Not reported **Past Trauma:** Participants had experienced a median of four past traumatic events	Cognitive Behavioural Intervention for Trauma In Schools (CBITS) N = 57 (pre-treat) -> 57 (at 10 month f/up) Versus Trauma Focused Cognitive Behaviour Therapy (TF-CBT) N = 14 (pre-treat) -> 14 (at 10 month f/up)	CBITS is a 10 group sessions and 1-3 individual sessions **Results** - Both school and clinic based treatment reduced PTSD symptoms, but symptoms remained in the clinical range. **No follow up data were reported.** TF-CBT 10 group sessions and 1-3 individual sessions; TF-CBT is a 12 session individual and conjoint intervention for child and parents

Post Publication – Single Event Treatment Studies (cont..)

Table 3 (Part A)
Treatment of PTSD following Single Event Trauma

Author/s & Location	Trauma Type (Sample N)	Age & Gender	PTSD or PTSS	Participant Characteristics	Treatment	Number of sessions
Nixon, Sterk & Pearce (2012) Location: Australian *Randomised Study*	Single event N = 33 MVA (31%) Home Invasion (25%) Other (18%) House fire (13%) Assault (13%)	Age: 7-17yrs Girls: 12(36.4%)	PTSD (100%)	Participants were referred from mental health services, hospitals and the police. **Loss of Significant Other/s:** Not reported **Damage to Home:** 12.1% had experienced a house fire **Comorbidity:** 27.3% had experienced "previous therapy, counselling or treatment **Past Trauma:** 60.6% had experienced "previous trauma" (the type or impact was not reported).	CBT N=17 Versus T2: CT N= 16	9 x weekly sessions x 90 mins (1/3 of time with parents) **Results** - Both CBT and CT reduced PTSD and other symptoms **Results maintained at 6 month follow up** 9 x weekly sessions x 90 mins (1/3 of time with parents)
Robb, Cueva, Sporn, Yang & Vanderburg (2010) Location: ?? *Randomised Study*	Mixed Trauma* N = 129 Witness to violence (48%) Sexual abuse (41.1%) Traumatic news (32.5%) Physical abuse/violence (31.8%) MVA or accident (24%) Fire or Natural Disaster (15.5%) Other (21.7%) *the frequency of these events does not sum to 100% because participants could report multiple type of exposure	6-17yrs Girls 78 (60.5%)	PTSD (100%) PTSS (0%)	Participants were part of a multicenter outpatient trial and were of mixed ethnicity, **Loss of Significant Other/s:** Not reported **Damage to Home:** Not reported. **Comorbidity:** 54.3% had a psychiatric history **Past Trauma:** Not reported, although participants endorsed a mean of 2.15 traumatic events	Sertraline (50-200mg) N=67 Versus Placebo N=62	Daily dose or Sertraline for 10 weeks **Results** - In comparison to the placebo, Sertraline did not reduce PTSD and other symptoms **No follow up data were reported.** Daily dose of placebo for 10 weeks

Post Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
de Roos, Greenwald, et al. (2011)	**B** **C - 2/3** Clinician Parent	✓	Pre to post treatment Effect sizes (Cohen's *d*) for: PROPS, CROPS, CUCLA & PUCLA CBT: *1.40, 1.16, 1.06, 1.38* EMDR: *1.08, 1.02, 1.23, 1.00* Pre to 3 month follow up Effect sizes (Cohen's *d*) for: PROPS, CROPS, CUCLA & PUCLA CBT: *1.20, 0.98, 1.27, 1.07* EMDR: *1.01, 1.10, 1.44, 1.62*	Pre to post treatment Effect sizes (Cohen's *d*) for: MASC & BDS CBT: *.62 & 1.09* EMDR: *1.12 & 0.92* Pre to 3 month follow up Effect sizes (Cohen's *d*) for: MASC, BDS & CBCL CBT: *.85, .80, .87* EMDR: *1.02, 1.04, .88*	**Key Findings (CBT versus EMDR)** EMDR and CBT were equally effective in alleviating trauma and non-trauma symptoms and gains were maintained at 3 month follow up. EMDR achieved the same gains in fewer sessions. **Methodological issues** The small sample size limits the degree to which findings can be generalised to the wider population and it is possible that the participants improved due to the passage of time because there was a lack of an inactive control group. There were no independent treatment fidelity ratings hence the high level of treatment adherence (based on clinician checklists) is unconfirmed. **Comments** This study made an important contribution to the treatment literature due to the inclusion of a comparative treatment condition and the promising findings in relation to brief intervention involving parents.
Gilboa-Schechtman et al., (2010)	**B** **C - 1/3** Parent	✓	Pre to post treatment & 6 month f/up Change in % probable PTSD PE-A: 100%--> 31.6% -> 36.8% TLDP: 100% -> 63.2% -> 73.7% *(p=.05 for pre to post treatment)* Pre & post treatment & 6 & 17 month f/up PE-A versus TLDP Effect size (Cohen's *d*) CPSS *0.21, 0.45*, 0.51*, 0.21* *(*p<.05)*	Pre & post treatment & 6 & 17 month f/up PE-A versus TLDP Effect size (Cohen's *d*) BDI 0.45, 0.07, 0.17, 0.02 CGAS 0.28, 0.58*, 0.55*, N/A *(*p<.05)* Pre to post treatment to 6 month f/up *Good end state functioning (CGAS score > 60 & CPSS < 12 & BDI < 10*): PE-A: 0% -> 73.7%* -> 63.2%** TLDP: 0% -> 31.6% -> 26.3% *(p=.05 for pre to post treatment)* *(p=.01 for post treatment to 6 month follow up)*	**Key Findings (Prolonged Exposure versus Dynamic Therapy)** Prolonged Exposure Therapy for Adolescents (PE-A) and Time Limited Dynamic Therapy for Adolescents (TLDP-A) alleviated PTSD symptoms and depression, and improved functioning. However, compared to TLDP-A, PE-A resulted in greater improvement in the incidence of PTSD and good end state functioning. Treatment gains were maintained at 6 and 17 month follow-up. **Methodological issues** The authors acknowledged limitations such as the 'modest' sample size, high proportion (81%) of comorbidity amongst participants who were exposed to different types of trauma ranging (e.g., Terrorist attacks, MVAs, sexual assault). **Comments** The authors reported that both treatments were acceptable to participants and parents and they acknowledged the need for replication and comparative or adjunctive treatment (e.g., with/without pharmacotherapy). They also reported that their long (17 month) follow up period was intended to account for the way in which psychopathology can manifest during the course of adolescents.

BDS, CBCL CRIES, CROPS, CUCLA, DSRS, MASC, PROPS, PUCLA, SDQ impact,

Post Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
Jaycox, Cohen, Mannarino, et al. (2010)	**C - 2/3** Clinician Teacher	×	Pre to Post treatment ***This paper only reported baseline to 5 month follow up data*** Pre-treatment to 5 month follow up Both groups significantly improved. CPSS: Mean (SD) CBITS: 22.0 (7.9) -> 15.8 (9.3) sig TF-CBT: 22.9 (8.3) -> 12.0 (10.4)sig At risk of PTSD CBITS: 100*% -> 65%* TF-CBT: 100*% -> 43%*	Pre to Post treatment ***This paper only reported baseline to 5 month follow up data*** Pre-treatment to 5 month follow up Only the CBITS group significantly improved. CDI: Mean (SD) CBITS: 13.4 (8.5) -> 9.7 (9.0)sig TF-CBT: 15.4 (7.6) -> 11.1 (10.5) ns	**Key Findings (Cognitive Behavioural Intervention in Schools versus Trauma-Focused CBT)** Both TF-CBT and CBITS treatments resulted in a significant improvement in PTSD symptoms, although gains were not clinically significant (symptom levels remained high). **Methodological issues** Recruitment rates were lower than expected hence the aim of the treatment was modified from identifying predictors of treatment outcome to participation. In addition to hurricane, participants had a high rate of lifetime exposure to trauma. The initial assessment for the TF-CBT group was conducted weeks or months after baseline. It is possible that the participants improved due to the passage of time because there was no inactive control group. **Comments** Families preferred access to therapy at their children's schools (98% uptake), rather than the community clinic settings (37% uptake), hence CBITS was far more accessible to families. Given that participants were assessed at baseline, 5 months and 10 months, the use of the term 10 month follow up in relation to the latter is somewhat confusing.

Post Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
Nixon, Sterk & Pearce (2012)	**B** **C - 2/3** Clinician Parent	×	Pre to post treatment Effect sizes (Cohen's *d*) for CBT & CT respectively CBT CT CAPS 1.44 1.03 CPSS 1.03 0.85 CPTCI 0.78 0.51 Pre treatment to 6-month f/up Effect sizes (Cohen's *d*) for CBT & CT respectively CBT CT CAPS 1.44 1.12 CPSS 1.19 0.96 CPTCI 0.55 0.60	Pre to post treatment Effect sizes (Cohen's *d*) for CBT & CT respectively CBT CT CDI 0.45 0.25 RCMAS 1.09 0.42 CBCL-I 0.72 0.69 CBCL-E 0.29 0.52 CBCL-T 0.63 0.59 Mother PDS 0.30 0.23 BDI-II 0.33 0.36 PTCI 0.26 0.19 Pre treatment to 6-month f/up Effect sizes (Cohen's *d*) for CBT & CT respectively CBT CT CDI 0.58 0.42 RCMAS 1.04 0.85 CBCL-I 0.51 0.66 CBCL-E 0.27 0.34 CBCL-T 0.53 0.55 Mother PDS 0.29 0.18 BDI-II 0.13 0.45 PTCI 0.09 0.26	**Key Findings (Trauma Focused Cognitive Behaviour Therapy versus Cognitive Therapy)** Both Trauma Focused Cognitive Behaviour Therapy (TF-CBT) and Cognitive Therapy CT (TF-CBT without exposure) significantly reduced PTSD, depression and anxiety. At post treatment only 35% and 44% of participants respectively met criteria for PTSD. Gains were maintained at six month follow-up. Treatment effects were moderated by maternal depression and negative trauma-focused beliefs. Whilst the dropout rate was relatively high 36%, this included participants who did not commence treatment. There was no difference in drop out between groups, although one child deteriorated in the CT group. **Methodological issues** It is possible that the participants improved due to the passage of time because there was a lack of an inactive control group. The authors also acknowledged the lack of independent fidelity ratings and limited statistical power for identifying small difference between the treatment conditions due to the 'modest' sample size. **Comments** The findings demonstrated that exposure is not essential for the treatment of single event trauma. The level of treatment adherence is unknown due to the lack of fidelity ratings. There was more sessions than usual for the treatment of single event trauma. The efficacy of treatments with and without exposure provides flexibility for clinicians and participants alike.

Post Publication – Single Event Treatment Studies (cont..)

Table 3 (Part B)
Treatment of PTSD following Single Event Trauma

Author/s	Blind (B) or Collateral (C) Outcomes Measures	Fidelity Ratings	PTSD Measures & Effect size	Non-PTSD Measures & Effect size	Conclusion/Comments
Robb, Cueva, Sporn, Yang & Vanderburg (2010)	**B** **C - 2/3** Clinician Parent	**NA**	Pre- to post treatment change scores for completers and Last Observation Carried Forward (LOCF) Sertraline Placebo UCLA PTSD-I Total -20.4 (±2.1) -22.8 (±2.1) ns -17.7 (±1.9) -20.8 (±2.1) ns	Pre- to post treatment change scores for completers and Last Observation Carried Forward (LOCF) Sertraline Placebo CSDC Total -13.2 (±1.7) -18.8 (±1.7) sig -12.4 (±1.7) -17.3 (±1.9) sig CGI-Severity -1.6 (±0.2) -2.0 (±0.2) ns -1.4 (±0.2) -1.8 (±0.2) sig CGI-Improvement 2.4 (±0.2) 2.2 (±0.2) ns 2.5 (±0.2) 2.3 (±0.2) ns CDRS-R -9.3 (±1.5) -12.0 (±1.5) ns -10.0 (±1.5) -12.3 (±1.6) ns PQ-LES-Total 7.5 (+1.4) 10.3 (+1.4) ns 7.2 (+1.3) 10.7 (+1.5) sig	**Key Findings (Sertraline versus Placebo)** Compared to a placebo, Sertraline did not result in an improvement in PTSD or non-trauma measures. In fact, the placebo group improved more than the Sertraline group on half of the outcome measures and the reasons for this are unclear. Whilst the authors concluded that Sertraline was "generally safe" for the treatment of children with PTSD, they acknowledged that the positive results from adult trials may not generalise to childhood PTSD. **Methodological issues** The authors acknowledged the unusually high placebo response rate which could have been associated with flaws in study design or execution. For example, interpersonal trauma and natural disasters were more common in the Sertraline and Placebo group respectively. In addition, the authors note the lack of valid and reliable assessment measures. They also noted the impact of multiple trauma on treatment outcome is unknown and this may have confounded the results. The attrition rate was higher in the Sertraline (29.9%) than placebo group (17.7%), and higher amongst children (35.9% Sertraline versus 20.0% Placebo) compared to adolescents (21.4% versus 14.8%). The lack of a comparative treatment group was also acknowledged. Treatment was discontinued due to a severe adverse reaction for 7.5% of the Sertraline group and none of the Placebo group. Risk ratios were highest for Sertraline compared to Placebo for hyperkinesia, rhinitis and vomiting. **Comments** Nil.

1.10.5 Evidence for eye movement desensitisation and reprocessing.

The review of the treatment literature as a whole (see section 1.9) highlighted the popularity and efficacy of CBT or Trauma Focused-CBT for the broadest range of trauma types and treatment settings. Whilst EMDR treatment studies were considerably less common, the reviews indicated that EMDR was at least equivalent to CBT (Rodenburg et al., 2009). There was also some evidence that EMDR was superior to CBT, particularly in regard to single event (type I) trauma (Flemming, 2012), although this must be considered in the context of the limited volume of treatment outcome research for type I trauma (Adler-Nevo & Manassis, 2005).

Prior to the publication of the first study in this thesis (see Chapter 2), the EMDR treatment literature had progressed from case studies (Cocco & Sharpe, 1993) to uncontrolled (Oras, De Ezpeleta & Ahmad, 2004) and controlled group studies (e.g., Ahmad, Larsson, & Sundelin-Wahlsten, 2007), and findings supported the efficacy of EMDR for the treatment of children and adolescents with PTSD symptoms. However, it was clear that further randomised and controlled research was needed to investigate the efficacy of EMDR with children afflicted by exposure to different types of single event trauma. If EMDR proved efficacious following exposure to a broader range of single traumatic events, a progression to comparative studies involving brief exposure treatments or modified CBT would be appropriate.

Since the publication of the first study in this thesis (Kemp, Drummond & McDermott, 2010), three additional EMDR studies have been published (Bronner, Beer, Jozine van Zelm van Eldik, Grootenhuis & Last, 2009; de Roos et al., 2011; Ribchester, Yule & Duncan, 2010) but only the comparison study by de Roos et al. (2011) was randomised and controlled. de Roos et al. (2011) compared EMDR and CBT amongst 52 children (aged 6 to12 years) with PTSD symptoms after exposure to a fireworks explosion in the Netherlands. The strengths of the study included the

use of blind assessors and multiple collateral measures (clinician and parent ratings). Results supported the efficacy of both treatments in alleviating PTSD symptoms, anxiety, depression and behavioural problems (see Table 3, Part A & B). Compared to CBT, EMDR resulted in more rapid improvement (i.e., 3.17 $\pm$.86 versus 4.0 $\pm$1.03 sessions) and gains were maintained at three month follow-up. The authors acknowledged several methodological issues which might limit the degree to which findings could be generalised. These included the modest sample size, lack of independent treatment fidelity ratings (and lack of session duration data) and absence of an untreated control group. The lack of accurate session duration data meant that the efficiency of EMDR might be explained by differences in session duration. Whilst the improvement in symptoms could have occurred due to the passage of time or through therapeutic attention (i.e., there was no wait-list or inactive control group), this was unlikely because of the persistent nature of symptoms (i.e., they were treated one to 3.5 years post trauma).

1.10.6 Conclusion.

The review of pre-publication treatment studies for single event trauma indicated that two brief interventions (CBT and EMDR) were well suited to the treatment of PTSD symptoms resulting from uncomplicated single traumatic events. EMDR was chosen in preference to CBT because of the potential efficiency of the protocol and the somewhat larger effect size. The limited application of brief interventions for single event trauma obviously invites further research. Thus, the aim of this thesis was to contribute to the treatment literature and therapeutic options for this population.

Subject to EMDR demonstrating some efficacy in comparison to a waitlist control condition (study 1), the ultimate aim was to compare EMDR to an alternative treatment condition based on Lang's (1977, 1979, 1983) bio-informational theory

(study 4). Before testing such a treatment, it was prudent to investigate a truncated version of the treatment in the form of an adjunctive assessment (study 3). This process suited a prospective study design which facilitated an investigation of sample representation. Specifically, the author was intrigued to know whether participants in single event trauma studies were representative of the population compared to those who did not participate (study 2).

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CHAPTER 2

Study One

A Wait-List Controlled Pilot Study of Eye Movement Desensitization and Reprocessing (EMDR) for Children with Posttraumatic Stress Disorder (PTSD) Symptoms from Motor Vehicle Accidents.

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Abstract

The present study investigated the efficacy of four EMDR sessions in comparison to a six week wait-list control condition in the treatment of 27 children (aged 6 to 12 years) suffering from persistent PTSD symptoms after a motor vehicle accident. An effect for EMDR was identified on primary outcome and process measures including the Child Post Traumatic Stress – Reaction Index, clinician rated diagnostic criteria for PTSD, Subjective Units of Disturbance and Validity of Cognition scales. All participants initially met two or more PTSD criteria. After EMDR treatment, this decreased to 25% in the EMDR group but remained at 100% in the wait-list group. Parent ratings of their child's PTSD symptoms showed no improvement, nor did a range of non-trauma child self-report and parent-reported symptoms. Treatment gains were maintained at three and 12 month follow-up. These findings support the use of EMDR for treating symptoms of PTSD in children, although further replication and comparison studies are required.

Keywords

childhood, controlled, EMDR, PTSD, trauma

Introduction

Although trauma-focused cognitive behaviour therapy (TF-CBT) is effective for treating PTSD in children and adolescents after physical or sexual abuse (Silverman et al., 2008), treatments for psychological dysfunction after single event paediatric trauma (e.g., motor vehicle accidents) (McDermott & Cvitinovich, 2000; Carrion, Weems, Ray & Reiss, 2002) are yet to be established. However, Eye Movement Desensitisation and Reprocessing (EMDR) holds some promise (Silverman et al., 2008). Of the three controlled studies that support the efficacy of EMDR with children (Ahmad, Larsson, & Sundelin-Wahlsten, 2007; Chemtob, Nakashima, & Carlson 2002; Jaberghaderi, Greenwald, Rubin, Zand & Dolatabadi, 2004), only one involved exposure to a single traumatic event (i.e., Hurricane Iniki) (Chemtob et al., 2002). Three uncontrolled group studies (Fernandez, 2007; Oras, De Ezpeleta & Ahmad, 2004; Puffer, Greenwald & Elrod, 1998) and several case reports (Cocco & Sharpe, 1993; Greenwald, 1994; Pellicer, 1993; Tufnell, 2005) have also supported the use of EMDR with child and adolescent populations. Findings suggest that EMDR can significantly reduce post-traumatic stress disorder (PTSD) and non-trauma symptoms such as anxiety and depression.

In the present study, the efficacy of EMDR was investigated against a wait-list control condition for children with PTSD symptoms from motor vehicle accidents. In comparison to the wait-list group, participants in the EMDR group were expected to show significant improvement in PTSD symptoms, process measures and non-trauma symptoms (anxiety, depression and behavioural problems).

Method

Participants

Over a four year period, 27 pre-adolescents (15 boys, 12 girls) were entered into the study following their admission to a hospital emergency department after a motor vehicle accident. Participants ranged from 6.00 to 12.65 years of age (M = 8.93, SD = 1.78), and between 3.33 and 19.82 months (M = 8.35, SD = 3.48) had elapsed since their accident. Participants were recruited from 404 motor vehicle accident victims who were first contacted by phone; 154 (38.4%) potential participants were sent information about the study and 56 (36.4%) of these attended an initial assessment. Of 38 eligible participants, five dropped out before the commencement of the study and six were screened out due to co-morbid conditions. Three participants dropped out of the study from pre- to post-treatment (EMDR = 1; wait-list = 2; participation rate 88.9%), and two dropped out from post-treatment to three-month follow-up (participation rate 81%). A further seven participants were lost at 12 month follow-up (participation rate 55%).

For inclusion in the study participants needed to be 6 to 12 years of age and to score at least 12 on the Child Post-Traumatic Stress - Reaction Index (Frederick, Pynoos & Nader, 1992; Pynoos & Nader, 1988) or meet at least two DSM-IV criteria (including exposure) for PTSD. Participants were excluded if they were taking psychotropic medication, had concurrent psychological conditions (e.g., major depressive disorder or attention deficit disorder), a past history of sexual and physical abuse or neglect, or had suffered a serious head injury with persistent associated neurological dysfunction or scores in Accident and Emergency less than 12 on the Glasgow Coma Scale (Teasdale & Jennett, 1974, 1976). Exclusion criteria ensured that participants had experienced a single event trauma uncomplicated by

head injury, parental injury, comorbid psychopathology, sexual abuse, and grief or loss.

Measures

To determine the efficacy of the EMDR intervention, outcome measures were taken at pre- and post-treatment, and three and 12 month follow-up.

Primary outcome measures:

i) PTSD (DSM-IV) Diagnostic Criteria.

A systematic clinical assessment was used to confirm exposure to trauma, re-experiencing, avoidance and arousal criteria (McDermott & Cvitanovich, 2000).

ii) Child Post-Traumatic Stress - Reaction Index (Child PTS-RI)

The Child PTS-RI (Frederick et al., 1992; Pynoos & Nader, 1988) has been widely used in child trauma research and has very good psychometric properties (McNally, 1996; Steinberg, Brymer, Kelly, Decker & Pynoos, 2004).

Secondary outcome measures:

Various secondary and process measures (*Subjective Units of Disturbance*; Wolpe, 1982; and *Validity of Cognition scales;* Shapiro, 1989) were taken to corroborate any improvements in trauma-specific symptoms and to determine whether such improvements generalised to non-trauma symptoms such as anxiety *(State Trait Anxiety Inventory for Children;* Spielberger, 1973; Hedl & Papay, 1982; Papay & Speilberger, 1986), depression (*Children's Depression Scale;* Lang & Tisher, 1983; Tisher, Lang-Takac & Lang 1992; Tisher, 1995) and behavioural problems *(Child Behaviour Checklist;* Achenbach, 1991; Saxe et al., 2003; Vila et al., 2001). Parent measures included known correlates of childhood PTSD that were

likely to impact upon recovery (Langeland & Olff, 2008) (the *Child Post-Traumatic Stress - Reaction Index: Parent Questionnaire* (henceforth referred to as the Parent PTS-RI), Nader, 1994*; General Health Questionnaire – 12*, Goldberg, 1978; the *Impact of Events Scale,* Horowitz, Wilner, & Alvarez, 1979; the *General Functioning Scale* derived from the Family Assessment Device; Epstein, Baldwin & Bishop, 1983; and a checklist of social stressors).

Procedure

Participants were randomly assigned to either the wait-list control (N = 14) or EMDR group (N = 13). EMDR treatment consisted of four 60-minute sessions delivered by the lead author (M.K.), a doctoral level psychologist with advanced EMDR training, every 7-10 days over a six week period. The six-week wait-list period was similar to the average waiting time for treatment at a local community child and adolescent mental health clinic. To ensure that the wait-list participants had the opportunity to benefit from active treatment, they received EMDR treatment (using the same protocol) after the wait-list period. Modifications were made to the standard EMDR protocol (Shapiro, 1995, 2001) to suit the age and developmental level of participants (see Appendix 1).

Treatment Fidelity

An experienced Child Clinical Psychologist who had completed advanced EMDR training viewed 11 video-taped treatment sessions and rated them for adherence to the EMDR treatment protocol. Ratings were made on a 0 to 5 scale of acceptability similar to that used by Pitman et al. (1996) and Rothbaum (1997). The fidelity rater also provided feedback to the therapist so that any deficits in the treatment could be addressed. The mean treatment fidelity rating was 4.27, SD (0.61) which falls between “acceptable” and “highly acceptable”.

Statistical Analysis

Chi square and independent t-tests were conducted to investigate pre-treatment differences between the EMDR and wait-list groups. Experimental effects were investigated using three MANOVA's with time (pre- vs post-treatment) as the within-subject factor and group (EMDR vs wait-list) as the between-subject factor. The variable groupings for the MANOVA's consisted of: i) the primary outcome measures (PTSD diagnosis, Child PTS-RI scores), ii) process measures, iii) child self-report measures (state and trait anxiety, and total depression and total positive scores on the *Children's Depression Scale*), iv) parent ratings of children, and v) parent self-report and other measures. Where overall (group x time) treatment effects were identified, univariate ANOVA's were conducted with *a priori* planned contrasts to delineate treatment effects. Where appropriate, the Greenhouse-Geisser adjustment was applied to the degrees of freedom to correct for violations of the sphericity assumption.

Since there were no significant changes across measures from before to after the wait-list period in the wait-list group, the EMDR and delayed treatment data were combined for further statistical analysis. Due to the loss of participants at 12 month follow-up, separate MANOVA's were used to investigate effects at post-treatment and three- and 12-month follow-up.

Results

The following case vignettes illustrate how EMDR is applied in practice and provide a clinical context for the results that follow. The contrast between a six and 12 year old participant also provides an indication of how EMDR is modified to suit the age and developmental level of the participant.

Case Vignettes

Jack

Jack, aged 6, was riding a skateboard (lying on his back) on the road when he lost control and a car ran over his leg resulting in a tibia and fibula fracture. Nine months after his accident, his initial Child PTS-RI score was 25 (moderate) and he met DSM-IV PTSD criteria for exposure and re-experiencing.

Early in the first treatment session a safe place was established by asking Jack to complete a few sets of eye movements whilst vividly recalling, in terms of images, emotions and body sensations, a time when he felt really happy and was having fun (e.g., visiting a local play area called "the fun factory"). Jack also practiced using the stop signal, by holding his hand up or turning his head, or saying "stop", a few times to promote his sense of control.

Jack was then asked to look at his drawing of the accident, to "imagine or remember the worse part of it" and to say to himself "I'm going to die" (his negative cognition). Jack's extreme level of discomfort (i.e., SUDS rating of 10), concordant non-verbal behaviour (holding his breath, widened eyes and restlessness) and limited initial responsiveness, led the therapist to acknowledge his obvious fear (the therapist noted "you're doing fine, it can be really hard to think about frightening memories like accidents and to do eye movements at the same time"). The therapist then asked if it would help Jack to imagine looking at the accident from further away; "perhaps you could imagine looking through a window at your accident or watching your accident on TV; would that help make it easier?" Desensitisation resumed after Jack replied "I want to imagine looking through the window of a car". Providing Jack with options in how he recalled his accident was intended to promote his sense of control.

Sometimes children were encouraged to bring their favourite toy to the therapy session to incorporate into the therapy. Jack brought his toy Kangaroo named "Joey" to the second session. The session commenced with the safe place exercise and Joey (instead of the therapist's hand) became the visual stimulus. The therapist gave Joey a voice (and jumping sound effects) during the eye movements (i.e., Joey asked Jack, "can I come to the fun factory too?") and in response Jack laughed and smiled. In line with the initial treatment session, Jack was given a choice of how he recalled his accident (i.e., looking at his drawing and remembering the worst part of the accident, looking at his accident through a car window or watching it on TV). He chose to look at his drawing. To promote engagement and to enhance Jack's sense of safety and security, Jack was asked if Joey could help with the eye movements. Desensitisation proceeded and Jack disclosed new and distressing material relating to his medical treatment (e.g., the painful experience of having his plaster cast removed). Throughout the session Jack stopped the eye movements on several occasions. After he complained of some eye soreness, the finger flicking technique was instigated. That is, instead of watching Joey move back and forth, the therapist held both fists approximately 1200mm apart and Jack was asked to track the alternate raising of the therapist's fingers. Desensitisation proceeded and after successive sets of eye movements Jack reported several accident-related memories (e.g., being under the car and screaming "get it off me!"; intense fear, and his father's anger). To further reinforce Jack's engagement and sense of control over the therapy process, he was given the option of completing one, three or five more sets of eye movements as the session drew to a close; he chose just one.

Towards the end of the third treatment session, Jack reported several accident-related memories (e.g., screaming under the car and going down the hill on

the skateboard) and after recalling his father swearing, he moved his chair a little further away from the therapist. He crouched behind the backrest of the chair and gradually peaked over the top of it. Despite this overt behaviour, the desensitisation procedure continued and, after successive sets of eye movements, Jack reported numerous further trauma-related images or memories (e.g., images of the hospital, having the plaster taken off and the associated pain). His SUDS rating at the end of the third session was 8.5.

Surprisingly, Jack said that he felt "safe" at the start of the fourth session. As the session progressed and his SUDS continued to be rated as zero, Jack completed sets of eye movements whilst he imagined his accident memory and repeated the phrase "I'm OK now" (his positive cognition) to himself. He then repeated the same words to himself as he completed further sets of eye movements and imagined himself successfully skateboarding in the future. He smiled as he pictured himself riding his skateboard in a standing position and saving Joey from a motor vehicle accident. At post treatment, Jack's SUDS remained at 0 and his VOC increased from 3 to 4.5 out of 7. He no longer met DSM-IV PTSD criteria for re-experiencing and his Child PTS-RI scores at post-treatment, three- and 12-month follow-up were 14 (mild), 7 (doubtful) and 10 (doubtful) respectively.

Steve

Steve, aged 12, was crossing a busy highway when he was hit by a car and sustained a fractured tibia and fibula. He was transported to hospital by ambulance and was admitted to hospital for surgery. Four months after his accident Steve met DSM-IV PTSD criteria for exposure, re-experiencing and arousal, and even though his initial SUDS rating was seven, he acknowledged only mild symptoms levels on the Child PTS-RI.

Treatment commenced with the usual safe place exercise and practice using the stop signal. Desensitisation progressed into the latter half of the session, at which point Steve reported strong accident-related feelings and a new negative cognition ("I'm useless"). He stated "my brain is reluctant to think and it wants to go home". To promote Steve's sense of control over the therapy process, he was subsequently given the option of completing three, five or 10 more sets of eye movements. Despite his obvious distress, he chose to complete 10 further sets of eye movements. When cognitive responses persisted during subsequent sets of eye movements (e.g., "I feel sorry for my brain"), he was directed to any associated body sensations (i.e., the therapist asked, "where do you feel that in your body?"). His subsequent responses included numerous images of his favourite video game and the various characters representing monsters and heroes.

During further desensitisation in session two, cognitive interweave (Shapiro, 1995) was employed to combat Steve's extreme level of fear after he stated "I don't ever want to cross roads" and "I'm never going to be safe for the rest of my life". This involved 'Socratic' questioning followed by sets of eye movements. For example, Steve was asked how many accidents he had had whilst crossing a road ("one"), and how many times he had crossed a road in his life ("thousands"). The therapist then said, "so you have had one serious accident in thousands of road crossings, which means the chance of you having an accident is….?" ("one in a billion" replied Steve).

During the third session, Steve's memory of his pet being killed on the road was targeted using EMDR and Steve's associated SUDS decreased from 5 to 2. Unexpectedly, Steve then mimed crossing the road and being hit by car. He completed sets of eye movements as he repeated this and he seemed amused by his own actions.

With continued desensitisation during the final treatment session, Steve's SUDS rating reached zero. The installation of his two positive cognitions was then completed ("I'm in control now" and "It's over and I'm safe now"). At the end of treatment his VOC ratings had increased from 2 to 7, and he no longer met DSM-IV PTSD criteria for re-experiencing or arousal. His Child PTS-RI scores improved from 16 (mild) at pre-treatment to 8 (doubtful) or below at post-treatment, three- and 12-month follow-up.

Pre Treatment Sample Characteristics

Despite random allocation to group, wait-list parents reported higher self-reported health problems on the GHQ – 12 [t (23) = -2.14, p<.05] and IES avoidance subscale [t (23) = -2.06, p<.05] (see Table 1). There were also significantly more girls in the wait-list group than in the EMDR group (n = 9 versus 3) [X^2 (1, n=27) = 4.64, p<.05)]. An ANCOVA showed no significant covariation between these three variables and outcome measures. The groups were otherwise equivalent at pre-treatment on all outcome measures, demographic and trauma related variables.

Primary outcome measures.

A MANOVA of the primary outcome measures revealed a significant main effect for time [F (2,21) = 8.78, p<.01] and an interaction between group and time [F (2,21) = 10.08, p=.001]. Univariate ANOVA confirmed significant main effects for time (Child PTS-RI scores [F (1,22) = 15.69, p=.001]; number of DSM-IV PTSD criteria [F (1,22) = 6.96, p<.05]), and interaction effects for group and time (Child PTS-RI scores [F (1,22) = 8.23, p<.01]; number of DSM-IV PTSD criteria [F (1,22) = 17.82, p<.001]). In a secondary statistical analysis (MANCOVA) that controlled for group differences at baseline, the group and time interaction remained significant [F (2,17) = 9.32, p<.01].

A priori contrasts identified a significant pre to post reduction in the number of DSM-IV PTSD criteria [t (11) = 4.17, p<.01] and Child PTS-RI scores [t (11) =

4.26, p=.001] for the EMDR group but not for the wait-list group (Figures 1A & 1B). There was also a significant difference between groups at post treatment, but not at pre-treatment, in the number of DSM-IV PTSD criteria [t (22) = 4.00, p=.001] and Child PTS-RI scores [t (22) = 2.38, p<.05].

Differences between groups in the rate of clinically significant improvement were determined by using Chi Square analysis to compare the number of participants in each group meeting two or more, and three or more PTSD criteria. Pre to post treatment, the proportion of participants in the EMDR group meeting two or more criteria decreased from 100% to 25% in the EMDR group, but did not change in the wait-list group [X^2 (1, n=24) = 14.40, p<.001)].

A MANOVA of the primary outcome measures for the combined data confirmed multivariate effects for time from pre- to post-treatment and three-month follow-up [F (4,18) = 15.86, p<.001] [F (= 9.77, p<.001] and from post-treatment to 12-month follow-up [F (2,13) = 6.56, p<.05]. Univariate ANOVA's with planned contrasts confirmed pre- to post-treatment improvement for both the number of DSM-IV PTSD criteria [F (1,21) = 32.09, p<.001]) and Child PTS-RI scores [F (1,21) = 46.14, p<.001] (Figures 1C & 1D).

Table 1

Pre-Treatment Comparison of all Measures

Variable	EMDR M ± SD	Wait-List M ± SD	t	sig
Primary Outcome Measures				
Total No. of PTSD Criteria	2.46 ± 0.66	2.64 ± 0.63	0.73	n.s.
Child PTS-RI Total	25.92 ± 12.18	27.29 ± 12.58	0.29	n.s.
Secondary Outcome Measures				
Process Measures				
SUDS	5.54 ± 2.90	6.00 ± 2.04	0.46	n.s.
VOC	3.77 ± 1.92	4.35 ± 1.53	0.78	n.s.
Child Self-Report Measures				
STAIC - State Anxiety	28.69 ± 4.53	32.21 ± 8.40	1.34	n.s.
STAIC - Trait Anxiety	35.54 ± 7.21	40.21 ± 7.02	1.71	n.s.
CDS - Total Depression	135.69 ± 25.63	140.69 ± 29.06	0.46	n.s.
Total Positive	72.23 ± 9.16	67.92 ± 7.32	1.32	n.s.
Parent Ratings of Child				
Parent PTS-RI Total	21.73 ± 12.14	30.0 ± 15.43	1.42	n.s.
CBCL Total Score	34.67 ± 22.60	45.77 ± 33.45	0.96	n.s.
CDS Total Depression	107.42 ± 21.62	114.23 ± 31.48	0.62	n.s.
Total Positive	68.00 ± 6.48	69.38 ± 6.33	0.54	n.s.
Parent Self-Report and Other Measures				
IES Total	22.33 ± 15.03	34.64 ± 22.48	1.61	n.s.
IES - Intrusions	14.83 ± 18.29	18.29 ± 12.68	0.82	n.s.
IES - Avoidance	7.50 ± 10.14	16.36 ± 11.53	2.06	*p<.05
GHQ-12	1.25 ± 1.91	3.93 ± 3.95	2.14	*p<.05
GFS	20.92 ± 4.19	19.42 ± 4.42	0.51	n.s.
No stressors in past 12 months	1.25 ± 1.91	1.62 ± 1.33	0.56	n.s.

Note. Table shows results of independent t tests. SUDS: Subjective Units of Disturbance; VOC: Validity of Cognition; STAIC: State Trait Anxiety Inventory for Children; CDS: Children's Depression Scale; PTS-RI: Children's Post Traumatic Stress - Reaction Index; CBCL: Child Behaviour Checklist.

Child PTS-RI scores, but not the number of DSM-IV PTSD criteria, significantly improved from post-treatment to three-month follow-up [$F(1,21) = 4.78$, $p<.05$] and both the number of DSM-IV PTSD criteria [$F(2,13) = 9.33$, $p<.01$] and Child PTS-RI scores [$F(2,13) = 13.38$, $p<.01$] improved from post-treatment to 12-month follow-up (Figures 1C & 1D).

From post-treatment to three-month follow-up, the number of participants meeting two or more criteria improved from eight (34.8%) to five (22.7%), and at 12-month follow-up only two participants (13.3%) met two or more criteria.

Secondary outcome measures.

Process measures.

A MANOVA revealed significant main effects for group [$F(2, 20) = 5.41$, $p<.05$] and time [$F(2, 20) = 14.99$, $p<.001$] and an interaction between group and time [$F(2, 20) = 7.55$, $p<.01$]. Univariate ANOVA confirmed a significant main effect for time for SUDS [$F(1,21) = 31.22$, $p<.001$], but not for VOC ratings.

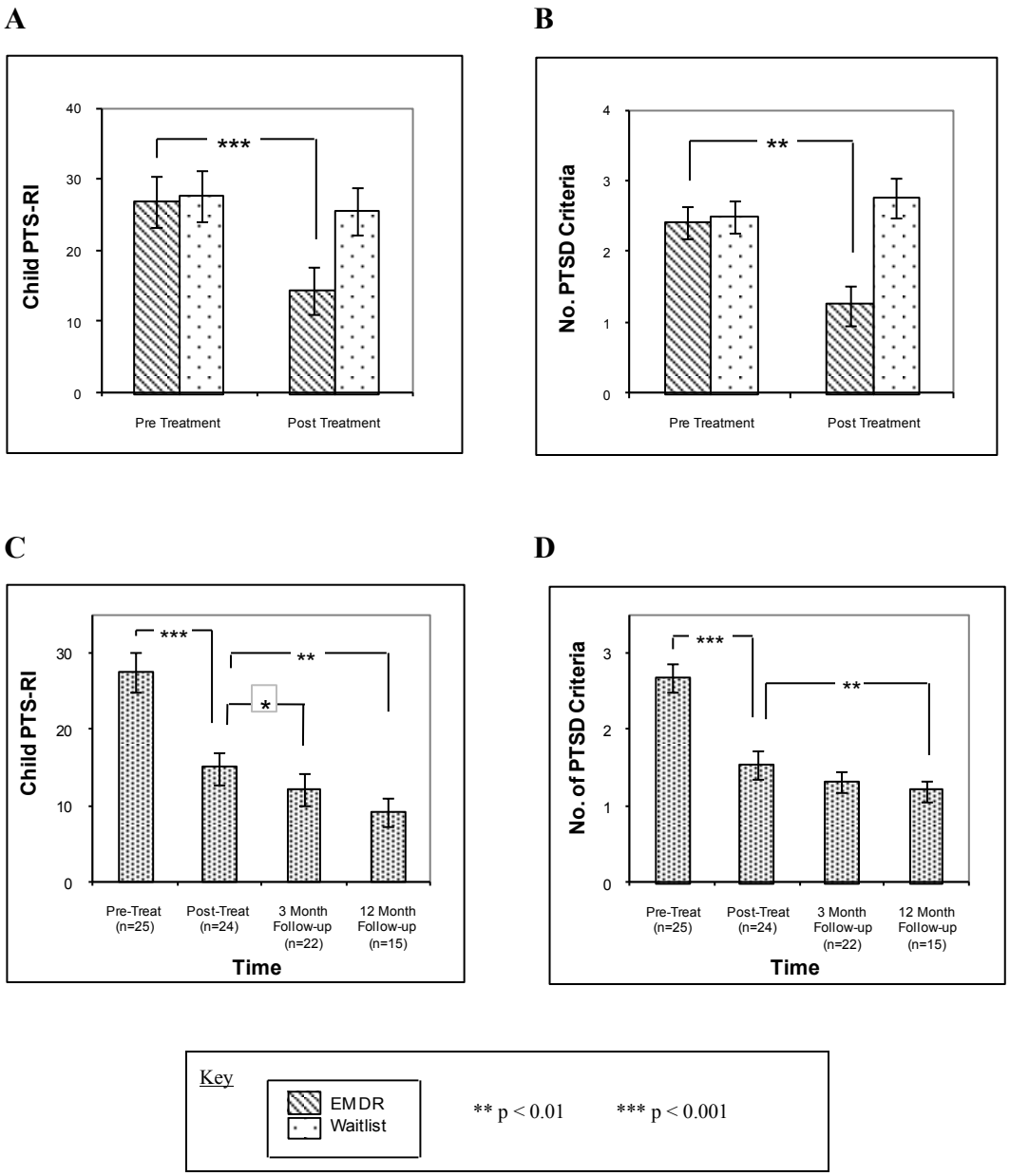

Figure 1. Change (±SE) in primary outcome measures from pre to post treatment and combined group data at three and 12 month follow-up

There were interaction effects for group and time for both SUDS [F (1,21) = 11.22, p<.01] and VOC ratings [F (1,21) = 10.80, p<.01]). As expected, *a priori* contrasts identified a significant pre- to post-treatment reduction in SUDS ratings [t (12) = -6.34, p<.001], and a significant increase in VOC ratings [t (12) = 3.41, p<.01] for the EMDR group but not for the wait-list group (Figures 2A & 2B). There

was also a significant difference between the EMDR and wait-list groups for SUDS [t (23) = -5.69, p<.001] and VOC ratings [t (23) = 3.87, p<.001] at post-treatment but not at pre-treatment. A repeated measures MANOVA of the process measures for the combined data confirmed multivariate main effects for time from pre- to post-treatment and three-month follow-up [F (4,18) = 14.78, p<.001], but not from post-treatment to 12-month follow-up. Univariate ANOVA's with planned contrasts confirmed pre- to post-treatment improvement for SUDS [F (1,21) = 50.85, p<.001]) and VOC ratings [F (1,21) = 21.50, p<.001] (Figures 2C & 2D).

Secondary child and parent measures.

Separate MANOVA's investigating treatment effects for child self-report measures, parent ratings of children and other parent measures were all non-significant (see Figure 2 and Table 2).

MANOVA's of the combined data from pre- to post-treatment and three-month follow-up revealed a significant main effect for time for parent ratings of children [F (12,9) = 4.24, p<.05] whilst child self-report and other parent measures were all non-significant (see Table 3). Similar MANOVA's of the combined data from post-treatment to 12-month follow-up were all non-significant. Univariate investigation of the main effects for time for parent ratings of children, with repeated contrasts, confirmed pre- to post-treatment improvement in Parent PTS-RI scores [F (1,20) = 19.68, p<.001], CDS scores [F (1,20) = 5.85, p<.05], and CBCL internalising [F (1,20) = 8.45, p<.01] and externalising [F (1,20) = 7.54, p<.05] (see Figure 2 and Table 3).

Discussion

The present investigation is only the second controlled study of EMDR for children afflicted by single event trauma, and the first study to examine the efficacy of the technique for the treatment of PTSD symptoms resulting from motor vehicle accidents. Independent ratings indicated that the EMDR treatment was delivered with a moderate to high level of fidelity. Four one-hour sessions of EMDR treatment proved more effective than a six-week wait-list control condition in alleviating PTSD symptoms as measured by Child PTS-RI scores and clinician rated PTSD diagnostic criteria. EMDR treatment also resulted in significant improvement on standard EMDR process measures.

Pre- to post-treatment effect sizes (Cohen's *d*; Cohen, 1988) for the EMDR group ranged from 1.16 for Child PTS-RI scores to 1.92 for SUDS scores. The former was comparable with the effect size of 1.55 obtained by Chemtob et al. (2002) and although non-trauma measures (self-reported anxiety and depression, and parent ratings of behaviour and depressive symptoms) did not show significant improvement, the significant improvement in PTSD symptoms in just four treatment sessions indicates that brief and focused treatments are of value for those afflicted by single-event trauma. These improvements were clinically significant. All participants initially met two or more PTSD (DSM-IV) criteria, whereas after EMDR treatment this decreased to 25% in the EMDR group. In addition, improvements in PTSD symptoms were maintained at three-month follow-up with some further improvement over the longer term in participants who could be contacted at 12-month follow-up.

The lack of pre- to post-treatment improvement on parent ratings of their children may reflect the subclinical characteristics of this population, or the lack of statistical power resulting from the small sample size. In relation to the former,

PTSD diagnostic rates, Child PTS-RI scores, and levels of co-morbid psychopathology were lower in this study than in other treatment samples (e.g., Chemtob et al., 2002; Farrell, Hains & Davies,1998; Field, Seligman, Scafedi & Schanberg, 1996; Goenjian et al., 1997). Furthermore, child-rated anxiety and depression levels were in the normal range or only moderately elevated, and parent-rated Child Behaviour Checklist scores were notably lower than those associated with functional impairment (Carrion, Weems, Ray & Reiss, 2002). Nevertheless, the failure of child and parent non-trauma measures to show significant improvement may indicate a specific treatment effect for EMDR on PTSD symptoms.

The lack of improvement in parent-rated PTSD symptoms could be explained by the fact that parents rate observable behaviour whilst children rate what they feel. The children may therefore have felt better after treatment, but without any change in their observable behaviour. However, consistent with the findings of Comer and Kendall (2004), there was no difference between parent and child ratings for different clusters of symptoms. Furthermore, it would appear that parents typically under report their child's PTSD symptoms (Meiser-Stedman, Smith, Glucksman, Yule & Daglish, 2007).

The main methodological limitation of this study is that a single therapist also completed the treatment and outcome assessments. Although the positive outcomes might be explained by the demand characteristics of EMDR, they could equally be explained by real treatment effects.

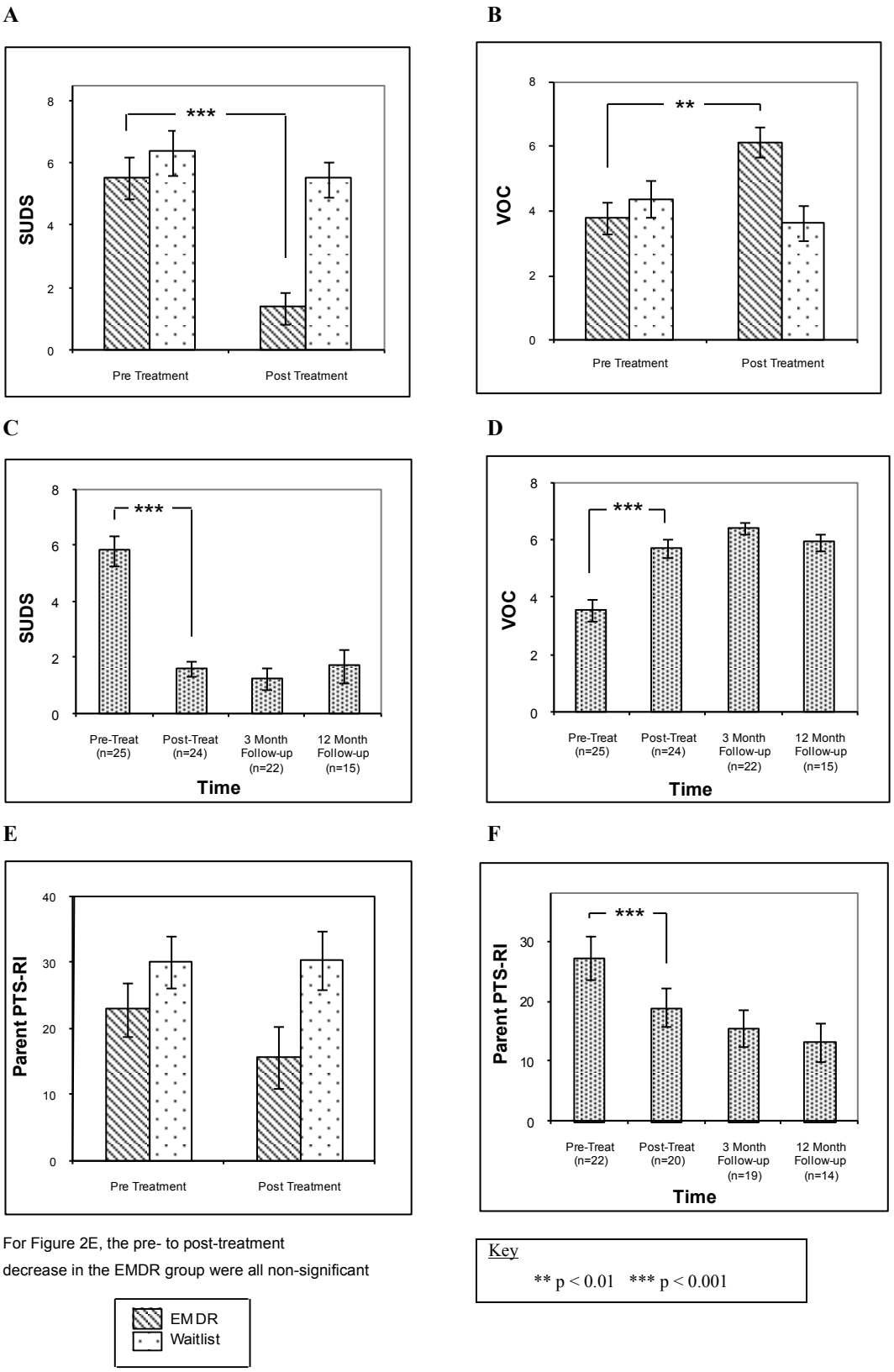

Figure 2. Change (±SE) in secondary outcome measures from pre to post treatment and combined group data at three and 12 month follow-up

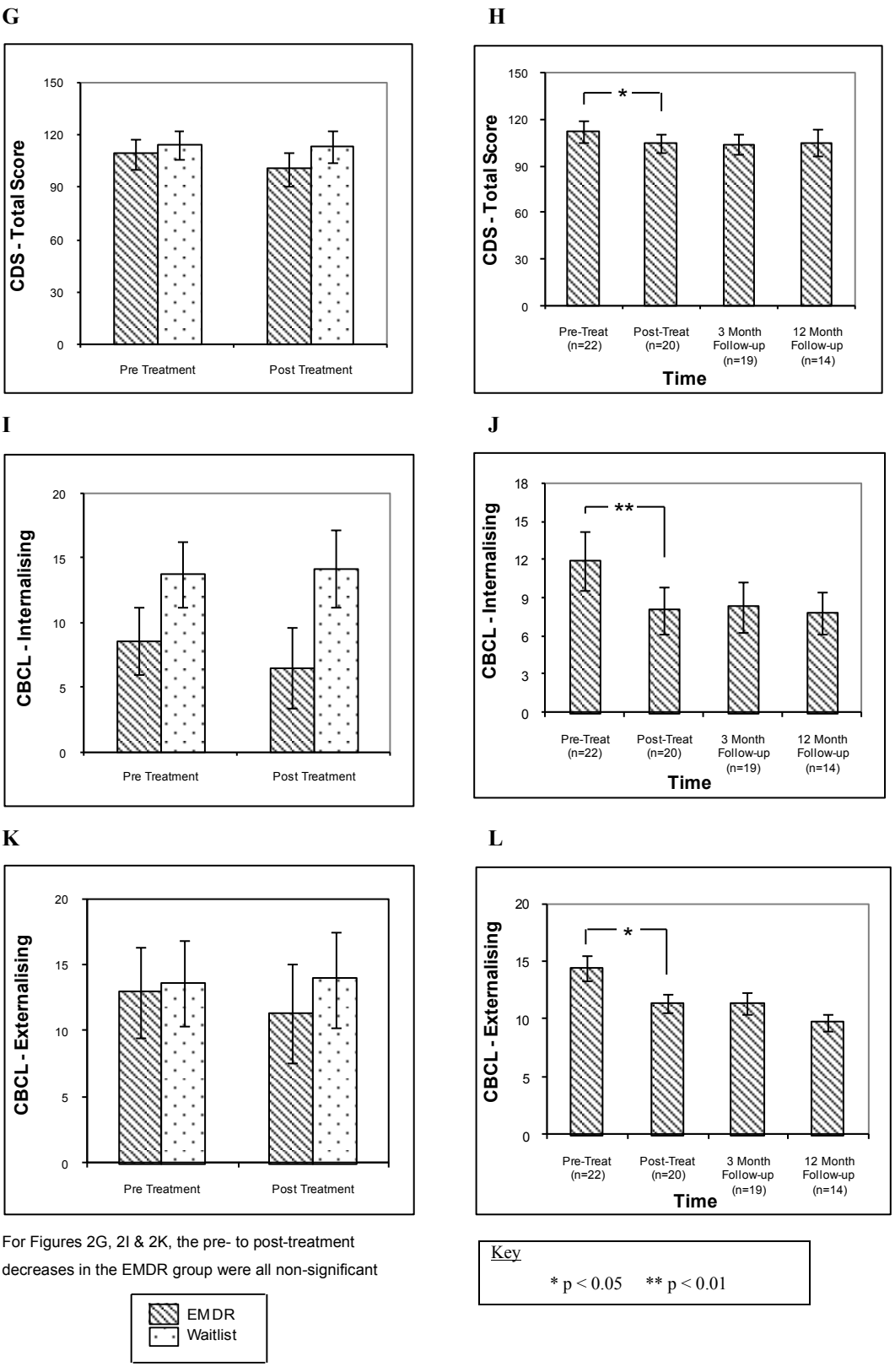

Figure 2 cont.. Change (±SE) in secondary outcome measures from pre to post treatment and combined group data at three and 12 month follow-up. CDS: Children's Depression Scale; CBCL: Child Behaviour Checklist.

Table 2

Pre- to Post-Treatment Comparisons for Non-Trauma Measures

	EMDR		Wait-List	
	Pre Treatment	Post Treatment	Pre Treatment	Post Treatment
Variable	**M ± SD**	**M ± SD**	**M ± SD**	**M ± SD**
Secondary Outcome Measures				
Child Self-Report Measures				
STAIC - State	28.50 ± 4.68	28.83 ± 3.35	32.33 ± 8.37	31.67 ± 6.83
STAIC - Trait	35.42 ± 7.51	33.50 ± 8.72	39.58 ± 7.23	36.17 ± 8.83
CDS Total	138.42 ± 24.72	135.75 ± 26.98	137.50 ± 27.87	131.25 ± 26.46
Total Positive	71.67 ± 9.33	70.00 ± 11.12	67.50 ± 7.48	67.92 ± 8.35
Parent Ratings of Child				
CBCL Total	36.73 ± 22.49	28.45 ± 22.34	30.10 ± 34.16	43.17 ± 40.16
CDS Total	109.09 ± 21.85	100.00 ± 19.76	116.36 ± 33.62	113.45 ± 40.77
Total Positive	68.18 ± 6.76	71.45 ± 5.41	69.50 ± 6.60	70.33 ± 9.06
Parent Self-Report and Other Measures				
IES Total	23.45 ±15.23	12.64 ±14.60	37.08 ±23.47	27.83 ±23.79
Intrusions	15.27 ± 8.09	7.18 ± 7.88	19.25 ±13.48	13.33 ±12.09
Avoidance	8.18 ±10.34	5.45 ± 8.13	17.83 ±11.69	14.50 ±13.83
GHQ	1.09 ± 1.92	1.91 ± 2.63	4.25 ± 4.11	3.83 ± 4.15
GFS	21.00 ± 4.38	19.73 ± 5.39	19.21 ± 4.55	19.08 ± 4.60
No. of stressors in past 12 months	0.88 ± 0.64	0.88 ± 0.83	1.63 ± 1.06	2.13 ± 1.55

Note. There were no significant differences between the EMDR and Wait-list group from pre to post-treatment. STAIC: State Trait Anxiety Inventory for Children; CDS: Children's Depression Scale; CBCL: Child Behaviour Checklist; IES: Impact of Events Scale; GHQ: General Health Questionnaire; GFS: General Functioning Scale.

In particular, it would be surprising for such demand effects to impact only on trauma measures at the exclusion of all non-trauma measures. However, the relatively small sample size and use of a subclinical population limit the degree to which the findings can be generalised to other traumatised child populations.

Despite the need to modify the cognitive component of EMDR for some children (see Appendix 1), aspects of CBT are incorporated in the EMDR protocol (Shapiro, 1995, 2001) (see the case vignette for "Steve"). It would therefore be interesting for future research to investigate the degree to which EMDR and CBT share common components and to determine their relative contribution.

Future Research

The immediate research priority should be to replicate the present findings with paediatric populations suffering PTSD symptoms (clinical and subclinical)

following common single traumatic events (e.g., serious playground accidents, burns, anaphylaxis or falls). Obviously, larger sample sizes would increase statistical power and enable the investigation of any subtle treatment effects and predictors of treatment outcome. Comparisons of EMDR with short versions of trauma-focused CBT would determine whether EMDR offers greater efficiency. Dismantling studies could also shed light on the relative contribution of the common (CBT) and unique elements of each treatment.

Table 3

Comparison of all Measures from Pre-Treatment to 12-Month Follow-up

	Pre Treatment	Post Treatment	3 Month Follow-up	12 Month Follow-up
Variable	**M ± SD**	**M ± SD**	**M ± SD**	**M ± SD**
Primary Outcome Measures				
Total No. of PTSD	N=25	N=23	N=21	N=15
Criteria Met	2.70 ± 0.82***	1.52 ± 0.85	1.33 ± 0.62	1.20 ± 0.56*
Child PTS-RI Total	27.09 ± 12.22***	14.74 ± 9.73	12.14 ± 10.06	9.07 ± 7.19**
Secondary Outcome Measures				
Process Measures				
SUDS	5.60 ± 2.60***	1.56 ± 1.28	1.25 ± 1.89	1.80 ± 2.33
VOC	3.54 ± 1.97***	5.71 ± 1.59	6.40 ± 0.88	5.90 ± 1.10
Child Self-Report Measures				
STAIC - State	30.13 ± 6.08	29.22 ± 4.98	28.29 ± 3.51	25.80 ± 3.90
STAIC - Trait	36.00 ± 8.14	34.09 ± 8.85	32.38 ± 8.85	32.40 ± 8.10
CDS Total	136.39 ± 24.67	128.83 ± 31.22	119.52 ± 32.99	117.20 ± 36.25
Total Positive	69.57 ± 8.99	70.70 ± 9.54	71.62 ± 8.10	69.80 ± 10.40
Parent Ratings of Child	N=22	N=20	N=19	N=14
Parent PTS-RI Total	27.45 ± 17.25***	18.55 ± 15.00	15.37 ±14.70	13.67 ±12.45
CBCL Total	40.91 ± 32.88	29.68 ± 30.12	31.80 ± 30.79	27.57 ± 20.85
Internalising	11.55 ± 10.62**	7.73 ± 8.39	8.30 ± 9.30	7.86 ± 6.30
Externalising	13.86 ± 11.93*	10.82 ± 12.27	11.40 ± 11.83	9.71 ± 8.43
Total Comp.	15.88 ± 3.26	16.22 ± 2.90	16.34 ± 3.78	16.81 ± 3.80
CDS Total	111.27 ± 31.99*	104.23 ± 26.24	104.10 ± 31.01	105.21 ± 31.25
Total Positive	68.77 ± 7.70	70.18 ± 6.47	68.95 ± 6.91	70.00 ± 7.01
Parent Self-Report and Other Measures				
IES Total	24.77 ± 19.74	14.59 ± 15.51	12.52 ± 15.15	14.00 ± 18.88
Intrusions	14.09 ± 10.39	7.64 ± 8.67	6.00 ± 7.42	7.93 ± 10.19
Avoidance	10.68 ± 12.12	6.95 ± 9.18	6.52 ± 8.58	6.07 ± 9.33
GHQ	2.59 ± 3.57	2.00 ± 2.98	1.38 ± 2.82	1.07 ± 2.20
GFS	20.18 ± 4.52	18.89 ± 5.07	19.78 ± 5.48	21.68 ± 4.73
No. of stressors in past 12 months	1.53 ± 1.36	1.27 ± 0.88	1.43 ± 1.16	1.00 ± 0.82

Note. Asterisks denote values significantly different to post treatment (* p<.05; **p<.01; ***p<.001). PTS-RI: Children's Post Traumatic Stress - Reaction Index; SUDS: Subjective Units of Disturbance; VOC: validity of cognition; STAIC: State Trait Anxiety Inventory for Children; CDS: Children's Depression Scale; CBCL: Child Behaviour Checklist; IES: Impact of Events Scale; GHQ: General Health Questionnaire; GFS: General Functioning Scale.

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Appendix

EMDR Protocol for Children

Having reviewed the case studies and available child EMDR literature, the present protocol draws on other relevant literature and takes into account the age and developmental range of the present population. As with the adult protocol, a degree of flexibility was accepted in applying the protocol to suit the needs of particular children. The following section describes the nature of modifications in each of the eight phases of treatment.

Phase 1 - Client History and Assessment

A detailed assessment interview is recommended for traumatised children (Yule, 1994) and in terms of procedure, Shapiro (1995) has recommended that therapists initially see the child and parent together. In this way the general details of the child's trauma-related problems can be identified with the parent present, and then the child can be interviewed alone for their account of their trauma-related problems. According to Shapiro (1995), this two part process transfers the authority of the parent to the therapist and helps the child to feel special. It also allows both parent and child to overcome any initial anxiety and to establish some rapport with the therapist which obviously facilitates the assessment. Nader and Pynoos (1993) have found it useful to elicit the parents' worries and concerns regarding the trauma in order to screen for parents who need therapy for their own trauma-related difficulties, and to help parents understand their child's trauma reaction. Seeing the child alone decreases the chance that children will try to protect their parents by underreporting their symptoms. The use of drawing as part of the child's assessment is also recognised as a useful way to facilitate free discussion and gather information

(e.g., Pynoos & Eth, 1986).

Important aetiological factors in the development of child PTSD need to be assessed such as the severity of trauma exposure, parental trauma-related distress, and time since the trauma. Severity of trauma exposure can be assessed by proximity to the traumatic event, injury severity, suddenness of the event, the number of lives lost, the perception that one is going to die and observation of dead or mutilated bodies. Parental trauma-related distress can be assessed using standard adult assessments of PTSD, general health assessments and a clinical interview.

For research purposes it is obviously advantageous to employ multiple measures from various sources such as parents, child self-report and clinician ratings which include trauma-specific, process (eg., SUDs and VOC), and general behavioural measures. Measures of anxiety and depression are particularly important because of the well established comorbidity between anxiety and depressive disorders.

Phase 2 - Preparation

Shapiro (1995) has explained that during this phase the therapist needs to adopt a client centred approach which is flexible, conveys unconditional positive regard, and supports the client's need for safety and reassurance. The primary task in this phase is to establish a safe place for the child so that if necessary the child could be guided to relax in order to contain a severe abreaction. The child was asked to recall a time when they felt in control, good, happy, confident or strong. Whilst imagining themselves at this time (i.e. where they were, how it looked and felt in their body) they completed at least two sets of EM's until they reported or displayed (e.g., smiling) positive feelings congruent with their imagined scene. Apart from dealing

with abreactions, the safe place was used to end sessions following incomplete processing, and it ensured that the EMDR procedure, particularly the EM's, were initially associated with positive, or at least neutral affects. Furthermore, commencing in this way allowed the therapist to test the child's level of comfort with EM's, and to determine the most suitable direction, distance and speed for the initial EM's. To reinforce the child's sense of safety and control, the child practised the use of the stop signal (i.e. holding their hand up or turning their head, or saying "stop"). They were advised that if they needed to, they could stop the EM's at any time (in phase 4 they were encouraged to keep engaging in EM's as much as possible, but to stop the therapist if they really needed to).

Importantly, Shapiro (1995) has advised that EMDR should not be attempted unless the client has sufficient trust in the therapist and understands the importance of giving honest feedback about their progress. As for adults, the theory of EMDR was explained in appropriate language.

Phase 3: Assessment of Target Memory

The two aims of this phase were to first help the child identify their traumatic image and associated negative cognition, positive cognition, emotions and body sensations, and second, to elicit their associated VOC and SUDs ratings. During phase 1, children completed a drawing of the "worse part of their accident" which was then used as the target or trigger for imaging their trauma. Although not utilised in this study, Shapiro (1995) has noted that images could also be encapsulated in children's drawings, play or games and these can be used as imaginal representations of trauma during EMDR if they are linked to trauma relevant feelings or cognitions. There has been one anecdotal report of a child drawing their problem (a black cloud) and

holding this in mind as the target for EMDR (Shapiro, 1995).

The child's negative cognitions were elicited by asking "when you look at your picture and think about the worst part of the accident, what words go with that? What thoughts do you have about it?" or "what do you think about in the picture?" Similarly, desired positive cognitions were elicited in the same way. For example, "when you look at your picture and think about the worst part of the accident, what words or thoughts would you like to have or prefer to have?

Consistent with the recommendations of Shapiro (1995), if the child could not identify cognitions, or their cognitions were unsuitable, several approximations of self-referent cognitions were offered to the child and they were asked which of these they would like to be able to think and believe instead of their negative cognition. Alternatively, the child's own cognitions were used, even if they were not ideal.

To assist children with making VOC ratings, the VOC scale was presented as a 700mm visual analogue scale ranging from "0 - completely false" to "7 - completely true". To orient children to the meaning of this scale and to ensure they understood it, three examples were used to demonstrate how it worked. For example, they were asked, "if you said to yourself, "I love my mum and dad", how true does that feel right now? ". Several other examples were used until it was clear they understood the meaning of the scale (e.g. they rated statements such as "I love school", " I love my brother or sister", "I love eating vegetables").

Given that children can have difficulty identifying emotions and their intensity, time was also spent helping them clarify their feelings if necessary. For example, if they

said they felt “bad” they would be asked “are there any other feelings?” or “do you mean bad like angry, like if someone steals your things at school? or sad, like when you lose your favourite toy? or scared or worried etc ?”.

The VOC scale, the SUD scale was presented as a 1000mm visual analogue scale ranging from “0 - calm” to “10 - most”. Again, to orient children to the meaning of this scale and to ensure they understood it, a few examples were used to demonstrate how it worked. For example, “if you imagine being at home watching TV on the couch, how uncomfortable do you feel?” and “if you imagine giving a speech or singing in front of the school, how uncomfortable do you feel?”. As per the recommendations of Shapiro (1995), arm actions were also used if necessary to demonstrate how the scale worked so that the child understood that SUDs ranged from “feeling OK or fine” (hands together) to “really, really, really uncomfortable, bad or yucky” (hands wide apart).

Given the number of elements involved in questions about body sensations, it was not surprising that some younger children required help understanding the question pertaining to the identification of body sensations. That is, just like the adult protocol, children were asked to look at their picture and to remember or imagine the worst part of their accident, to think about their negative cognition and feelings and to tell the therapist “where they felt it in their body”. If they didn’t understand or seemed confused, they were simply asked “when you think about you accident like that, do you feel anything in your body at all”? Alternatively, an example was given such as, “sometimes when you have strong feelings, you can feel it in your body, like when you’re worried and you feel a knot in your tummy or it feels churned”.

Phase 4 -7: Desensitisation, Installation, Body Scan and Closure

Desensitisation

Shapiro (1995) has encouraged the use of age appropriate explanations of physiology checks which basically ask the child "what is happening now?" or "what do you get now?" after each set of EM's. An initial explanation in age appropriate language may go as follows "sometimes you might feel or think differently about the accident after you've watched my hand. I will ask you what you are thinking or feeling. If you do not think or feel anything that's OK - you can't do this stuff wrong, just tell me what ever is happening whether it's nothing, something or anything". Shapiro (1989) states that such instructions serve to reduce performance anxiety, confusion, and demand effects, especially since clients can have difficulty with the changes that occur. She has also suggested that "clinicians should gently reinforce the client's effort by softly saying "good" during the set *(of EM's).* This often reassures clients who are not sure they are doing it right" (Shapiro, 1995, p. 143).

Low Demand Levels with Reassurance

To help the child feel as comfortable as possible and to understand the low demand level of the technique, almost any response to the initial set of EM's (e.g. shrugging of the shoulders) was followed by the instruction to "think about that" during a subsequent set of EM's. If there seemed to be any confusion about what was required, further explanation and reassurance was offered. For example, some children seemed to think that if they couldn't maintain their accident image during the initial sets of EM's they were doing something wrong. In this case they would be offered reassurance such as, "that's fine, it's impossible to do this wrong, whatever happens is OK. You might have thoughts about the accident, then they might go away, you might have thoughts about what you had for lunch or other memories, you

might think of nothing, or even something that is silly or funny, whatever happens is OK".

General Approach, Flexibility and EM Variations

The general approach was that of being child focused because, after all, the child was coming along to engage with the therapist about something quite distressing; hence, the sessions needed to be at least tolerable, preferably interesting and most of all useful. The latter of course necessitated the child attending enough sessions to receive adequate treatment. Hence, positive reinforcement was offered to participants for engaging in the difficult task of thinking and talking about their accident. Lighter moments were also encouraged during the treatment where the child or therapist would be playful or silly.

In terms of flexibility, if children wanted to spontaneously draw or act out some part of the accident this was allowed. For example, after a set of EM's, one child demonstrated how he was thrown back and forward in his chair during the accident. Another child added to the picture of his accident to show where other people were positioned and where bystanders came from after the accident. These disclosures were naturally the focus of sets of EM's.

Due to the fact that some children find eye movements difficult, Shapiro (1995) has recommended the two handed method, the use of puppets, coloured spots on the wall, cartoon figures or comic book heroes. She has also suggested concurrent methods of maintaining the child's attention/processing such as humming a tune during EM's, making rhythmical movements with the upper body or acting congruent with the child's imagery. In the present protocol, the two handed EM method was

used for children who complained of eye discomfort or had difficulty tracking. This consisted of the therapist placing their closed fists approximately 500 mm to 1400 mm apart and asking the child to focus on the therapist's alternate flicking of a finger or hand. Some children brought along their favourite toy to the treatment session which at times was incorporated in the EM's. For example, a few children brought a doll, teddy or stuffed toy, hence the instruction for EM's would be to look at "name of toy" moving from side to side. This would facilitate a more comfortable atmosphere and help the child engage in the treatment.

Dealing with Blocks

If younger children (e.g., 6 or 7 years) seemed to be having difficulty holding all the elements of their accident memory in their imagination (picture, thoughts, feelings etc.), the instructions were initially simplified. For example, "when you look at your picture and think about your accident "what thoughts do you have?" or "what do you think about in the picture?". For older children, the procedure was more like that for adults.

In addition to the procedures for dealing with blocks, such as changing the speed or direction of the EM's, the flexibility of the protocol allowed for intermittent periods of drawing, play or breaks either in the therapy room or the child could visit their parent in the waiting room. Alternatively, the parent was allowed in the therapy room whilst the treatment continued (e.g. the child could sit on their parent's lap). The only exception to this was where the parent had significant levels of trauma symptoms which could be exacerbated and compromise the child's treatment. The aim of this was to create a low demand environment where the child felt they had much of the control (often in contrast to their experience during their accident). This theme of

giving the child a sense of control was the hallmark of dealing with blocks or abreactions. For example, if after successive sets of EM's, the child continued to experience no change in their experience, or displayed discomfort that could not be labelled, even after asking, "what's happening in your body?", they would be asked if it was difficult to think of the accident. If they indicated that this was the case, the therapist made a suggestion such as, "perhaps we could make it easier for you to think about the accident. What if I asked you to imagine that we were watching your accident through the window or on TV, or we could imagine your accident happening to tiny little people, like ants that we are looking at on the ground? We could even imagine it like a cartoon. Which one of these would help you most?

Invariably, after the child chose a form of distancing and the desensitising phase continued, they would progress from talking about the accident in the third person (e.g., on TV) to talking in the first person. If after trialling the distancing technique, the child still had some difficulty with the material, the image would be manipulated. For example, the therapist might refer to the child's original account of the accident and say, "if we imagine the accident on TV, we would be watching you get into the car after arguing with your brother, then playing your computer game on the way to nana's, stopping at nana's place to pick up the cake, getting back in the car, going through the lights just before the other car hit you, the car hitting you, the man asking if you are OK, mum crying, then the ambulance coming. That's a lot to think about! How about we pretend you have a remote control and you can fast forward the picture to where you're comfortable to start with, which part would you go to first?"

For some children eye movement compliance was facilitated by using the two handed method, puppets, coloured spots on the wall, cartoon figures, comic book

heroes, humming a tune, making rhythmical movements with the upper body or acting congruent with the child's imagery. Variations included corrective imagery such as having the child imagine blowing their traumatic picture to bits (EM's need to be repeated with new images and blown up repeatedly).

As with the standard protocol, sets of EM's (approximately 12-24 back and forth movements, at 2 per second) continued for as long as the child's response material continued to indicate desensitisation. Any time that there was repeatedly no change in response material, the child was directed to return to the original target memory. If a positive cognition emerged during desensitisation, EM's continued until nothing further was being added (in terms of insight, understanding or emotional adjustment). The child was subsequently returned to their target memory.

Installation, Body Scan & Closure

When children reported SUDS of 0 or 1, attention switched to the validity of the desired cognition (PC). "How do you feel about the statement ...". Usually there was an increase in the child's VOC rating concurrent with their reduced SUDs ratings. In any case, the child was then asked to recall their trauma memory along with desired PC. Although positive cognitions were sometimes offered to children during phase 3, as per the recommendations of Shapiro (1995), there were no other variations to the standard installation procedure. Hence when children could evoke the original trauma and achieve a VOC of 6 or 7 for their desired cognition (with no other trauma or competing cognition emerging), at least three sets of saccades were completed to engrain the new cognitions. The standard body scan and closure procedure followed with the latter involving the safe place exercise if necessary.

It was standard practice to debrief the child after the session and to give them the opportunity to comment or ask questions. They were then asked if it was OK to tell their parent how they went, and if they consented, there was a brief debriefing with the parent whilst the child was present. The parent was usually given an overview of the material covered and the plan for subsequent sessions. The parent was given an opportunity to make any comments or ask questions.

Both child and parent were told that there might be further thoughts, feelings or memories which come up about the accident between sessions and they were assured that this was normal. At the commencement of the next session, the therapist routinely asked the child and parent about any associations to their accident, or changes in behaviour which emerged after the previous session. If necessary, this material became the focus of the session.

Phase 8: Re-evaluation, Planning Generalisation & Maintenance

In order to encourage the optimal level of generalisation and maintenance of treatment gains, Shapiro (1995) insists that four factors be addressed, and these apply to children as much as adults. The therapist ensured that: i) the treatment target or targets were resolved, ii) any associated material activated by the primary target/s was resolved, iii) any additional material from the past or present that could impede generalisation and maintenance was targeted, and iv) the treatment was conducted in the context of adequate social or family supports. The evaluation of these four factors was considered at post treatment and at three and 12 month follow-up.

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CHAPTER 3

Study Two

Sample Representation in a Psychological Treatment Study after Single Event Paediatric Trauma.

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Abstract

Children and their families who attended an emergency department following a single traumatic incident and who agreed to participate in a psychological treatment study (N = 211) were compared with non-participants (*N* = 2333) on several measures of trauma and injury severity: duration of admission and heart rate in the emergency department, emergency transport and admission to hospital, injury severity score, and triage code. Within the non-participant population, those who requested further information about the study (*N* = 573) were exposed to more severe trauma or injury than other non-participants (*N* = 1760). In addition, participants were exposed to more severe trauma or injury than either group of non-participants. These observations indicate that those exposed to more severe trauma or injury do not avoid participation in psychological treatment studies. Findings can therefore be generalised to those with more severe exposure, but not to the population as a whole.

Key words: trauma, child, adolescent, accidents, injury severity, recruitment bias

Introduction

The recruitment of representative samples is fundamental to scientific research. If research samples represent the core characteristics of the population, results can be meaningfully generalised to that population. Unfortunately, researchers have often inadequately reported recruitment and participant characteristics (Betan, Roberts, & McCluskey-Fawcett, 1995) and this has extended to prospective studies within paediatric populations afflicted by single event trauma. For example, researchers have failed to compare characteristics of participants and non-participants (e.g., Daviss et al., 2000; Winston, Kassam-Adams, Garcia-Espana, Ittenbach, & Cnaan, 2003). Compared to prospective or survey studies, treatment samples are even less representative because the number of studies is limited (Adler-Nevo & Manassis, 2005) and half of them consist of small sample sizes (i.e., $N = 13$ to 26) or populations exposed to war and natural disasters. The community context and sample characteristics of populations exposed to such widespread and catastrophic events seem unlikely to generalise to the populations afflicted by single incident trauma (e.g., paediatric injury).

The symptoms of Posttraumatic Stress Disorder (PTSD) after exposure to a single event trauma consist of three core symptom domains in DSM-IV: re-experiencing, avoidance, and hyper-arousal. As the name suggests, avoidance symptoms consist of efforts to avoid trauma-related images, thoughts, conversations, and memories that are likely to cause distress. Avoidance symptoms are therefore likely to reduce the level of participation and, more importantly, restrict the range of trauma symptoms among participants (i.e., those with greater distress would be less likely to participate). Similarly, research samples from traumatised (Erickson & Steiner, 2000) and non-traumatised populations (Lefkowitz & Tesiny, 1985; Weinberger, Tublin, Ford, & Feldman, 1990) have shown lower rates of distress than

in non-participants, indicating that those with more severe symptoms are less likely to participate. The reluctance to participate in research among those with more severe symptoms is not surprising given that around 10% of participants in trauma research report increased levels of distress that can be directly attributed to the research itself (Jorm, Kelly, & Morgan, 2007; Kassam-Adams & Newman, 2005).

Although participants in trauma studies are likely to be less distressed than non-participants, this cannot be assessed in a direct manner (i.e., using face-to-face interview, self report, collateral information from teachers or parents, etc.) as non-participants have already withdrawn their consent to participate. Furthermore, even if non-participants were assessed (e.g., in an abbreviated fashion), they would immediately be redefined as participants, or at least partial participants, thereby setting them apart from true non-participants. The best analogue study is therefore to examine variables related to the degree of trauma exposure, particularly if such variables are routinely recorded during triage or emergency medical treatment. In the present study, the variables of interest were chosen because of their association with trauma-related distress or the level of trauma exposure. They consisted of the severity of injury, heart rate in the emergency department (Bryant, Salmon, Sinclair, & Davidson, 2007; Langeland & Olff, 2008), and the duration of hospital admission (Williams, Cercarelli, & Dye, 2005). Additional variables were examined because they were likely to correlate with injury severity (i.e., transport to hospital by ambulance and admission to hospital). Demographic variables that show some association with the severity of trauma symptoms were also investigated. For example, girls show higher rates of trauma symptoms than boys (Borse et al., 2008; Mytton, Towner, Brussoni, & Gray, 2009; Tolin & Foa, 2006) and the level of trauma-related distress is greater in younger than older children (Ellis, Stores, & Mayou, 1998).

The aim of this study was to determine the degree to which those willing to participate in a trauma study differed from non-participants. The target population consisted of child and adolescent age groups who had been exposed to a diverse range of paediatric injuries (e.g., falls, anaphylaxis, physical assault, animal bites, burns etc.). A unique component of this study was the examination of a subgroup of non-participants who were sent information about the study but ultimately did not participate. The characteristics of this subgroup, defined as "initially interested non-participants" was of interest to determine if they exhibited features either of non-participants or participants, or elements of both. In view of the paucity of research in the area of sample representation and the equivocal nature of the findings, the present study was exploratory.

Method

Population Sample

The population consisted of all children aged six to 17 years (N=2780) who presented to the emergency department at Princess Margaret Hospital for Children, Perth, Western Australia, following single traumatic events (e.g., motor vehicle accident, dog bite, serious burn, near drowning, electrocution, fall) during a 21-month period from December 2003 to August 2005.

Exclusion Criteria

Exclusion criteria were identified from the emergency department database (see Table 1) and included: death, serious head injuries (e.g., skull fracture, scores in Accident and Emergency less than 12 on the Glasgow Coma Scale), past sexual or physical abuse, or serious (permanent) injury or death of a significant other in the accident. The exclusion criteria ensured that the sampled population were exposed to a single traumatic injury uncomplicated by head injury syndromes, parental injury,

comorbid psychopathology or other psychological sequelae of abuse or loss.

Sample Recruitment

The parents of patients meeting the parameters of the target population were contacted by phone one to three weeks (M = 14.31 $\pm$ 7.31 days) after their admission to the emergency department following an injury, and were asked whether they wished their child to participate in a psychological treatment study. The primary aims of the study were explained, namely: (a) to investigate the factors (particularly the role of various components of traumatic memories) in predicting persistent PTSD symptoms so that children at risk might be more easily identified in the future, and (b) to provide treatment for those children with persistent PTSD symptoms three months after their admission to the emergency department. Standard hospital resources such as patient transport were available upon request, but no additional incentives were offered to solicit participation.

If parents expressed interest in the study or agreed to participate, a brief screening for exclusion criteria was conducted and initial questions were addressed. Information about the study was then mailed and a follow-up call was arranged in the subsequent week. During the follow-up call, any further questions were addressed and participation was confirmed. Reasons given for not participating were documented and subsequently coded for analysis (see Table 1).

Most (91.5%) of the population (N = 2544) were contacted by phone and offered a place in the study. Those who were unable to be contacted by phone no longer had the same phone number, their phone was disconnected, or they did not answer the phone or reply to multiple phone messages despite several attempts to make contact at different times during the day and evening. For those who could be contacted, the recruitment procedure resulted in three distinct groups: (a) study participants, who were initially sent information about the study and then attended

the initial appointment (i.e., for the prospective investigation of PTSD symptoms; *n* = 211), (b) interested non-participants, who were initially sent information about the study but later declined to participate (*n* = 573), and (c) non-participants, who declined to participate in the study and were therefore not sent the study information (*n* = 1760).

Table 1

Recruitment Data for the Population

Participation Level	**Number of Cases**	**Percentage of population**
Non-Participants		
Could not be contacted	236	8.5%
Contacted but declined to participate		
No comment about reason for non-participation *(e.g., "no thanks", "our son doesn't want to do it", "we're not interested")*	333	12.0%
Child perceived as coping *(e.g., "s/he's fine", "he's not bothered at all by it", "no thanks, she's back to her usual self")*	1702	61.2%
Child/parent too busy *(e.g., "s/he's got too much else on", "we're too busy," or "we don't have time")*	185	6.6%
Exclusion criteria identified *(e.g., sexual or physical abuse, death of significant other, serious head injury noted in medical records, currently receiving intensive medical or psychological treatment, "our son has severe ADD")*	60	2.2%
Logistical problems *(e.g., "it's too inconvenient", "it's too far to come", parents both employed so it's too difficult to attend, unable to attend second assessment, lack of child care support, assessment times unsuitable)*	53	1.9%
Participants	211	7.6%
Totals	2780	100.0%

Measures

Injury cause.

The hospital emergency department utilised Emergency Department Information Systems (EDIS) software, which included relevant demographic and medical details (i.e., triage details and final diagnosis) along with a detailed coding system for "injury cause." The latter consisted of 67 codes for injury cause that were collapsed into eight broad categories for this study (see Table 2).

Table 2

Broad Categories of Injury Cause

Injury Category	**Examples**
(a) General injury or fall	Caught hand in machine, fall from bicycle, wall, tree, play equipment, fall through window and laceration
(b) Assault by an animal	Kicked by horse, stung or bitten by a spider, snake, fish, bee or dog.
(c) Assault by a person	Punched, kicked or stabbed
(d) Sporting injury	Tackled, collision with another player, hit by cricket bat, golf stick etc., fall during netball, soccer, rugby, gymnastics etc.
(e) Burn	From hot liquid, steam or chemicals
(f) Breathing threat	Near drowning, choking or anaphylaxis
(g) Unintentional injury by another person	Accidentally kicked, hit, elbowed or pushed, accidentally stuck with a stick or other implement, hit by a projectile such as a rock or ball, someone fell on them
(h) Motor vehicle accident	Car rollover; car, truck or bus versus car, motor cycle, bicycle or pedestrian

Mode of transport to the emergency department.

Mode of transport to the emergency department was coded within EDIS into five categories: private transport, ambulance, Royal Flying Doctor Service, helicopter, and "other." Due to the low number of patients in the latter three categories (i.e., $n = 3$, $n = 2$, and $n = 1$, respectively), Royal Flying Doctor Service and helicopter transport were coded as "ambulance," and "other" was coded as "missing."

Triage code.

Upon arrival in the emergency department, each patient was screened by a trained emergency nurse to determine the degree of urgency for medical treatment. The Australasian Triage Scale (ATS) is a one to five rating that indicates the degree of urgency for medical treatment as follows: immediate (1), within 10 minutes (2), within 30 minutes (3), within 60 minutes (4), within 120 minutes (5) (Australian College of Emergency Medicine, 2000). The following terms also reflect the degree of urgency for the triage codes: resuscitative (1), emergency (2), urgent (3), semi-urgent (4), non-urgent (5) (Williams et al., 2005).

Injury severity score.

Injury Severity Scores (ISS) were obtained using the Abbreviated Injury Scale - 2005 (AIS-2005) (Association for the Advancement of Automobile Medicine, AAAM, 2005), which is considered the "gold standard" of anatomically based injury severity measures (Rutledge et al., 1997). Furthermore, ISS have outperformed other trauma scoring methods for predicting injury outcomes in paediatric patients (Narci et al., 2009). A Trauma Registry Officer with expertise in using the AIS-2005 provided training and cross-checked ISS to ensure that they were accurate.

ISS were calculated for a total of 602 patients consisting of all study participants ($n = 211$) and a random sample of 391 non-participants (i.e., interested

non-participants, *n* =129; non-participants, *n* = 132; and those who could not be contacted, *n* = 130). This sample was selected using the 'Random sample of cases' option within the 'Select Cases' function of SPSS 13.0 for Windows. This number of non-participants corresponded with the maximum number of patients for whom data could be obtained by the researchers without compromising the resources of the patient records department. The distribution of injury severity scores was as follows: score of 0 = 58 (9.6%), mild (1-3) = 247 (41.0%), moderate (4-8) = 267 (44.4%), serious (9-15) = 26 (4.3%), severe (16-24) = 3 (0.5%), and critical (25-74) = 1 (0.2%).

Emergency department heart rate.

Within this hospital, standard clinical care included the measurement and documentation of patient heart rates in the emergency department. This information was subsequently obtained for all study participants and the random sample of non-participants (as per ISS). Heart rates were included for analysis if they were taken within 12 hours of triage, although most (76.4%) were taken within one hour of triage. While numerous factors can affect post injury heart rate such as blood pressure, hormones, and personality (including a predisposition to anxiety) (Kraemer, Moergeli, Roth, Hepp, & Schnyder, 2008), heart rate in the emergency department is a well established predictor of trauma-related distress six months after a trauma (Langeland & Olff, 2008) even after controlling for age, gender, and injury severity (Bryant et al., 2007).

Time spent in the emergency department.

The EDIS database incorporated admission and discharge times from the emergency department, which permitted calculation of the time each patient spent in the emergency department.

Discharge status.

The "destination" or discharge status of patients was coded within EDIS under several categories: (a) departed - treatment completed, (b) admitted to the ward - inpatient unit, (c) referred to another department (e.g., dental), (d) transferred to another public or private hospital, (e) did not wait, or (f) left at own risk. Due to the low numbers in four of these categories, those referred to another department (i.e., n = 9) or transferred to another hospital (i.e., n = 7) were coded as "admitted to ward" because further treatment was required. Those who "did not wait" (n = 1) or "left at their own risk" (n = 1) were coded as "missing."

Statistical Analysis

Inter-correlations.

To determine if the variables examined in this study measured the intended construct (i.e., "the level of trauma exposure or injury severity"), Pearson inter-correlations were calculated between all variables within the population sub-sample (i.e., n = 602) and within the population as a whole (N = 2780) (see Table 3).

Participants versus non-participants.

Two mixed design multivariate analyses of covariance were conducted to compare participants and non-participants in the two populations groups (i.e., population subsample and entire population). Both involved three levels for participation (i.e., participants and two groups of non-participants) with triage code and duration of time in the emergency department as one set of dependent variables and injury severity scores and heart rate as the other. As both age and gender were significantly inter-correlated with a number of variables, these were entered as the main covariates (see Table 3). Other variables, such as injury severity scores and heart rate in the emergency department, were entered as additional covariates where appropriate. Where multivariate results were significant, univariate analyses of

variance were conducted with a priori Helmert contrasts (i.e., study participants were compared with the two groups of non-participants combined, and then the two groups of non-participants were compared with each other).

The chi square and multivariate analyses that were used to compare participants and non-participants incorporated calculations of means, standard deviations, and percentages for the key variables (see Table 5). Variables were also compared by gender and age group with repeated and Helmert contrasts to investigate differences between age groups (6 to 8 years, 9 to 11 years and 12 years and above).

Reasons for non-participation.

Within the non-participant group, separate mixed design multivariate analyses of covariance (controlling for age and gender) were conducted for each population group to examine the reason for non-participation (perceived as coping versus declined to participate for other reasons).

Table 3

Correlation Matrix for Age, Gender, Injury Severity Scores, and Indices of Injury Severity

Variable	Injury Severity Score	Heart Rate in Emergency Department	Transport to Emergency by ambulance	Triage Code	Duration (minutes) of Emergency Admission	Hospitalised after Emergency Department
	N = 602		N = 2780			
Age	.03	-.19**	.08**	-.10**	.01	.01
Gender	.04	.15**	.02	.04*	.00	.08**
Injury Severity Score	1.0	.19**	.12	-.22**	.04	.30**
Transport to Emergency by ambulance	.12	.13**	1.0	.31**	.08**	.19**
Triage Code	-.22**	-.26**	.31**	1.0	-.11**	.28**
Heart Rate in Emergency Department[a]	.19**	1.0	.13**	-.26**	.08*	.09*
Duration (minutes) of Emergency Admission	.04	.08*	.08**	-.11**	1.0	.12**
Hospitalised after Emergency Department	.30**	.09*	.19**	.28**	.12**	1.0

Note. [a]$N = 543$ for heart rate in the emergency department
* $p \leq .0.5$. ** $p < .01$.

Table 4

Demographic Data and Indices of Trauma Severity for the Population and Subsample

Variable	**Mean (*SD*)**
Population	N=2780
Age	10.70 (2.71)
Gender	
Number of Males (%)[a]	1825 (65.6%)***
Number of Females (%)	955 (34.4%)
Number transported to the Emergency Department by ambulance (%)	784 (28.2%)
Triage Code	3.29 (0.70)
Number of minutes spent in the Emergency Department	166.4 (144.4)
Number admitted to hospital after attending the Emergency Department (%)	1187 (42.7%)
Population Subsample	N=602[b]
Injury Severity Score	2.95 (2.72)
Girls[c]	2.69 (2.53)**
Boys	3.12 (2.81)
Emergency Department heart rate	89.45 (15.74)
Girls[d]	93.61 (15.80)***
Boys	86.87 (15.16)

Note. [a]There were significantly more males than females [X^2 (1, N = 2780) = 272.3].
[b]There were 59 subsample participants for whom ED heart rate data was missing however, when these participants were compared with those for whom there was data (N = 543), Injury Severity Scores were not significantly different [t(100.52) = -0.71, p > .05].
[c]Injury Severity Scores were significantly lower for girls compared with boys (even when age, triage code and ED heart rate were entered as covariates).
[d]ED heart rates were significantly higher for girls compared with boys.
** $p \leq .01$. *** $p < .001$.

Results

Inter-Correlations

As demonstrated in Table 3, most indices of injury severity were significantly, although weakly, inter-correlated. Within the subsample, injury severity scores were not significantly correlated with transport to hospital by ambulance or duration of time spent in the emergency department.

Participants Versus Non-Participants

While study participants did not differ from non-participants by age, participants consisted of a smaller proportion of boys (55.5% versus 66.5%), X^2 (1, N = 2780) = 10.53, p = .001. They also had higher rates of transport to the emergency department by ambulance (36.5% versus 27.5%; X^2 [1, N = 2778] = 7.71, p < .01) and higher rates of admission to hospital (53.8% versus 41.8%; X^2 [1, n=2778] = 11.40, p = .001). Within the non-participants, those who were initially sent information about the study but later declined to participate had higher rates of transport to the emergency department by ambulance than those who declined to participate in the first instance and were not sent information (34.0% versus 24.5%; X^2 [1, N = 2331] = 19.92, p < .001) and a higher hospital admission rate subsequent to their emergency treatment (46.4% versus 40.1%; X^2 [1, N = 2333] = 7.21, p < .01).

The results of the mixed design multivariate analyses of covariance were significant for participation group for triage code and time spent in the emergency department, F(4, 5078) = 8.76, p < .001, and for heart rate and injury severity score, F(4, 858) = 2.82, p < .05. Subsequent univariate results were significant for triage code (F[2, 2539] = 17.38, p < .001) and heart rate (F[2, 429] = 4.24, p < .05), but not for time spent in the emergency department or injury severity score (see Table 5). Helmert contrasts confirmed that study participants had significantly lower (more

urgent) triage codes ($p < .001$) than non-participants. Furthermore, within the non-participant group, those who were sent information about the study also had significantly lower triage codes than those who declined to participate from the outset ($p = .001$). Study participants had higher heart rates than non-participants and this remained the case when the injury severity score was entered as a covariate in addition to gender and age.

The various findings in relation to age and gender are catalogued in Tables 4 and 6. In summary, the population consisted of significantly more boys than girls. In comparison to boys, girls had significantly higher heart rates in the emergency department (with age, triage code, and injury severity score as covariates) and significantly lower injury severity scores (with age, triage code, and emergency department heart rate as covariates). Rates of transport to hospital by ambulance increased significantly with progressive increases in age group. Mean triage codes and heart rates decreased as age group increased. However, mean injury severity scores and duration of time spent in the emergency department did not differ between age groups.

Reasons for Non-participation

The two mixed design multivariate analyses of covariance (controlling for age and gender) within the non-participant group (perceived as coping versus declined to participate for other reasons) were significant for triage code and time spent in the emergency department, $F(2, 2451) = 9.37$, $p < .001$, but not for heart rate or injury severity score. Subsequent univariate results were significant for triage code, $F(1, 2565) = 25.17$, $p < .001$, but not for time spent in the emergency department, heart rate, or injury severity score. A chi square analysis also confirmed significantly lower rates of transport to the emergency department by ambulance for those perceived as coping compared to those who did not participate for other

reasons (23.4% versus 34.9%; X^2 (1, N = 2211) = 26.95, p < .001). The rate of hospital admission did not differ between groups.

Table 5

Demographic Data and Indices of Trauma Severity for Participants and Non-Participants in the Population and Subsample

	Participants	**Non-Participants**	
Variable		**Initially Interested**	**Not Interested**
Population (*N*=2544)	*n*=211	*n*=573	*n*=1760
Age	10.44 (2.64)	10.83 (2.65)	10.71 (2.74)
Gender (percent)			
Number of Males	117 (55.5%)[a]***	371 (64.7%)[c]	1181 (67.1%)[c]
Number of Females	94 (44.5%)	202 (35.3%)	579 (32.9%)
Transported to the Emergency Department by ambulance	77 (36.5%)[a]**	195 (34.0%)[b]***	431 (24.5%)
Mean Triage Code (*SD*)	3.09 (0.74)[a]***	3.23 (0.73)[b]***	3.34 (0.67)
Mean number of minutes spent in the Emergency Department (*SD*)	180.11 (145.09)	167.13 (149.65)	166.36 (142.96)
Admitted to hospital after attending the Emergency Department	113 (53.8%)[a]***	266 (46.4%)[b]**	705 (40.1%)
Population Subsample (*N*=434)[d]	*n*=200	*n*=115	*n*=119
Injury Severity Score	3.06 (2.90)	3.26 (2.98)	2.58 (1.97)
Heart Rate in Emergency Department	92.10 (16.21)[a]*	88.68 (12.83)	86.71 (15.21)

Note. [a]Significant difference between participants and the two non-participant groups (i.e., initially interested and not interested) combined.
[b]Significant difference between the two non-participant groups (i.e., initially interested and not interested).
[c]There was a significantly higher proportion of boys than girls within each non-participant group (initially interested non-participants [X^2 (1, N = 573) = 49.84, p < .001)] and not interested non-participants [X^2 (1, N = 1760) = 205.9, p < .001)], but not in the participant group.
[d]N differs from previous tables because non-participants who were unable to be contacted (n = 109) were excluded.
* $p \leq .05$. ** $p \leq .01$. *** $p < .001$.

Table 6

Demographic Data and Indices of Trauma Severity for Each Age Group in the Population and for the Subsample

	Age Group		
Variable	**6 to 8 years**	**9 to 11 years**	**12 years+**
Population (*N*=2780)	N=882	N=904	N=994
Gender (percent)			
Number of Males	579 (57.7%)[ac]***	569 (62.9%)[bc]***	747 (75.2%)[c]
Number of Females	373 (42.3%)	335 (37.1%)	247 (24.8%)
Transported to the Emergency Department by ambulance	216 (24.5%)[a]**	237 (26.2%)[b]***	331 (33.4%)
Mean Triage Code (*SD*)	3.36 (0.68)[a]***	3.30 (0.71)[b]*	3.21 (0.70)
Mean time (minutes) spent in the Emergency Department (*SD*)	169.49 (163.02)	164.28 (132.50)	165.53 (136.41)
Admitted to hospital after attending the Emergency Department	382 (43.4%)	382(42.3%)	423 (42.6%)
Population Subsample (*N*=602)	*n*=192	*n*=212	*n*=198
Injury Severity Score (*SD*)	2.81 (2.53)	3.06 (2.88)	2.97 (2.71)
	n=170	*n*=190	*n*=183
Emergency Department heart rate (*SD*)[d]	92.99 (13.88)[a]***	90.21 (16.25)[b]**	85.39 (15.98)

Note. [a]Significant difference between the youngest age group and the older age groups combined.
[b]Significant difference between the middle age group (i.e., 9-11yrs) and older age group.
[c]Chi Square analyses were significant for the proportion of boys within each age group; i.e., 6 to 8yrs [X^2 (1, N = 882) = 20.97, p < .001)], 9 to 11 yrs [X^2 (1, N = 904) = 60.57, p < .001)] and 12 yrs and older [X^2 (1, N = 994) = 251.5, p < .001)]
[d]Due to missing values, *N*=543 for Emergency Department heart rate.
* $p \leq .05$. ** $p \leq .01$. *** $p < .001$.

Discussion

Given the relatively low rates of participation in trauma research and the prospect that this may result from the very nature of trauma symptoms (i.e., avoidance and fears that participation will exacerbate symptoms), the degree to which findings can be generalised to the population could be overstated. However, if sample bias occurs in the opposite direction (i.e., if participants were more traumatised than the population) findings could be usefully generalised to clinical populations, but not others. Despite these implications, sample representation has attracted little research attention. A key reason for this might be that the direct assessment of non-participants is impossible. That is, once non-participants have declined to participate they have permanently withdrawn their consent and cannot be interviewed or surveyed. The present study therefore compared participants and non-participants on several variables that were likely to reflect the degree of trauma exposure or injury severity, or to indirectly reflect the degree of distress. In addition, a sample of initially interested non-participants was investigated to determine if there was a gradient effect across the various levels of participation.

Several variables of interest in the present study were weakly, but significantly, inter-correlated and therefore shared some common variance indicative of the degree of exposure to trauma or injury. Subject to replication and further confirmation of construct validity, these indirect measures appear useful in determining sample representation for paediatric populations following injury or trauma. The present study confirmed that within a population of children and adolescents exposed to a diverse range of single paediatric injuries, those who were willing to participate in a psychological treatment study were exposed to more severe trauma or injury than non-participants. In comparison to non-participants, participants had significantly higher post injury heart rates, were more frequently

transported to hospital by ambulance, were more urgently in need of medical care (i.e., had lower triage codes), and were more frequently admitted to hospital following their treatment in the emergency department. Participants were also more likely to be girls than non-participants, consistent with the higher levels of trauma-related distress among girls compared to boys (Tolin & Foa, 2006). The sample bias toward more severe trauma exposure or injury severity among participants allays concerns that the more trauma-exposed members of the population avoid participating in research due to their trauma-related distress. Of course, the direct role of PTSD symptoms such as avoidance was not assessed among non-participants and, as noted previously, such an assessment is impossible because non-participants can never be directly surveyed or assessed.

The other component to this study was to determine whether there was a selection gradient or intermediate level of trauma exposure or injury severity among non-participants who were initially interested in participating in the study, but ultimately declined. This group did indeed show higher levels of trauma exposure and injury severity than non-participants with no interest in participating from the outset. In addition, both participants and initially interested non-participants showed higher rates of transport to hospital by ambulance, lower triage codes, and higher rates of admission to hospital than other non-participants. It was clear that initial interest in participation and actual participation were related to higher levels of trauma exposure or injury severity. The presence of a selection bias was further confirmed when those non-participants who indicated that they were coping with their injury were found to be less frequently transported to hospital by ambulance and required less urgent medical treatment (i.e., had higher triage codes) than those who declined to participate for other reasons.

The association between help seeking and higher levels of PTSD following other single traumatic events (de Vries et al., 1999; Pina et al., 2008) may offer a simple explanation for the sample bias toward more severe trauma exposure or injury among participants (or at least their parents). Alternatively, this finding could relate to higher rates of trauma symptoms among parents (Landolt, Vollrath, Timm, Gnehm, & Sennhauser, 2005; Ostrowski, Christopher, & Delahanty, 2007) or the use of more adaptive coping strategies by parents or children (Greening & Stoppelbein, 2007; Stallard & Smith, 2007) in line with the cognitive model of PTSD (Elhers & Clark, 2000).

Participants did not differ from non-participants on injury severity scores or the duration of time spent in the emergency department, perhaps because of the characteristics of the population and inherent weaknesses of these measures. For example, the subsample of injury severity scores was restricted in range because 95% of scores were at or below moderate levels. Furthermore, injury severity scores focus on the degree of threat to life rather than injury severity per se; hence, the level of injury or 'dose' of exposure to trauma can be quite high, but is not necessarily reflected by the injury severity score. For example, an injury resulting in fractured bones in each arm (e.g., fractured left humerus, ulna, and radius and fractured right humerus and radius) is scored the same (i.e., a score of 2) as an injury resulting in a single fracture to one arm (e.g., left ulna). For this reason, injury severity scores based on the Abbreviated Injury Scale (AAAM, 1998, 2005) have been deemed inappropriate for use with children (Beattie, Currie, Williams, & Wright, 1998). Injury severity scores have also been criticised for failing to reflect the seriousness of traumatic events that do not result in injury such as near drowning or anaphylaxis (Beattie et al., 1998).

It is important to note that the measures of injury severity were recorded during the course of medical treatment; hence a degree of error is expected. While measures such as emergency department heart rate and duration of admission do not require clinical judgement, they are influenced by several factors unrelated to injury severity. For example, the duration of an emergency admission is affected by the type of medical treatment required, the level of demand for services, and availability of resources such as medical staff, treatment beds, specialists, and operating theatres. Heart rate is influenced by factors such as the time of day, temperature, weight, and fitness level. Nonetheless, the finding that heart rate was greater in participants than non-participants suggests that level of trauma-related distress was associated with desire to participate in a psychological treatment study.

In the process of investigating sample representation, several population characteristics were noted with respect to gender and age differences. First, significantly more boys than girls presented to the emergency department following their exposure to an injury or trauma. Second, girls had significantly lower injury severity scores than boys (adjusted for age, triage code, and heart rate in the emergency department), yet their heart rates in the emergency department (adjusted for age, triage code, and injury severity scores) were significantly higher than boys. This is consistent with the pattern observed in healthy children (Silvetti, Drago, & Ragonese, 2001), children under laboratory stress (Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004; Matthews & Stoney, 1988) and traumatised populations (Langeland & Olff, 2008). Furthermore, there is an increased level of autonomic reactivity at the commencement of puberty (Salameh et al., 2008; Silvetti et al., 2001) which occurs earlier for girls than boys (Euling et al., 2008) and this coincides with the mean age of the present population. Third, the younger age groups showed significantly higher triage codes and lower rates of transport to

hospital by ambulance. Fourth, those in the younger age groups recorded heart rates in the emergency department that were significantly higher than older age groups, even when adjusted for gender and injury severity scores. This finding is not surprising given the decrease in basal and ambulatory heart rate (Salameh et al., 2008) and heart rate reactivity (Matthews & Stoney, 1988) that occurs with increasing age until the onset of puberty, at which point there appears to be a general dampening of autonomic reactivity (Alkon et al., 2003; Matthews & Stoney, 1988). Although these findings account for some of the population variance, it may have been useful to investigate additional demographic characteristics because in a comparable study of injured Australian children, the proportion with married and year 12 educated parents was above the level expected in the general population (Davey et al., 2005).

In conclusion, the use of several correlates of trauma exposure and injury severity has proven useful in identifying sample bias among trauma study participants. The inclusion of novel comparison groups (i.e., non-participants with an initial interest in participation, non-participants who perceived they were coping and those who did not participate for other reasons) has added to the convergent validity of the present findings, which support the notion that participants are self selecting on the basis of legitimate perceptions of trauma exposure and injury severity.

The present findings suggest some convergence between indices of injury severity and trauma-related psychological symptoms. It is important to reiterate that trauma-related psychological symptoms were not assessed directly in the present study. Nonetheless, a major strength of this study was the use of several indirect measures of injury severity across a diverse range of single traumatic injuries or events. Subject to replication and further construct validation, these measures suggest that the generalisation of trauma study data is appropriate for clinical

purposes (i.e., because the more trauma-exposed members of the population appear to be well represented) but may overstate the level of pathology in epidemiological or normal populations. While the findings suggest that there is a positive self selection bias related to increasing levels of injury severity, it is important to note that the use of exclusion criteria may have distorted the results. In particular, some of the most traumatised populations afflicted by single traumatic events (e.g., those involving the death or serious injury of a significant other, serious head injury, and sexual or physical abuse) were not sampled. It is also worth noting that the participants examined here consisted of those who were offered treatment who otherwise might not have sought assistance for themselves or their child. Whether this particular group is under- or over-represented in single-trauma treatment studies warrants further investigation.

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CHAPTER 4

Study Three

Does Increased Exposure During an Initial Assessment Reduce Paediatric PTSD Symptoms Following a Single Event Trauma?

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Abstract

Children and adolescents (N=52) with symptoms of Posttraumatic Stress Disorder (PTSD) completed a standard assessment one month after a single traumatic event. To determine if greater exposure to response-focused elements of the trauma memory resulted in improved PTSD and other symptoms, a random sample of children (N=22) completed an additional assessment. In contrast to debriefing which can be harmful, this involved the detailed recall of each component of their trauma memory (image, distressing thoughts, emotions, and autonomic and motor responses). This additional exposure in the response-focused group resulted in an accelerated rate of recovery in re-experiencing and avoidance symptoms from one week to two months later. Furthermore, in the response-focused group, there were greater improvements in the proportion of participants meeting the PTSD (DSM-IV) criterion for avoidance (54.6% versus 36.7%) and in parent ratings of their child's somatic complaints at two-month follow-up. Whilst these improvements were specific rather than global in nature and might be explained by therapeutic attention, they invite further investigation into the therapeutic role of response-focused assessment for PTSD.

Keywords: assessment, exposure, treatment, paediatric injury, PTSD, trauma, information processing

Introduction

As discussed in chapter 1, much of the treatment research for childhood Posttraumatic Stress Disorder (PTSD) has focused on interventions for children exposed to multiple or complicated trauma such as abuse or neglect. However, over the past decade there has been more focus on brief (three to four sessions) psychological interventions (e.g., CBT and EMDR) for children exposed to a single event trauma (Chemtob, Nakashima & Carlson, 2002a; Chemtob, Nakashima & Hamada, 2002b; Rodenburg, Benjamin, de Roos, Meijer & Stams, 2009). These treatments have incorporated the information processing model in which PTSD symptoms are thought to be the result of a failure of information processing (Brewin & Holmes, 2003; Solomon & Heide, 2005). In broad terms, the failure of information processing is rectified or reinstated by both exposure to the traumatic memory (learning and behavioural theory) and the cognitive reappraisal of the threat associated with the traumatic memory (i.e., cognitive element).

Nixon, Sterk & Pearce (2012) have highlighted the overlap between efficacious psychological interventions for PTSD which emphasise either the cognitive or exposure components of therapy. Predominantly cognitive therapy obviously incorporates elements of exposure therapy and, conversely, exposure therapy can clearly result in cognitive reappraisals. With this principle in mind, the merits of exposure in the context of an assessment were investigated in the present study.

Whilst exposure based interventions such as debriefing have proved beneficial (Stallard, et al., 2006), the limited benefit of debriefing and potential for harm was established some time ago in adult populations (Bisson, Jenkins, Alexander & Bannister, 1997; Mayou, Ehlers, & Hobbs, 2000), and more recently a

cautious approach was adopted for Australian children (Australian Centre for Posttraumatic Mental Health, 2013).

The exposure delivered in this investigation was therefore quite distinct from debriefing which is typically delivered very soon after exposure and in a group setting. Unlike the prolonged exposure utilised with adults, the exposure delivered here did not involve a narrative of the trauma memory but the systematic recall of various components of the memory. The exposure was intended to facilitate some habituation in line with the two factor theory of learning (Mowrer, 1960) which forms a core element of the contemporary information processing model.

Mowrer's (1960) two factor theory incorporates principles both of classical and operant conditioning. The classical conditioning component of the theory explains how PTSD develops due to the strong pairing of an Unconditioned Stimulus (traumatic event) and Conditioned Stimulus (memories and reminders of the trauma) such that the Conditioned Stimulus subsequently evokes the Unconditioned Response (trauma related emotional and physiological distress). The operant component of the theory explains how avoidance (negative reinforcement) serves to reduce trauma-related fear and distress which, in turn, prevents extinction and thereby transforms the Unconditioned Response into a Conditioned Response that maintains persistent PTSD symptoms.

Treatments based on the two factor model must therefore elicit the trauma memory and associated distress in a way that weakens or extinguishes the strong association between the Conditioned Stimulus and Conditioned Response. For this reason, a counterconditioning task such as relaxation is often used in conjunction with exposure to the Conditioned Stimulus and Conditioned Response to facilitate desensitisation which, in turn, reduces the need for avoidance. However, it is noteworthy that the majority of children with PTSD symptoms following a single

traumatic event will recover during the subsequent three to six months without the need for therapeutic exposure (see Di Gallo, Barton & Parry-Jones, 1997; Schäfer, Barkmann, Riedesser & Schulte-Markwort, 2006; Zink & McCain, 2003). In addition to confirming the high rate of recovery from PTSD symptoms, these prospective studies indicate that the assessment of PTSD, which naturally includes substantial exposure to the trauma memory (i.e., a detailed history of the event and questions about the nature and severity of symptoms) does not appear to exacerbate PTSD symptoms or complicate the process of natural recovery. With this in mind, the role of a more detailed assessment was investigated in the present study to determine if somewhat greater exposure to the traumatic memory facilitated a change in process scores consistent with desensitisation, and improvements in PTSD and non-PTSD symptoms. To control for the process of natural recovery, the more detailed assessment was compared with a standard assessment.

The more detailed (response focused) assessment was based on the bio-informational theory of emotional imagery (Lang, 1977, 1979, 1983) which is a core component of PTSD treatment. This theory explains how memories and reactions to traumatic events are stored together. For example, the trauma memory or schema contains both stimulus and response information which is thought to be stored in modality-specific response units (i.e., visual information about the traumatic event is stored along with the verbal, physiological, motor and other responses). Lang's (1979) work makes it clear that affective and autonomic responses are part of the traumatic memory rather than consequences of its elicitation. In recognition of this, most treatments based on information processing theory acknowledge the importance of activating the complete traumatic memory or schema, including the associated affects and physiological responses (e.g. Foa & Rothbaum, 1998; Shapiro, 1995,

2001; Smith et al., 2007). Once the trauma memory or schema is properly activated, more complete "processing" can follow.

Thus**,** in the present study, there was an emphasis on trauma-related response information across four domains: i) verbal response memories including the victim's words, sounds, thoughts and feelings; ii) somato-motor memories including head and body position, muscle tension, and gross body actions such as running; iii) visceral or physiological response memories such as changes in heart rate, sweating or hot flushes; and iv) processor memories including the clarity of mental processes (e.g., dream-like perceptions, racing or muddled thoughts). Compared to the standard assessment, the response focused assessment was expected to result in an initial increase in the vividness of trauma-related imagery and associated distress, followed by a decrease in these process scores for each component of the trauma memory (i.e., stimulus, verbal, motor, physiological and processor). Greater subsequent reductions in PTSD symptoms were also expected due to greater decoupling of the Conditioned Stimulus (memories of the traumatic event) from the Conditioned Response (distress) within the safe clinical setting.

Method

Participants

Two hundred and eleven children and adolescents (6 to 17 years of age) gave informed consent to participate in the present study following their attendance at the emergency department of a children's hospital due to a single traumatic event (e.g., motor vehicle accidents, dog bites, serious burns, near drowning, electrocution, or falls). A prior investigation by the present authors indicated that in comparison to the non-participants (N = 2,326), these participants were representative of those exposed to more severe trauma or injury (Kemp & Drummond, 2013). For the purpose of this study, traumatic events were those likely to meet PTSD criterion A(1) in the

Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) which states, "the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or threat to the physical integrity of self or others" (American Psychiatric Association, 1994, p. 424).

The study complied with the guidelines for research involving human participants, and ethics approval was granted by the relevant hospital and university ethics committees prior to the commencement of the study. The recruitment process and exclusion criteria are described in detail elsewhere (see Kemp & Drummond, 2013). In brief, parents were initially contacted by telephone soon after their child's attendance at the emergency department and those interested in participating were posted information about the study (N = 784). Exclusion criteria ensured that participants had experienced a single event trauma uncomplicated by head injury, parental injury, comorbid psychopathology, sexual abuse, and grief or loss. Participants were also excluded if they did not have at least moderate symptoms (i.e., a score of 25 or greater) on the Child Post Traumatic Stress - Reaction Index.

Of the157 eligible participants who completed an initial interview around one month after the trauma, 77 (49.0%) were excluded because they did not have at least moderate symptoms and 28 (17.8%) could not be contacted or did not attend the second assessment for unknown reasons. A total of 52 participants (32 boys, 20 girls) were randomly assigned to a standard (N = 30) or response-focused initial assessment (N = 22). Both groups completed a second (final) assessment approximately two months later.

The mean age of participants was 9.30 years (range: 6.48 to 15.82 years; SD $\pm$2.24) and the most common traumatic events were general accidents and falls (34.62%) and motor vehicle accidents (23.08%). Other events included: assaults by an animal (e.g., spider or dog bite, kicked by a horse) (13.46%), burns (7.69%),

unintentional injuries by another person (e.g., accidentally hit with a stick) (7.69%), threats to breathing (e.g., anaphylaxis) (5.77%), assault by another person (5.77%) and sporting injuries (1.92%). Two participants were taking psychotropic medication, but none were receiving concurrent mental health treatment for their trauma symptoms.

Measures

Trauma measures.

Children's Post Traumatic Stress - Reaction Index (CPTS-RI) and Parent Questionnaire (PPTS-RI). The CPTS-RI (Frederick, Pynoos, & Nader, 1992) and accompanying parent questionnaire (PPTS-RI; Nader, 1994) were used to measure PTSD symptoms. The CPTS-RI has good internal consistency (Yule, 1994), strong predictive validity (r = 0.91) for PTSD cases (McNally, 1996), and excellent inter-rater reliability of 94% (Pynoos et al., 1987).

Children's Revised Impact of Events Scale – 13 (CRIES-13). The CRIES-13 (http://www.childrenandwar.org/ CRIES-13) is a 13-item self-report questionnaire based on an eight-item version of the adult Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979). The three subscales of the CRIES-13 (i.e., intrusions, avoidance and arousal) are confirmed by factor analysis (Smith, Perrin, Dyregrov, & Yule, 2003) and the scale is supported by very good concurrent validity (Yule, 1992).

PTSD (DSM-IV) Diagnosis. Based on the method used by McDermott and Cvitanovich (2000) and a prior study involving the present authors (see Kemp, Drummond, & McDermott, 2010), a clinical assessment systematically confirmed the frequency and severity of all 19 PTSD symptoms and therefore the presence or absence of all four PTSD criteria. Assessments were completed by the first author (M.K.), an experienced clinician with Level 2 training in EMDR and more than 1000 hours of supervised practice.

Process measures.

Image clarity.

Participants rated the clarity or vividness of their trauma image which represented the "worst part or parts" of their trauma. Ratings were made on an 11 point scale from 0 (totally unclear or can't imagine or remember at all) to 10 (perfectly clear or can imagine or remember like I'm there now) (see Appendix A).

Number of negative emotions.

Whilst imagining or recalling their trauma image, participants were asked to confirm the presence or absence of nine negative emotions (sad, angry, frightened, guilty, ashamed, confused, embarrassed, helpless, and stupid) (see Appendix A).

Subjective Units of Disturbance (SUDS) & Mean positive and negative Validity of Cognition (VOC). The Subjective Units of Disturbance Scale (SUDS) (Wolpe, 1982) was used to determine the intensity of distress evoked by trauma-related memories. Improvements in SUDS ratings correlate with improvements on more objective measures in single event adult trauma studies (e.g. Vaughan et al., 1994; Wilson, Silver, Covi & Foster, 1996). Furthermore, a correlation between SUDS scores and some physiological measures has been demonstrated (Thyer, Papsdorf, Davis & Vallecorsa, 1984). Global SUDS ratings were taken for both the standard and response focused participants whilst they recalled or imagined the "worst part or parts" of their trauma memory. In the response focused group, SUDS ratings were also taken whilst they recalled or imagined each component of their trauma memory, after which the global SUDS (and image clarity) rating was repeated (see Appendix B & C).

A modified version of the VOC Scale (Shapiro, 2001) was utilised in this study so that more comprehensive data could be obtained in relation to the frequency and strength of both negative and positive self-referent beliefs. Rather than eliciting

a single positive cognition based on what participants would prefer to believe instead of their single negative cognition, they were asked to imagine or remember their trauma image and rate whether a list of negative beliefs, which were read aloud, "felt true or false". This list consisted of the 38 negative cognitions identified by Shapiro (2001) presented in a mixed order rather than being grouped into certain themes (e.g., safety/vulnerability), and for younger children some wording was simplified. After rating the statements as true or false, participants were again asked to recall their trauma image, but this time only those negative statements that "felt true" were read to them. Participants were then asked to rate how true these statements felt from 1 (completely false) to 7 (completely true). Ratings were then made for the positive cognitions to these items. Mean negative and positive VOC ratings were then calculated.

Non-trauma measures.

Revised Children's Manifest Anxiety Scale (RCMAS).

The RCMAS has been used with traumatised samples (Chemtob, Nakashima & Carlson, 2002; Saigh, 1989, 1991) and is a well-established measure of chronic anxiety. The RCMAS has good reliability (r=0.81) (Ryngala, Shields & Caruso, 2005), convergent validity (r=0.85) with the trait scale of the State Trait Anxiety Inventory for Children, and factor analytic support for the three subscales (Reynolds & Richmond, 1985).

Children's Depression Inventory (CDI).

The CDI has good reliability (Cronbach's alpha = 0.86), is useful for detecting changes in depressive symptoms over time (Kovacs, 1992), and can discriminate between psychiatric inpatients with major depression and other non-depressed psychiatric patients (Craighead, Curry & Ilardi, 1995).

Child Behaviour Checklist (CBCL).

Parents completed the Child Behaviour Checklist (CBCL) (Achenbach, 2001). The CBCL has acceptable reliability and validity and it has been used widely with traumatised child populations (Saxe et al., 2003; Vila et al., 2001).

Procedure

Assessments were conducted at a mean of one month (range 7 to 49 days post trauma; M: 31.68, SD: 8.70 days), five weeks (brief phone assessment only) and three months post trauma (range 56 to 137 days post trauma; M: 94.64, SD: 11.08 days). The time between the initial and final assessments ranged from 34 to 99 days (M: 62.36, SD: 13.84 days). The brief phone assessment was limited to the CRIES and PPTS-RI, and this was routinely conducted one week after the one month post trauma assessment (i.e., approximately five weeks post trauma). The initial assessment began with both the child and parent present. After taking a history and gathering basic information about their trauma, children under 13 years of age were asked to draw "the worst or most frightening part or parts" of their trauma to facilitate free discussion and more detailed information gathering (e.g., Pynoos & Eth, 1986). The child then completed the standard assessment protocol consisting of trauma measures (CPTS-RI, CRIES – 13, PTSD Diagnosis), process scores (negative and positive validity of cognition ratings, image clarity, SUDS and number of negative emotions ratings) and non-trauma measures (CDI & RCMAS). Meanwhile, parents independently completed child trauma (PPTS-RI and additional questions to confirm PTSD diagnosis), non-trauma (CBCL) and self-report measures (not included in this report).

Table 1 shows how the procedure for the additional exposure and administration of process scores. The five memory components included in the additional exposure corresponded to those identified by Lang's (1977, 1979, 1983)

bio-informational theory, and consisted of stimulus information and four components of response information. The stimulus information consisted of the visual image of the trauma (place, objects, people, and movement) and associated auditory stimuli (sounds and words). The response components consisted of the following: i) verbal response memories included the words, sounds, thoughts and feelings associated with the traumatic memory; ii) somato-motor memories included the head and body position, the presence or absence of muscle tension, and gross body actions such as running, sitting, standing, hobbling or pacing; iii) visceral or physiological response memories included changes in heart rate, sweating, hot flushes or cold chills, goose bumps, dry mouth, shakiness, upset stomach, nausea, vomiting, bowel or urinary urgency, and pain; and iv) processor memories included the clarity of mental processes, feelings of derealisation or dream-like sensations, the presence of racing or muddled thoughts, and time distortions.

At the final assessment (approximately three months post trauma) all children completed the standard and response-focused assessments.

Table 1

Procedure for Completing the Additional Exposure and Administering Process Scores for the Response-Focused and Standard Assessment Groups

Process Scores & Exposure	1 Month Post trauma	3 Months Post trauma
Process scores taken before detailed exposure		
Negative validity of cognition ratings	Both Groups	Both Groups
Positive validity cognition ratings		
Image clarity rating		
SUDS rating		
No of negative emotions		
Detailed exposure to the trauma memory		
Elicitation of memory information[1]	Response-focused Group only	Both Groups
Process scores taken during detailed exposure		
Image Clarity & SUDS rating for each component[2]:		
Stimulus component		
Verbal component		
Somato-motor component		
Autonomic component		
Processor component		
Process scores taken after detailed exposure[3]		
Image clarity rating	Response-focused Group only	Both Groups
SUDS rating		

Notes. [1]Appendix B details the standard questions used to elicit information for each component of the trauma memory.
[2]Appendix C details the standard way in which image clarity and SUDS ratings were obtained for each component of the trauma memory
[3]After completing the detailed exposure to the five components of their trauma memory, the image clarity and SUDS ratings were completed in the same manner as before the detailed exposure

Statistical Analysis

Outcomes for trauma and non-trauma measures.

Differences between the two types of assessment (standard and response-focused) were investigated using repeated measures MANOVA. For the analysis of the CRIES and PPTS-RI, there were three repeated measures over time (i.e., initial, five weeks post-trauma and final assessments), with repeated contrasts. For all other variables there were two repeated measures over time (i.e., initial and final assessments). Dependent variables were grouped as follows: i) CPTS-RI and clinician-rated number of PTSD criteria and ii) child non-trauma measures – the RCMAS, CDI, CBLC-internalising and CBCL-externalising. The effect of the response focused assessment on parent and child trauma and non-trauma subscales was investigated in planned contrasts for each dependent variable.

Analyses of process scores.

Three MANOVAs were conducted with assessment type and symptom status (remitted versus unremitted) as independent variables. Symptoms were considered to have remitted if CPTS-RI scores had decreased by at least 70% (Ironson, Freund, Strauss, & Williams, 2002) from one to three months post trauma, or to a score of less than 12 (Frederick et al., 1992). The five process scores taken before the detailed exposure (i.e., number of negative emotions associated with the trauma memory, clarity of the trauma memory, SUDS, mean negative VOC and mean positive VOC) were investigated with planned contrasts between the initial and final assessments for each measure. In addition, image clarity and SUDS ratings at the final assessment were investigated in separate MANOVA's for the five components of the trauma memory and (i.e., stimulus, verbal, motor, autonomic, processor) and general trauma memory (i.e., the pre-exposure image clarity and SUDS ratings for the trauma memory were repeated).

Results

To investigate the association between trauma scores and the passage of time, partial correlations were calculated between final trauma scores and the number of days elapsed since the trauma, correcting for initial trauma scores. All correlations were non-significant except for the time elapsed since the trauma at the final assessment and PPTS-RI scores ($r = -0.50$, $p < 0.001$).

Outcomes for Trauma and Non-Trauma Measures

The repeated measures MANOVA over three time intervals for the CRIES and PPTS-RI confirmed a main effect for time [$F(4, 47) = 11.89$, $p < .05$, $\eta_p^2 = .50$] but no other main or interaction effects. Contrast analyses confirmed significant decreases in scores for both CRIES [$F(1,50) = 38.38$, $p < .001$, $\eta_p^2 = .43$] and PPTS-RI [$F(1,50) = 15.71$, $p < .001$, $\eta_p^2 = .24$] from the first to the final assessment and from the second to final assessment: CRIES [$F(1,50) = 37.20$, $p < .001$, $\eta_p^2 = .43$]; PPTSRI [$F(1,50) = 37.20$, $p < .001$, $\eta_p^2 = .43$] (see Table 2).

Repeated measures MANOVA's over two time intervals confirmed a main effect for time for each set of child trauma and non-trauma measures, but no other main or interaction effects (i.e., gains were similar in the standard and response-focused assessment groups, and scores did not differ between groups at the final assessment). The main effect for time was significant for child trauma [$F(2, 49) = 34.78$, $p < .001$, $\eta_p^2 = .59$] and non-trauma measures [$F(5, 46) = 4.02$, $p < .01$, $\eta_p^2 = .30$]. Contrast analyses confirmed significant decreases from one to three months post trauma for: i) child trauma measures: CPTS-RI [$F(1, 50) = 66.84$, $p < .001$, $\eta_p^2 = .57$] and PTSD Diagnosis [$F(1, 50) = 54.16$, $p < .001$, $\eta_p^2 = .52$], and ii) non-trauma measures: RCMAS [$F(1, 50) = 15.85$, $p < .001$, $\eta_p^2 = .24$] and CDI [$F(1, 50) = 14.00$, $p < .001$, $\eta_p^2 = .22$] (see Tables 2 & 3).

Planned contrasts confirmed significant interaction effects for time and assessment type for several trauma subscale scores as follows (see Figures 1A-E): In comparison to the standard group, the response-focused group showed greater improvement from five weeks to three months post trauma for CRIES-re-experiencing [$F(1, 50) = 4.70$, $p < .05$, $\eta_p^2 = .09$], CRIES-avoidance [$F(1, 50) = 6.20$, $p < .05$, $\eta_p^2 = .11$] and PPTS-RI-re-experiencing [$F(1, 50) = 4.18$, $p < .05$, $\eta_p^2 = .08$]. Similarly, the response-focused group showed greater improvement from the initial to the final assessment for CRIES-avoidance [$F(1, 50) = 5.24$, $p < .05$, $\eta_p^2 = .10$]. Despite these improvements in subscale scores for the response-focused group, subscale scores at the final assessment did not differ significantly between the response-focused and standard assessment groups. However, it is noteworthy that the lower scores on the CRIES-avoidance subscale for the response-focused group approached the criterion for statistical significance [$t (50) = 2.00$, $p=.051$], and the proportion of participants meeting diagnostic criteria for avoidance decreased significantly in the response-focused group (77.3% to 22.7%) [X^2 (1, n=22) = 6.54, $p<.05$], but not in the standard group (86.7% to 50.0%); hence, the proportion meeting the avoidance criterion for PTSD was significantly lower for the response-focused group (22.7% versus 50.0%) [X^2 (1, n=52) = 3.99, $p<.05$] (see Figure 1D). Interestingly, planned contrasts confirmed a significant interaction for time and assessment type for CBCL-somatic complaints [$F(1, 50) = 8.12$, $p < .01$, $\eta_p^2 = .14$] due to a greater reduction in the response-focused group at three-month follow-up (see Figure 1E).

Process Scores

Repeated measures MANOVA's over two time intervals confirmed a main effect for time for process scores [$F(5, 46) = 11.47$, $p < .001$, $\eta_p^2 = .56$], but no main or interaction effects. Contrast analyses confirmed significant decreases from one to

three months post trauma for image clarity [$F(1, 50) = 17.98$, $p < .001$, $\eta_p^2 = .26$]; SUDS ratings [$F(1, 50) = 40.11$, $p < .001$, $\eta_p^2 = .44$]; the number of trauma-related negative emotions [$F(1, 50) = 12.41$, $p = .001$, $\eta_p^2 = .20$] and mean negative VOC ratings [$F(1, 50) = 20.66$, $p < .001$, $\eta_p^2 = .29$], but not mean positive VOC ratings (see Table 2). In addition, there was a main effect for symptom status (remitted versus unremitted) [$F(5, 44) = 4.36$, $p < .01$, $\eta_p^2 = .33$] and a significant interaction for time and symptom status [$F(5, 44) = 2.84$, $p < .05$, $\eta_p^2 = .24$] which was significant for SUDS [$F(1, 48) = 7.42$, $p < .01$, $\eta_p^2 = .13$], the number of negative emotions [$F(1, 48) = 4.08$, $p < .05$, $\eta_p^2 = .08$] and mean negative VOC ratings [$F(1, 48) = 7.45$, $p < .01$, $\eta_p^2 = .13$], but not for image clarity or mean positive VOC (see Table 4). Planned contrasts confirmed a significant interaction for time, symptom status and assessment type for image clarity only [$F(1, 48) = 4.44$, $p < .05$, $\eta_p^2 = .08$] (see Figure 2A and 2B).

At three months post trauma, neither assessment type nor symptom status influenced ratings of image clarity and SUDS for the five components of the trauma memory (i.e., stimulus, verbal, motor, autonomic and processor).

Table 2

Mean (± SD) Trauma and Process Measures

Variable	1 Month Post trauma M ± SD (N=52)	Five weeks Post trauma M ± SD (N=52)	3 Months Post trauma M ± SD (N=52)	
Children's Revised Impact of Events Scale				
Standard Assessment Group	36.67 ± 12.76	31.03 ± 15.37	25.57 ± 18.77	a,b***
Response-Focused Group	38.27 ± 10.70	33.45 ± 10.19	20.32 ± 14.12	
Posttraumatic Stress – Reaction Index (Parent Questionnaire)				
Standard Assessment Group	22.27 ± 16.61	19.14 ± 16.13	15.88 ± 16.53	a,b***
Response-Focused Group	23.86 ± 13.03	23.36 ± 11.32	15.59 ± 10.57	
Child Posttraumatic Stress – Reaction Index				
Standard Assessment Group	38.33 ± 11.30	N/A	24.47 ± 18.28	c***
Response-Focused Group	36.27 ± 8.26		17.00 ± 14.23	
Mean Number of PTSD Criteria				
Standard Assessment Group	3.67 ± 0.61	N/A	2.60 ± 1.28	c***
Response-Focused Group	3.64 ± 0.58		2.32 ± 1.04	
Trauma Memory Ratings				
Image clarity (0-10)				
Standard Assessment Group	7.57 ± 2.31	N/A	5.85 ± 3.10	c***
Response-Focused	8.18 ± 2.28		5.54 ± 3.33	
SUDS (0-10)				
Standard Assessment Group	7.18 ± 3.05	N/A	4.62 ± 3.90	c***
Response-Focused Group	7.20 ± 3.11		3.84 ± 3.80	
Number of negative emotions (0-9)				
Standard Assessment Group	4.07 ± 2.66	N/A	3.03 ± 2.98	c***
Response-Focused Group	3.50 ± 1.37		1.91 ± 2.09	
Mean validity of negative cognition (1-7)				
Standard Assessment Group	4.32 ± 1.59	N/A	3.12 ± 1.65	c***
Response-Focused Group	4.26 ± 1.12		3.18 ± 1.21	
Mean validity of positive cognition (1-7)				
Standard Assessment Group	4.89 ± 1.52	N/A	5.22 ± 1.30	n.s.
Response-Focused Group	5.26 ± 0.90		5.23 ± 0.86	

Note. Standard Assessment Group (N = 30); Response-Focused Assessment Group (N = 22).
The response-focused (experimental) assessment was initially conducted at one month post trauma.
The five weeks post trauma data refers to the telephone assessment conducted one week after the initial assessment.
[a]For both assessment groups combined the change in scores from 1 to 3 months post trauma was significant.
[b]For both assessment groups combined the change in scores from 5 weeks to 3 months post trauma was significant.
[c]For both assessment groups combined, the change in scores from 1 to 3 months post trauma was significant.
* $p<.05$. *** $p\leq.001$.

Table 3

Mean (± SD) Non-Trauma Measures

Variable	One Month Post trauma M + SD	Three Months Post trauma M + SD	
Child Self-Report	(N=52)	(N=52)	
Revised Children's Manifest Anxiety Scale			
Standard Assessment Group	15.77 ± 6.40	11.83 ± 7.82	a***
Response-Focused Group	14.41 ± 6.08	11.41 ± 5.91	
Children's Depression Inventory			
Standard Assessment Group	10.77 ± 8.03	7.73 ± 7.10	a***
Response-Focused Group	11.05 ± 6.78	7.59 ± 5.64	
Child Behaviour Checklist			
Internalising			
Standard Assessment Group	9.43 ± 4.45	9.16 ± 6.98	
Response-Focused Group	8.89 ± 6.44	7.04 ± 5.21	
Externalising			
Standard Assessment Group	9.87 ± 7.46	8.63 ± 6.55	
Response-Focused Group	8.87 ± 5.60	9.09 ± 8.00	
Total Competence			
Standard Assessment Group	23.53 ± 4.87	22.57 ± 5.65	
Response-Focused Group	19.95 ± 5.76	20.73 ± 6.40	

Note. Standard Assessment Group (N = 30); Response-Focused Assessment Group (N = 22).
The response-focused (experimental) assessment was initially conducted at one month post trauma.
[a]For both assessment groups combined, the change in scores from 1 to 3 months post trauma was significant.
*** p<.001.

Table 4

Mean (± SD) Process Scores for Assessment Group and Symptom Status Taken Before, During and After Detailed Exposure

	1 Months Post Trauma		3 Months Post Trauma		
Symptom Type	**Remitted**	**Unremitted**	**Remitted**	**Unremitted**	
Variable	**M ± SD**	**M ± SD**	**M ± SD**	**M ± SD**	
	(N=19)	(N=33)	(N=19)	(N=33)	
Process scores associated with the trauma memory taken before detailed exposure					
Standard Assessment Group	N = 9	N = 21	N = 9	N = 21	
Response-Focused	N = 10	N = 12	N = 10	N = 12	
Image clarity (0-10)					
Standard Assessment Group (N = 9 & 21)	8.22 ± 2.44	7.29 ± 2.26	4.28 ± 3.98	6.52 ± 2.46	
Response-Focused (N = 10 & 12)	7.70 ± 1.70	8.58 ± 2.68	5.70 ± 3.68[b]*	5.42 ± 3.18[b]*	
SUDS (0-10)					
Standard Assessment Group	6.22 ± 4.06	7.60 ± 2.52	1.78 ± 2.68	5.83 ± 3.74	[a]**
Response-Focused Group	6.80 ± 3.12	7.54 ± 3.20	2.15 ± 3.15	5.25 ± 3.84	
Number of negative emotions (0-9)					
Standard Assessment Group	2.67 ± 2.92	4.67 ± 2.37	0.78 ± 1.09	4.00 ± 3.02	[a]*
Response-Focused Group	3.00 ± 1.15	3.92 ± 1.44	0.40 ± 0.52	3.17 ± 2.08	
Mean validity of negative cognition (1-7)					
Standard Assessment Group	4.51 ± 1.62	4.24 ± 1.61	1.77 ± 0.94	3.69 ± 1.57	[a]**
Response-Focused Group	3.85 ± 1.25	4.60 ± 0.92	2.54 ± 1.11	3.72 ± 1.05	
Mean validity of positive cognition (1-7)					
Standard Assessment Group	5.60 ± 0.66	4.59 ± 1.68	5.89 ± 0.71	4.93 ± 1.40	
Response-Focused Group	5.19 ± 1.06	5.32 ± 0.79	5.47 ± 1.00	5.04 ± 0.71	
Process scores during detailed exposure for each component of the trauma memory					
Stimulus component					
Image Clarity (0-10)					
Standard Assessment Group			7.17 ± 3.37	7.32 ± 2.43	
Response-Focused	8.10 ± 2.38	8.21 ± 2.19	6.50 ± 2.84	7.33 ± 2.31	
SUDS (0-10)					
Standard Assessment Group			3.44 ± 4.93	6.32 ± 3.11	
Response-Focused Group	3.80 ± 2.74	6.17 ± 4.09	1.70 ± 3.27	5.50 ± 3.29	
Verbal component					
Image Clarity (0-10)					
Standard Assessment Group			5.44 ± 4.67	7.78 ± 2.18	
Response-Focused	7.50 ± 2.37	8.83 ± 1.60	7.50 ± 3.31	6.75 ± 3.02	
SUDS (0-10)					
Standard Assessment Group			2.89 ± 3.55	6.37 ± 3.03	
Response-Focused Group	6.60 ± 3.63	7.21 ± 3.41	1.70 ± 1.83	6.83 ± 2.92	

Note. [a]Regardless of assessment group, those with remitted symptoms there was a significant change in scores from 1 to 3 months post trauma.

[b]The was a significant interaction between assessment group and symptom status (remitted versus unremitted) from one to three months post trauma.

* p<.05. *** p≤.001.

Table 4 cont..

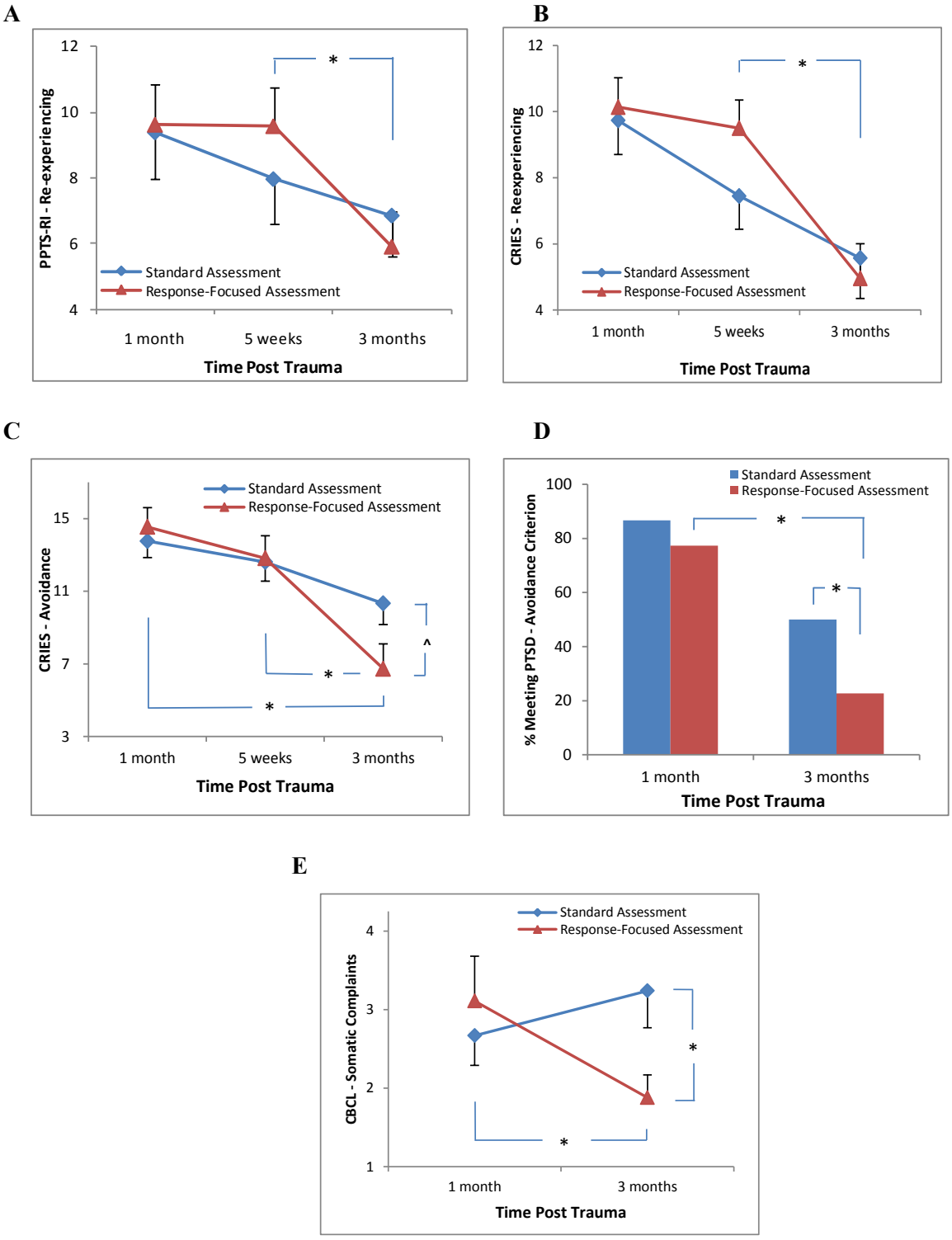
Mean (± SD) Process Scores for Assessment Group and Symptom Status Taken Before, During and After Detailed Exposure

	1 Months Post Trauma		3 Months Post Trauma	
Symptom Type	**Remitted**	**Unremitted**	**Remitted**	**Unremitted**
Variable	**M + SD**	**M + SD**	**M + SD**	**M + SD**
	(N=10)	(N=12)	(N=19)	(N=33)
Process scores during detailed exposure for each component of the trauma memory				
Motor component				
Image Clarity (0-10)				
Standard Assessment Group			5.89 ± 4.01	7.50 ± 2.54
Response-Focused	7.85 ± 3.30	7.79 ± 3.34	6.60 ± 4.30	7.54 ± 2.95
SUDS (0-10)				
Standard Assessment Group			3.78 ± 4.21	6.23 ± 3.44
Response-Focused Group	4.20 ± 3.12	7.67 ± 3.31	2.25 ± 2.57	6.42 ± 3.26
Autonomic component				
Image Clarity (0-10)				
Standard Assessment Group			4.44 ± 3.68	7.49 ± 2.82
Response-Focused	6.80 ± 3.05	9.29 ± 1.14	6.95 ± 3.04	7.42 ± 2.50
SUDS (0-10)				
Standard Assessment Group			4.00 ± 4.21	7.37 ± 2.62
Response-Focused Group	7.05 ± 3.25	6.67 ± 4.03	3.78 ± 3.17	6.92 ± 3.12
Processor component				
Image Clarity (0-10)				
Standard Assessment Group			5.56 ± 4.22	6.54 ± 3.03
Response-Focused	5.00 ± 2.45	8.08 ± 2.91	4.20 ± 3.36	6.92 ± 3.09
SUDS (0-10)				
Standard Assessment Group			2.89 ± 4.17	5.68 ± 3.41
Response-Focused Group	3.40 ± 2.55	6.88 ± 3.73	3.10 ± 3.87	5.96 ± 3.54
Process scores associated with the trauma memory taken after detailed exposure				
Image clarity (0-10)				
Standard Assessment Group			5.22 ± 4.09	7.09 ± 2.04
Response-Focused	7.70 ± 2.11	8.96 ± 1.57	6.08 ± 3.50	6.83 ± 2.86
SUDS (0-10)				
Standard Assessment Group			3.56 ± 4.30	7.39 ± 2.64
Response-Focused Group	6.60 ± 3.34	6.67 ± 3.58	2.70 ± 2.45	6.17 ± 2.66

Note. [a]Regardless of assessment group, those with remitted symptoms there was a significant change in scores from 1 to 3 months post trauma.

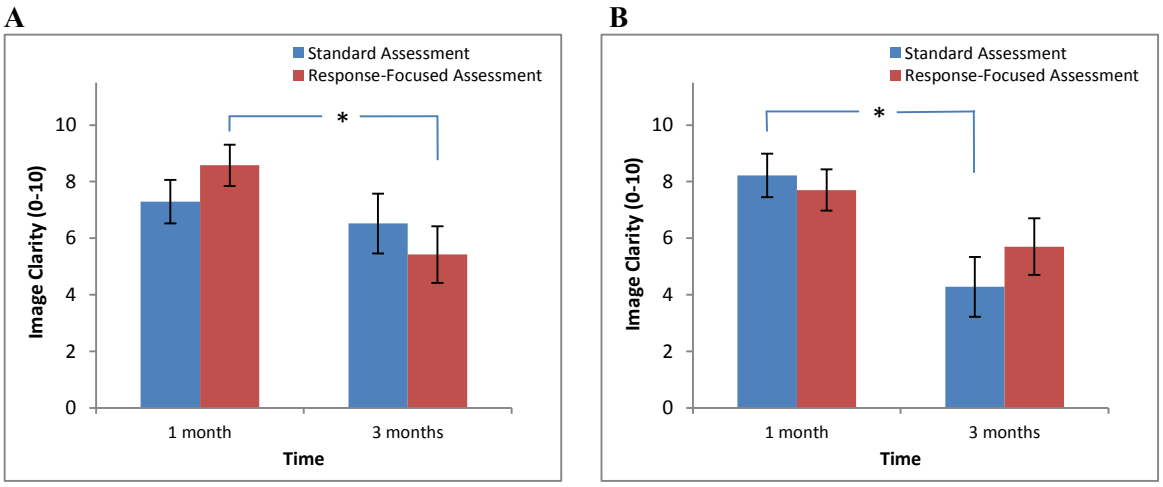
[b]The was a significant interaction between assessment group and symptom status (remitted versus unremitted) from one to three months post trauma.

* p<.05. *** p≤.001.



Notes: N = 52 for all figures (i.e., standard assessment group = 30; response-focused group = 22).
*p < .05 ^p =.051

Figures 1A-E. Mean scores (±SE) from one to three months post trauma for those with at least moderate PTSD symptoms



Participants with remitted PTSD symptoms **Participants with unremitted PTSD symptoms**

Notes: N = 19 and N = 33 for Figures 2A and 2B respectively
*p < .05

Figures 2A-B. Mean image clarity scores (±SE) from one to three months post trauma for those with remitted and unremitted PTSD symptoms

Discussion

This study aimed to determine whether a response-focused assessment one month after a traumatic event was more effective than a standard assessment in facilitating a subsequent reduction in PTSD symptoms in children and adolescents with at least moderately severe symptoms. Consistent with the bio-informational theory of fear networks (Lang, 1977, 1979, 1983), the response-focused condition emphasised the detailed recall of trauma-related verbal, cognitive, autonomic and motor responses. It was expected that exposure to such detailed response information would more effectively activate the trauma memory within a safe therapeutic context, and thereby facilitate reductions in the vividness of trauma imagery, related emotional distress, PTSD and other symptoms through a process of counterconditioning.

Interestingly, the response-focused group showed an accelerated rate of recovery in avoidance symptoms. There was also a reduction in parent ratings of somatic complaints on the child behaviour checklist. The results suggest that the additional exposure in the response focused group facilitated counterconditioning, but it also appeared to delay decreases in re-experiencing symptoms at one week follow-up. Although discomfort ratings were not taken at this time, it is likely that this short term delay resulted from an increase in emotional distress and trauma processing resulting from exposure to trauma-related memories which were previously avoided. The crucial role of exposure in activating the trauma memory and associated schema (e.g., verbal, somatic and autonomic responses) is demonstrated to some extent by the subsequent rate of recovery in re-experiencing symptoms from one week to two months after the initial assessment. It is tempting to speculate that the additional exposure in the response focused group demonstrated to participants, both through automatic and conscious processes, that the trauma

memory could be approached, tolerated and potentially mastered. Furthermore, in line with the present findings, the accelerated improvement in re-experiencing symptoms may have reduced the need for internalised coping mechanisms such as conversion symptoms (i.e., somatic complaints).

The overall decrease in PTSD symptoms observed both in the response-focused and standard assessment group is typical of the process of natural recovery observed during the first three to six months post trauma (Di Gallo et al., 1997; Mirza, Bhadrinath, Goodyer & Gilmour, 1998; Schäfer et al., 2006; Zatzick et al., 2006; Zink & McCain, 2003). This was exemplified by a strong association between the initial to final assessment interval and decreases in parent ratings of their child's PTSD symptoms. On the other hand, child and clinician ratings of PTSD symptoms were unrelated to the passage of time. Moreover, the process of natural recovery does not explain the specific effects of the response focused assessment observed in the present study.

The initial image clarity and SUDS ratings for both assessment groups taken prior to the intervention indicated that participants were readily able to access their most distressing trauma memory, along with the associated emotional distress. Contrary to expectations, the additional exposure during the response focused assessment did not result in higher SUDS ratings. However, when symptom remittance was taken into account, the response focused assessment assisted decreases in the vividness or clarity of the trauma image. Specifically, for those who had recovered from their PTSD symptoms at the final assessment, the additional exposure to the trauma memory in the response focused group weakened the vividness of their trauma memory.

The accelerated rate of recovery in avoidance symptoms in the response focused group, along with the findings in relation to image clarity for those with

remitted symptoms, support the view that PTSD results from a failure in information processing (Brewin & Holmes, 2003; Solomon & Heide, 2005). Recovery from PTSD may therefore involve the movement of the traumatic memories from a more primitive, fear laden form, in the right limbic system of the brain, to a more integrated, semantic form in the left neocortex (Solomon & Heide, 2005). The response focused assessment appears to have initiated this sequence by reducing the level of avoidance and reducing the salience (vividness) of the traumatic memory and weakening the link between the Conditioned Stimulus (memories and reminders of the trauma) and Conditioned Response (emotional and physiological distress). In turn, this is likely to have reduced the need for internalised coping (re-experiencing and somatic symptoms) and could have facilitated further processing of the trauma memory.

Notwithstanding the limited support for single session interventions (e.g., Stallard, et al., 2006), the aim of further research in this area would be to determine whether more global treatment effects could be achieved by variations in the delivery of response focused assessment. For example, negative cognitions could be added as a separate response category and the various components of the trauma memory could be presented in more than one modality at a time (e.g., verbal and autonomic) instead of in the sequence used here (i.e., stimulus, verbal, somatomotor, autonomic and processor).

Unlike the single validity of cognition rating used routinely in the treatment of trauma by Shapiro (1995, 2001), participants were initially presented with all 38 negative cognitions identified by Shapiro (1995) and from these they endorsed the applicable items. After rating the validity of each negative cognition, participants rated the validity of the polar opposite (positive) cognition to obtain a comprehensive assessment of the meaning of the traumatic event. Regardless of assessment type,

there was a significant reduction in the mean validity of negative cognition ratings and a significant increase in the ratio between positive and negative validity of cognition ratings from one to three months post trauma. These findings were stronger for those who recovered from their PTSD symptoms (remitted participants) compared to those who did not. These findings are consistent with cognitive models of PTSD development and treatment. That is, a more adaptive or constructive interpretation of the traumatic event develops as PTSD symptoms regress. This change may be most useful if there is a reduction in the validity of negative compared to positive cognitions. It would be interesting to cross-validate this modified validity of cognition scale with other cognitive assessment measures such as the Child Post-Traumatic Cognitions Inventory (Meiser-Stedman et al., 2009) because the latter only includes negative and not positive trauma-related cognitions and does not ask the respondent to imagine or recall their trauma when completing the questionnaire. The combination of the best qualities of these questionnaires could provide a robust screening and treatment tool.

Debriefing after traumatic incidents has proved harmful for adults (van Emmerik, Kamphuis, Hulsbosch & Emmelkamp, 2002) and is not recommended for children and adolescents as early exposure to traumatic memories may exacerbate PTSD symptoms (Australian Centre for Posttraumatic Mental Health, 2013). However, the response focused assessment was not utilised until one month post trauma, and was not associated with a higher rate of symptom exacerbation. Whilst six participants had higher scores on the Children's Post Traumatic Stress-Reaction Index at three months compared to one month post trauma (response focused, N = 2; standard assessment group, N = 4), these participants had already been diagnosed with PTSD at the initial assessment. At the conclusion of this study, they all accepted psychological treatment.

Given the potential process of natural recovery in the few months following a traumatic event, the failure to include an assessment-delayed control group could be considered a weakness of the study. However, the lack of significant correlations between the severity of PTSD symptoms at the initial assessment and the time elapsed since the trauma (range 7 to 49 days) mitigated this problem to some degree. Despite the small sample size, we were able to detect some benefits of response focused assessment. It would be interesting to determine whether additional effects (e.g., in image clarity and SUDS) would emerge in larger samples.

Due to the additional assessment time required in the response focused condition and the lack of a control group, the benefits of the response focused assessment could be explained by therapeutic attention. Amongst other potential confounds to the present study are concerns about the validity of some measures such as the lack of a blind or independent assessment. On the other hand, the concurrent validity of the PTSD diagnosis (total number of criteria met) at three months post trauma was supported by strong correlations with the child self-report measure ($r = 0.80$) and semi-structured interview ($r = 0.80$).

Conclusion and Future Directions

The present findings invite further investigation of response-focused assessment for children and adolescents with moderate or severe PTSD symptoms. Ideally, future investigations would recruit participants at least three to six months post trauma, and would examine the degree to which additional and combined elements of the trauma memory (e.g., negative cognitions and autonomic responses) along with repeated response-focused assessment or exposure accelerates the recovery of PTSD symptoms. Our findings suggest that response-focused assessment may be particularly beneficial for overcoming avoidance of traumatic memories.

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Appendix A

Name: _____ Date_____

Global Assessment of Image Clarity and Subjective Units of Discomfort (SUDs)

EXPLAIN THE IMAGE CLARITY AND SUDS SCALES WITH CONCRETE EXAMPLES

Ask if the child can read the anchor words on the scale

FOR IMAGE CLARITY
Use an example such as, "If I asked you to imagine or remember what you had for breakfast this morning, how clearly could you imagine or remember that?

What about if I asked you how clearly you could remember or imagine what you had for breakfast last Tuesday or on July 23rd last year?

Explain further as required

FOR SUDs Ratings
Use an example such as, "How uncomfortable do you feel out of 10, when you imagine or remember being at the dentist?"

"OK. How uncomfortable do you feel out of 10, when you imagine or remember sitting on the couch at home watching cartoons?"

Other examples might include: speaking in front of the class/school, being told off by a parent,

Initial Pre-elicitation SUDS Ratings

"When you imagine or remember your (trauma) – especially the worse part of it, how clearly would you say that you can remember it out of 10 (where 0 = hardly at all and 10 = as clear as possible/like you are there)?"

Image Clarity_____

OK now I'd like you to remember your (trauma) again, especially the worse part of it. How uncomfortable do you feel right now when you imagine your (event), especially the worse part of it.

SUDS _____

What's that feeling (**unprompted**)? _____

Are there other feelings (what are they)? _____

Prompted
OK. Tell me? When you imagine or remember your (trauma), especially the worse part of it, do you have any of these feelings (just say yes or no).

happy, sad, angry, frightened, guilty, ashamed, confused, embarrassed, helpless, stupid?

When you imagine or remember your (trauma), especially the worse part of it, where abouts do you feel it in your body? _____

Is body location related to the site of the injury Y / N

Appendix B

Note: at 1 month post-trauma, this section was completed for the response-focused group and not the standard group, At 3 months post-trauma, this section was completed by the standard group only.

Name: _____ Date_____

Elicitation of the Response Focused Components of the Trauma Memory

Propositional units of the trauma image

I. Stimulus propositions	
1. i) Where did the (trauma) take place (general & specific) i.e. at the intersection on Smith St?	
ii) can you remember any tastes or smells from the (trauma)	
2. What objects/things do you remember seeing in the environment at the time of the (trauma)?	
3. Who was around at the time of the (trauma) (participants and observers)	
4. Do you remember anything moving?	
5. Do you remember any sounds or anyone saying anything?	
II. Response propositions	
i). Verbal responses	
6. At the time of the (trauma) did you scream/yell out or say anything?	
7. Did you have any words or thoughts go through your mind at the time of the (trauma) or when you remember the (trauma)?	
8. What did you think about yourself when you were in the (trauma) or what do you think about yourself when you remember the (trauma)?	
9. What do you think the other people (name them) in the (trauma) or the people who were watching the (trauma) would think or say about you?	
10. What did you feel at the time of the (trauma)? What feeling is that?	
ii) Somatomotor events	
10. At the time of the (trauma) do you remember you muscles being tense (demonstrate)?	
11. Do you remember your body being out of control? Like did you freeze, or find you couldn't move? Did you run, sit down, walk around, hop, hobble or stand.	
v) Sense organ adjustments	
12. Do you remember what position you were in at the time of the (trauma) i.e. were you sitting, standing, running. Can you show me?	
13. So how was your head positioned?	

Appendix B (cont...)

Elicitation of the Response Focused Components of the Trauma Memory

Propositional units of the trauma image (cont…)

iii) Visceral events	
14. Did your feel your heart beat speed up or become louder (more noticeable)?	
15. Did your body or hands sweat?	
16. Did you get cold or hot, go pale or red in the face?	
17. Did you get goose bumps?	
18. Did your mouth get dry?	
19. Did your breathing become faster or more noticeable?	
20. Did you feel shaky?	
21. Did you get an upset or knotted stomach/tummy?	
22. Did you feel sick?	
23. Did you vomit	
24. Did you find you had to go to the toilet or that you went to the toilet accidentally?	
25. Did you feel any pain?	
26. Was it sharp, dull, aching, stabbing?	
iv) Processor characteristics	
27. When you remember the (trauma) is it really clear or a bit unreal like it was a dream?	
28. Do you remember racing thoughts or not being able to think clearly?	
29. Do it feel like time went really fast or slow at the time of the (trauma)?	

Appendix C

Notes: At 1 Month post-trauma, the standard group completes Section 1 only and the response-focused group completes Sections 1 & 2. At 3 Months post-trauma, both groups complete Sections 1 & 2

Name: _____ Date_____

Section 1 - Image Clarity, SUDS ratings & No of Negative Emotions

Pre-elicitation Image Clarity & SUDS Ratings

Transfer this data from the Pre-elicitation SUDS Ratings Box

Image Clarity_____ **SUDS** _____

What's that feeling (**unprompted**)? _____

Prompted Number of Negative Emotions

happy, sad, angry, frightened, guilty, ashamed, confused, embarrassed, helpless, stupid?

Are there other feelings (what are they)? _____

Where about do you feel it in your body? _____

Is body location related to the site of injury Y / N

Section 2 - Image Clarity & SUDS ratings for components of the trauma memory

For each component of the trauma memory, read the participant's trauma memory information from Appendix B and obtain an image clarity rating. Read the same information again and obtain a SUDS rating.

I Stimulus Components	**Image Clarity (0-10)**	**SUDS (0-10)**
OK. Now I'd like you to imagine or remember what you saw and heard (and if present what you tasted or smelt) at the time of the (trauma). Imagine or remember (read all stimulus components).		
How clearly can you imagine or remember that/ these things/ these parts of the (trauma)		
OK. When you imagine or remember the (trauma) and (read all stimulus components)		
How uncomfortable do you feel now?		

II. Verbal Components	**Image Clarity (0-10)**	**SUDS (0-10)**
OK. Now I'd like you to imagine or remember what you said, thought or felt at the time of the (trauma). Imagine or remember (read all verbal components).		
How clearly can you imagine or remember that/ these things/ these parts of the (trauma)?		
OK. When you imagine or remember the (trauma) and (read all verbal components).		
How uncomfortable do you feel now?		

Appendix C (cont…)

Section 2 - Image Clarity & SUDS ratings for components of the trauma memory

For each component of the trauma memory, read the participant's trauma memory information from Appendix B and obtain an image clarity rating. Read the same information again and obtain a SUDS rating.

III Motor events and Body Position	**Image Clarity (0-10)**	**SUDS (0-10)**
OK. Now I'd like you to imagine or remember how your body moved or was positioned at the time of the (trauma).). Imagine or remember (read all **somatomotor and sense organ** components).		
How clearly can you imagine or remember that/ these things/ these parts of the (trauma)?		
OK. When you imagine or remember the (trauma) and (read somatomotor and sense organ components).		
How uncomfortable do you feel now?		

IV Autonomic Components	**Image Clarity (0-10)**	**SUDS (0-10)**
OK. Now I'd like you to imagine or remember how your body reacted at the time of the (trauma). Imagine or remember (read visceral events).		
How clearly can you imagine or remember that/ these things/ these parts of the (trauma)?		
OK. When you imagine or remember the (trauma) and (read visceral events).		
How uncomfortable do you feel now?		

V Processor Components	**Image Clarity (0-10)**	**SUDS (0-10)**
OK. Now I'd like you to imagine or remember what your mind was like at the time of the (trauma). Imagine or remember (read processor characteristics).		
How clearly can you imagine or remember that/ these things/ these parts of the (trauma)?		
OK. When you imagine or remember the (trauma) and (read processor characteristics).		
How uncomfortable do you feel now?		

Section 3 - Image Clarity and SUDS ratings

Administered in the same manner as Section 1

"When you imagine or remember your (trauma) – especially the worse part of it, how clearly would you say that you can remember it out of 10 (where 0 = hardly at all and 10 = as clear as possible/like you are there)?"

Image Clarity_____

OK now I'd like you to remember your (trauma) again, especially the worse part of it. How uncomfortable do you feel right now when you imagine your (event), especially the worse part of it.

SUDS _____

CHAPTER 5

Study Four

Eye Movement Desensitisation and Reprocessing (EMDR) versus Exposure Therapy for Paediatric Posttraumatic Stress Disorder (PTSD) Symptoms from a Single Event Trauma

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Abstract

Eye Movement Desensitisation and Reprocessing (EMDR) was compared with an Exposure Therapy that involved repeated and detailed exposure to as many cues as possible of the traumatic memory (i.e., the stimulus or image, distressing thoughts, emotions, and autonomic and motor responses). The participants were 28 children and adolescents (aged six to 16 years) (M = 9.97 ±2.33 years) who had presented at the emergency department of a local children's hospital following a single traumatic event (e.g., motor vehicle accident, fall, burn injury, anaphylaxis). All but one participant met two or more DSM-IV criteria for PTSD and seventeen (60.7%) met full PTSD criteria. Both treatment conditions resulted in robust improvements in child, parent and clinician rated PTSD measures, and child and parent rated non-PTSD measures. Whilst there was no difference in the duration of treatment sessions between the EMDR and exposure group, the exposure condition involved fewer exposure periods than the EMDR condition [4.8 (±2.1) versus 17.8 (±6.4), $p<.001$] but longer periods of exposure [157.7 (±58.3) versus 23.5 (±4.7) seconds, $p<.001$] and a greater total duration of exposure in each session [12.3 (±8.0) versus 7.0 (±3.2) minutes, $p<.05$]. This result provides support for the efficiency of EMDR, although more research is necessary with larger samples. The efficacy of both treatments is best explained by the use of vivid and repeated exposure to the trauma memory in a safe environment along with other non-specific elements common to both treatments.

Keywords: PTSD, EMDR, exposure therapy, single event, paediatric, accidents

Introduction

The efficacy of Eye Movement Desensitisation and Reprocessing (EMDR) for Posttraumatic Stress Disorder (PTSD) resulting from single event trauma is well established for adults (Chambless et al., 1998; Chemtob, Tolin, van der Kolk, & Pitman, 2000; Rubin, 2003), but support for the efficacy of EMDR amongst children has emerged only recently (Fleming, 2012; Rodenburg, Benjamin, de Roos, Meijer & Stams, 2009). In particular, the treatment of PTSD and other symptoms for children exposed to single event (Type I) trauma has been examined in only a few controlled studies (i.e., Chemtob, Nakashima & Carlson, 2002a; de Roos et al., 2011; Kemp, Drummond & McDermott, 2010). Two of these were waitlist controlled designs limited to primary school-aged children. Post treatment improvements in PTSD were reported and gains were maintained at six and 12 month follow-up respectively. In addition, Chemtob et al. (2002a) reported gains in non-PTSD symptoms and their investigation across a broad age range (4 to 18 years) proved that EMDR and CBT were effective, but EMDR achieved treatment gains in fewer sessions.

Given the need for EMDR replication or comparison studies from more diverse populations, both in terms of age and type of single event trauma, an investigation was conducted with a paediatric population (i.e., 6-16 years) presenting to an emergency department following traumatic accidents and events (e.g., motor vehicle accidents, falls, physical assault, burns). Injuries of this nature are relatively common. For example, in 2005-2006 approximately 68,000 Australian children under 15 years of age received hospital treatment following injury or poisoning (Australian Institute of Health and Welfare, 2008). Up to 22% of these children are likely to suffer from persistent and debilitating PTSD symptoms at least three months after their trauma (Di Gallo, Barton & Parry-Jones, 1997; Kassam-Adams & Winston, 2004; Sturms et al., 2005).

The efficacy of CBT is supported by a large number of controlled studies; however, most of these were developed for children exposed to chronic or multiple episodes of sexual abuse (Silverman et al., 2008). As discussed in chapter 1, few controlled CBT studies for those exposed to single event trauma are uncomplicated by the characteristics of type II trauma. Therefore, the target population for the present study was the same as for study three which consisted of children who had presented to a paediatric emergency department following exposure to uncomplicated type I trauma (e.g., motor vehicle accident, fall, burn injury, anaphylaxis). The aim was to compare EMDR to an alternative treatment based on the bio-informational theory of emotional imagery (Lang, 1977, 1979, 1983) involving systematic exposure and limited cognitive therapy.

In unpublished work (study 3), the present authors found that additional exposure to the trauma memory during an assessment one month after a trauma did not facilitate a significant improvement in PTSD symptoms two months later. However, for those with at least moderate PTSD symptoms, the additional exposure resulted in an accelerated rate of recovery of re-experiencing and avoidance symptoms, and a related reduction in the proportion of participants meeting PTSD criteria for avoidance. The additional exposure consisted of information about various components of the trauma memory (i.e., images, thoughts, words, sounds, feelings, physical and mental actions and reactions). The Exposure Therapy protocol was derived from the assessment based intervention applied in study three. It was hypothesised that repeated exposure to these components over four treatment sessions in the Exposure Therapy condition would offer greater therapeutic benefit than EMDR.

Method

It should be noted that this study was not registered as a clinical trial because the study commenced before the primary registries were established by the International Committee of Medical Journal Editors (ICMJE) and the World Health Organization (WHO) in 2007.

Participants

Twenty eight children and adolescents (17 boys and 11 girls) aged from six to 16 years (M = 9.97 ±2.33 years) with PTSD symptoms were recruited three months after they had attended a hospital emergency department following a single traumatic event. Participants were recruited from a larger study involving 211 participants, of whom 200 and 172 respectively had completed an assessment one and three months after their traumatic event. A pool of 69 children and adolescents with persistent PTSD symptoms (i.e., at least mild scores on the Child's Posttraumatic Stress Reaction Index) at least three months after their trauma were eligible to participate in this study. Thirty-four declined to participate because their symptom levels were mild, they expected to recover over time, or did not want to risk exacerbating their symptoms. One parent did not believe their child had PTSD symptoms despite assessment findings to the contrary. Six other patients were excluded; four because they identified other social or clinical issues for which alternative intervention was required, and two had arranged treatment elsewhere.

The participant's mean symptom level on the Children's Posttraumatic Stress - Reaction Index (CPTS-RI) of 33.39 (±15.30) was 'moderate' and the distribution of scores by symptom severity was as follows: mild (11); moderate (8), severe (6), and very severe (3). All but one participant met two or more DSM-IV (APA, 1994) criteria for PTSD, 21 (75%) met three or more criteria and 17 (60.7%) met full criteria.

Four participants (EMDR – 1; Exposure – 3) were excluded from the three month follow-up analysis because they were still experiencing severe PTSD symptoms at post treatment and were subsequently provided with additional treatment sessions. One participant from the Exposure group dropped out of the study after one treatment session. The parent explained that this was because the child wanted to focus on other activities which competed with attending treatment. This left 27 (EMDR – 14 versus Exposure – 13) in the pre to post treatment analysis and 23 in the post treatment to three month follow-up analysis (EMDR – 13 versus Exposure – 10).

Exclusion Criteria

Exclusion criteria were the same as those described study three and consisted of, "death, serious head injuries (e.g., skull fracture and scores in the emergency department below 12 on the Glasgow Coma Scale) (Teasdale & Jennett, 1974, 1976), past sexual or physical abuse, or serious (permanent) injury or death of a significant other in the accident." (Kemp & Drummond, 2013, p. 43).

Measures

Child and parent rated measures were the same as those used in study three (see Kemp & Drummond, 2013). Trauma measures consisted of the Children's Post Traumatic Stress - Reaction Index (CPTS-RI) and Parent Questionnaire (PPTS-RI) (Frederick, Pynoos, & Nader, 1992; Nader, 1994), the Children's Revised Impact of Events Scale – 13 (Children and War Foundation, 2003) and clinician-rated PTSD (DSM-IV) Diagnosis (McDermott & Cvitanovich, 2000). The process measures were taken after participants had imagined or recalled the "worst part or parts" of the trauma image. These measures consisted of image clarity ratings from 0 to 10 (where 0 = totally unclear and 10 = perfectly clear), the number of negative emotions (0 to 9), Subjective Units of Disturbance (SUDS) and mean positive and

negative Validity of Cognition (VOC). Non-trauma measures included the Revised Children's Manifest Anxiety Scale (RCMAS) (Reynolds & Richmond, 1985), the Children's Depression Inventory (CDI) (Kovacs, 1992) and parent ratings on the Child Behaviour Checklist (CBCL) (Achenbach, 2001). Parent self-report measures included the Impact of Events Scale (Horowitz, Wilner & Alvarez, 1979), General Health Questionnaire-12 (GHQ-12) (Goldberg & Williams, 1978) and General Functioning Scale (GFS) derived from the Family Assessment Device (Epstein, Baldwin & Bishop, 1983) which is a strong measure of family pathology (Byles, Byrne, Boyle, & Offord, 1988).

Given that a single therapist delivered each treatment condition, expectancy ratings were taken prior to treatment to determine if participants perceived a bias on the part of the therapist in favour of one condition over another. Child and parent expectancy was rated on a four point Likert scale (1 = not helpful; 2 = a little helpful; 3 = somewhat helpful; 4 = very helpful).

Procedure

The assessment of participants at one and three months post trauma established a within and between group baseline, and thereby eliminated the need for an untreated control group. The three month post trauma (post baseline) assessment served as the pre-treatment assessment. Participants gave informed consent prior to commencing the treatment study whereupon they were randomly allocated to either the EMDR or Exposure Treatment group. Both treatments were delivered on a weekly basis, over four 60 minute sessions because this number of sessions had proved efficacious in a prior EMDR study (Kemp et al., 2010). Both treatments were delivered by the lead author (M.K.) and developer of the Exposure Therapy protocol. M.K. is an experienced doctoral level psychologist with advanced EMDR

training and demonstrated ability to provide high fidelity treatment (Kemp et al., 2010).

Treatment Protocols

The common and unique elements of each treatment protocol are summarised in Table 1. The EMDR protocol consists of eight treatment phases (Shapiro, 1995, 2001) and this protocol was delivered to adolescents with appropriate modifications to suit younger children (see Kemp et al., 2010 and Tinker & Wilson, 1999). As phases one (Client History) and three (Assessment) were completed during the baseline and pre-treatment assessments, treatment consisted of Phase one (Preparation) and Phases four to eight (Desensitisation, Installation, Body Scan, Closure and Re-evaluation). In the Preparation phase, the therapist established rapport with the child, addressed any of their concerns and established a safe place. The content of phases four to eight (see Tinker and Wilson, 1999) as summarised following. Desensitisation - the child recalled the core elements of their trauma memory (i.e., image, associated negative cognition/s, emotional and physiological arousal) and they repeated concurrent sets of eye movements following the child's free associations until their SUDS rating decreased to at least 2. Installation - the target memory was paired with the child's positive cognition and sets of concurrent eye movements until the validity of cognition rating increased to 7. Body Scan - the child held the target memory and positive cognition in mind and completed a body scan; any positive or negative body sensations that emerged were subsequently processed as per phase four and five. Closure - after the treatment session, the parent and child were provided with a brief review of the child's progress and they were reminded that trauma-related thoughts, pictures, feelings and body sensation may come up after the session and to remember or note if this occurred. Re-evaluation - each session commenced with a review of the child's progress since the

last session, and in line with the closure phase, they were routinely asked if any accident (trauma) related material had emerged.

The Exposure Therapy protocol was developed by the authors and consisted of short periods of repeated exposure (usually for 0.5 to 5 minutes) during which the participants practised relaxation. Although practising relaxation (and other "safety behaviours") might be a form of avoidance which is counterproductive to therapy (Abramowitz, 2013; Telch & Lancaster, 2012), there is evidence to the contrary (Ost, Johansson & Jerremalm, 1982) and for benign effects (Ost, Lindahl et al., 1984; Ramnerö, 2012). Relaxation is also a frequent component of efficacious treatments for PTSD (e.g., Cohen, Mannarino, Deblinger, 2012; Gilboa-Schechtman et al., 2010) and it was considered necessary from a self-efficacy and safety perspective (i.e., in the event of an abreaction).

The therapist initially taught participants a relaxation technique (i.e., controlled/slow breathing) and this was practised a few times. The initial instruction in relaxation also involved the creation of a "safe place" and this involved the relaxation technique and concurrent recall of a positive memory along with the associated image, feelings and body reactions. During exposure, the child was prompted to commence the relaxation technique and then the therapist read aloud the participant's trauma-related memories in one (or more) of five modalities. The child chose which trauma memory component they would target first and after the first exposure, they were able to choose an alternative target or could continue with the same target. If the child's SUDS ratings remained high at the end of the session, the safe place was utilised to reduce the level of discomfort and to finish the session with positive imagery. The aim of treatment was to progress through all components of the trauma memory from the least to most distressing component (or in the order chosen by the child). Treatment concluded with one or more exposures to all five

components of the trauma memory until maximum desensitisation had occurred (i.e., SUDS ratings were at least 2). The components of the trauma memory were derived from Lang's bio-informational theory (1977, 1979, 1983) which demonstrated that response information is crucial to the activation of emotional memories, accompanying physiological arousal and effective processing. The imagery components for the present study therefore consisted of stimulus information (e.g., the visual image of the setting, people, sounds of the event and words spoken by others) and four response components consisting of the following information modalities: i) verbal (e.g., their words, vocalisations, sounds, thoughts and feelings), ii) somato-motor (e.g., their head and body position, muscle tension, and gross body actions such as running), iii) visceral or physiological (e.g., heart rate reactions, sweating or hot flushes), and iv) processor (i.e., information about the quality of mental processes including dream-like perceptions and racing or muddled thoughts).

Analysis of Treatment Content & Fidelity

Exposure and cognitive therapy data.

A random sample of 32 of 75 videotaped treatment sessions were transcribed to assist with the assessment of treatment fidelity. Periods of exposure were shown on each transcript and for each condition were defined as follows: EMDR Group – a set of eye movements; Exposure Group – a period of relaxation or guided exposure to a component of the trauma memory. A research assistant reviewed all the videotapes and transcripts for accuracy and confirmed the presence or absence of cognitive intervention. The latter was defined as the use of 'cognitive interweave' in EMDR or direct cognitive disputation in the exposure group. In order to check inter-rater reliability, another research assistant subsequently reviewed a random selection of 12 transcripts (six from each group).

Treatment fidelity.

A random sample of 16 videotaped and transcribed treatment sessions (i.e., eight from each group) were independently rated for adherence to the treatment protocol. The ratings for each group were completed by two Clinical Psychologists; each with at least 10 years of clinical experience and specific training relevant to the group they were rating (i.e., exposure therapy and level I EMDR training respectively). A random sample of eight of these sessions (four from each group/rater) were also assessed by an independent Clinical Psychologist with 32 years of experience and specialised training and familiarity with both EMDR (level I training) and exposure therapy.

The treatment fidelity scale for EMDR consisted of 33 items and was based on the key elements of each treatment phase described by Tinker and Wilson (1999). The treatment fidelity scale for exposure consisted of 24 items and the content of the scale reflected the elements common to both treatments and unique to the exposure protocol. Overall adherence was rated on a five point scale for each treatment group with scores ranging from 0 to 4 (0 - no adherence to 4 – very good adherence).

Statistical Analysis

The data from this study were independently entered into PASW Statistics 18 and checked for accuracy by a research assistant. The statistical analysis was conducted by the lead author (M.K.) and reviewed by the second author (P.D). Prior to the full analysis, the EMDR and Exposure groups were compared on demographic, trauma history variables and expectancy using Chi Square and t tests. Repeated measures MANOVA's were then conducted to investigate pre-treatment (i.e., first to second baseline), experimental (pre to post treatment) and follow-up (post treatment to three month follow-up) effects. Each repeated measures MANOVA included time (pre vs post) as the within-subject factor and group

(EMDR vs Exposure) as the between-subject factor. Separate MANOVA's were run for: i) child trauma measures, ii) process scores, iii) child non-trauma, and iv) parent self-report. Results are reported as the mean ± standard deviation.

Results

Baseline Comparisons

Despite the random allocation of participants to each group, some baseline differences between the groups were identified (see Appendix A). In comparison to the Exposure group, participants in the EMDR group had a significantly greater frequency of pre-school or school refusal [X^2 (1, n=28) = 4.67, p<.05)], they endorsed a greater number of negative cognitions [t (26) = 2.14, p<.05] and had higher mean validity of negative cognition ratings [t (26) = 2.10, p<.05]. In comparison to the EMDR group, the Exposure group had significantly lower triage codes (i.e., they required more urgent emergency medical treatment) [t (26) = 3.48, p<.01]. All other baseline comparisons of demographic, trauma history variables and expectancy were non-significant.

The baseline to pre-treatment MANOVA was non-significant for all child outcome measures and process scores, but parent self-report measures showed a significant main effect for time [F(3, 24) = 3.37, p < .05] which was confirmed by univariate analysis for reductions in parent IES [F(1, 26) = 5.53, p < .05] and GHQ-12 scores [F(1, 26) = 8.68, p < .01] (see Table 2).

Treatment Content & Fidelity.

Exposure and cognitive therapy data.

There was a high degree of inter-rater reliability (i.e., between 98.48% and 100%) for the number and duration of exposures as well as the presence or absence of cognitive therapy. There was no difference in the duration of treatment sessions for each treatment condition. However, the total number of exposures per session

differed between groups: EMDR 17.7 (±6.2); Exposure 4.8 (±2.1); [t (30) = 18.63, p<.001] as was the total duration of exposure: EMDR 7.0 (±3.2) minutes; Exposure 12.3 (±8.0) minutes [t (30) = 3.44, p<.05]. The duration of exposure to the trauma memory for each session (as distinct from the duration of the treatment or session) correlated significantly with the change in scores on the Children's Revised Impacts of Events Scale (r = 0.48, p< 0.01) and SUDS (r = 0.40, p< 0.05). In the exposure group, the duration of exposure for each session correlated significantly with the number of exposures (r = 0.74, p = 0.001), and the change in CRIES scores (r = 0.61, p< 0.05), SUDS (r = 0.60, p< 0.05) and validity of negative cognition ratings (r = 0.57, p< 0.05). In the EMDR group, the duration of exposure correlated significantly with the number of exposures (r = 0.89, p<0.001) and the change in image clarity (r = 0.62, p< 0.05).

There was no difference in the frequency with which cognitive intervention was used in each group and this consisted of 18.8% (3/16) of EMDR and 31.3% (5/16) of Exposure sessions. The negative cognitions in these eight cases were related to just two themes: self-blame ("I shouldn't have gone to the skate park") and a persistent sense of danger/threat ("It's going to happen again"). A comparison of sessions with and without cognitive therapy indicated that there were no differences on outcome measures (e.g., the change on trauma scores) or process scores (e.g., image clarity, SUDS, the number of negative emotions and mean positive and negative validity of cognition ratings).

Treatment Fidelity.

The mean treatment fidelity ratings on the 0-4 scale of adherence were: 3.38 (± 0.74) for EMDR and 3.62 (± 0.52) for the exposure group, and whilst the ratings by the independent 'expert' were slightly lower [EMDR 3.25 (± 0.50); Exposure

3.50 (± 0.58)], there was a high degree of inter-rater reliability (EMDR 96.3% and Exposure 96.6%).

Effects of the Intervention

Pre to post treatment.

Pre to post treatment results are detailed in Table 2. Main effects for time from pre to post treatment were confirmed for child trauma measures [$F(4, 22) = 12.89$, $p < .001$], process scores [$F(5, 21) = 15.85$, $p < .001$], non-trauma [$F(5, 21) = 11.97$, $p < .001$], and parent self- report measures [$F(3, 23) = 4.96$, $p < .01$]. Univariate effects for time were confirmed for i) all child trauma measures: PPTS-RI [$F(1, 25) = 6.85$, $p < .05$], CPTS-RI [$F(1, 25) = 47.75$, $p < .001$], CRIES [$F(1, 25) = 37.91$, $p < .001$], clinician rated PTSD diagnosis [$F(1, 25) = 21.46$, $p < .001$]; ii) most process scores: SUDS [$F(1, 25) = 38.31$, $p < .001$], number of negative emotions [$F(1, 25) = 35.51$, $p < .001$], mean validity of negative cognition [$F(1, 25) = 26.17$, $p < .001$], mean validity of positive cognition [$F(1, 25) = 33.71$, $p < .001$]; iii) most child non-trauma measures: CDI [$F(1, 25) = 16.25$, $p < .001$], RCMAS [$F(1, 25) = 15.82$, $p = .001$], CBCL-Internalising [$F(1, 25) = 6.14$, $p < .05$]; and iv) one parent self-report measure: PIES [$F(1, 25) = 15.39$, $p = .001$]. However, group and group x time (interaction) effects were non-significant. In addition, the clarity of the trauma memory did not change from pre-to post-treatment.

During treatment.

An analysis of data from sessions one to four is available upon request from the authors (see Appendix B). In summary, this analysis showed a significant improvement in scores on the Children's Revised Impact of Event Scale and all process measures (except for Image Clarity). Image clarity ratings did not improve for the various components of the trauma image. However, SUDS ratings first

improved for the autonomic component and then all other components except the stimulus component.

Three month follow-up.

The four MANOVA's examining experimental effects were repeated to investigate maintenance effects from post-treatment to follow-up. Multivariate main and interaction effects were non-significant. However, univariate analysis confirmed a reduction at 3-month follow-up for CPTS-RI [$F(1, 21) = 8.78$, $p < .01$] and RCMAS [$F(1, 21) = 4.53$, $p < .05$] (see Table 2). There was also a univariate main effect for group (i.e., for post treatment and follow-up combined) for the mean number of clinician rated PTSD symptoms [$F(1, 21) = 4.80$, $p < .05$]. Hence, in comparison to the EMDR group, participants in the Exposure group met fewer mean PTSD criteria at post treatment and follow-up. In particular, only 38.5% of participants in the Exposure group met the PTSD criterion for hyper-arousal at post treatment compared with 85.7% of participants in the EMDR group [X^2 (1, n=27) = 6.45, p<.05)] (see Table 2).

Discussion

The efficacy of EMDR and Exposure Therapy were compared for a paediatric sample of children exposure to single event trauma. The EMDR condition consisted of the standard protocol for adolescents with modifications for younger children where required. The exposure condition was based on Lang's (1977, 1979, 1983) bio-informational theory of emotional processing and involved the systematic exposure to as many cues as possible of the traumatic memory (i.e., the stimulus or image, distressing thoughts, emotions, and autonomic and motor responses). In addition, several features of the exposure condition were fundamentally different from EMDR. Specifically, the exposure condition involved graded exposure to each component of the trauma memory rather than the memory as a whole; there were

fewer periods of exposure (two to seven), which were longer in duration (i.e., up to five minutes instead of 15 to 30 seconds during EMDR), and instead of eye movements the exposure condition involved concurrent relaxation. The exposure condition allowed participants to distance themselves (escape) from trauma related material (e.g., through drawing, play or conversation) between periods of exposure whereas an alternative type of distancing (i.e., through free association) is an implicit component of EMDR.

Despite the repeated and detailed exposure in the Exposure Therapy condition, there were no significant differences in outcomes between the groups. Whilst participants in the Exposure group met fewer PTSD criteria at post treatment and three month follow-up compared to the EMDR group, this was primarily due to differences in the proportion of participants meeting the PTSD criterion for hyper-arousal at post treatment (i.e., 38.5% versus 85.7%). Both treatment conditions resulted in robust improvements in PTSD symptoms as measured by child self-report, parent ratings and clinician rated PTSD diagnosis. Self-reported anxiety and depression, and parent rated behavioural problems also improved significantly. These gains were maintained at three month follow-up and there was a further reduction in PTSD symptoms on the semi-structured interview and in self-reported anxiety symptoms. These treatment gains may have been driven by common elements of the two treatment approaches (e.g., the use of psycho-education, vivid and repeated exposure to the trauma memory, distancing/escape, the provision of choices/control over some aspects of treatment, and some limited use of cognitive therapy). Alternatively, therapist qualities may have contributed to treatment gains as the same therapist administered both treatments.

Whilst there was no difference in the duration of treatment sessions between the EMDR and exposure group, the exposure condition involved fewer exposure

periods than the EMDR condition but longer periods of exposure and a greater total duration of exposure in each session. These results suggest that EMDR targets trauma memories more directly than the exposure treatment used here. However, given that fewer participants in the Exposure than EMDR group met PTSD criteria for hyper-arousal at post treatment, the greater total duration of exposure would appear to have been of some benefit in the exposure therapy condition. EMDR could also be less effective for alleviating hyperarousal symptoms in some children (Ahmad, Larsson & Sundelin-Wahlsten, 2007).

In the absence of a control group (e.g., waitlist or supportive therapy), an improvement in outcome measures with the passage of time cannot be ruled out. On the other hand, in line with other controlled waitlist treatment studies (Giannopoulou, Dikaiakou & Yule, 2006; Chemtob et al., 2002a; Kemp et al., 2010), PTSD symptoms did not improve during the extended baseline period. In addition, the fidelity of the treatment was confirmed by independent treatment fidelity ratings with inter-rater reliability above 96%. Furthermore, there were significant correlations between exposure duration and the change in child SUDS ratings and PTSD symptoms for each session, consistent with treatment effects.

The effectiveness of Exposure Therapy and EMDR demonstrated here implies that both treatments emphasised the processing of response information consistent with the core principle in Lang's (1977, 1979, 1983) bio-informational theory. The exposure therapy condition was a direct application of the bio-informational theory. Similarly, the EMDR condition intentionally evokes the response elements of the traumatic memory by routinely, and where necessary, repeatedly eliciting the cognitive, autonomic, emotional and somatic components of the trauma-memory (Shapiro, 1989, 1995, 2001).

Several adult studies with non-clinical populations (e.g., Andrade, Kavanagh & Baddeley, 1997; Maxfield, Melnyk & Hayman, 2008; van den Hout, Muris, Salemink & Kindt, 2001) have demonstrated that eye movements reduce trauma-related image vividness ratings. However, in the present study, imagery vividness ratings failed to decrease either during EMDR or Exposure Therapy. This could be explained by differences in the way that clinical and non-clinical populations process traumatic memories. Alternatively, imagery vividness ratings may have remained stable due to practice effects from the repeated assessment of imagery vividness before and after each session, and in each memory modality (stimulus, verbal, motor, autonomic and processor). Developmental factors might also account for the stability of imagery vividness ratings because there is a natural increase in imagery vividness during middle to late childhood (Isaac & Marks, 1994). Clearly further research is necessary to determine if EMDR, Exposure Therapy or other types of treatment influence the vividness of trauma-related imagery within clinical and non-clinical populations.

A supplementary analysis of measures taken during treatment indicated that amongst the reduction in SUDS ratings for the response components of the trauma memory, the autonomic component was the first to show an improvement in session two. In the following session, there was significant improvement in the verbal and processor components, and in avoidance symptoms and mean positive validity of cognition ratings. These findings support the importance of response information in the treatment of PTSD symptoms and they are generally consistent with popular theories of information processing (i.e., Foa & Kozac, 1986; Foa et al., 1989) which have built on Lang's bio-informational theory (1977, 1979, 1983). Although the present findings do not explain what features were critical to the efficacy of each treatment, it seems noteworthy that each treatment incorporated similar non-specific

elements. For example, free association during EMDR facilitates the emergence of information unrelated to the trauma memory, whilst the Exposure Therapy protocol utilised here allowed participants to distance themselves from trauma-focused material (e.g., through play, conversation, drawing) between periods of exposure. There is some evidence that focusing on non-trauma material (i.e., distancing) is more potent in alleviating PTSD symptoms than focusing on the details (i.e., reliving) of the traumatic memory (Lee, Taylor & Drummond, 2006).

Similar to the "emotional engagement" hypothesis discussed by Foa (1997), the present findings indicate that initial reductions in trauma-related emotional distress are important for the increase in approach (as opposed to the avoidance which is characteristic of PTSD) necessary to continue with treatment. Then in turn, the reduced arousal and increased capacity for participants to approach their traumatic memory implicitly strengthens more positive self-referent appraisals of the trauma experience. It could well be that when participants have the option of escaping or distancing from their trauma memory, they feel more willing to tolerate increasing levels of exposure (i.e., they are comforted by the fact that they can escape if they want to), thereby facilitating more habituation and automatic cognitive reassessment.

The comparable efficacy of EMDR and Exposure Therapy in the present study indicates that these non-specific elements may be as crucial to treatment success as the core components of established treatments; at least in relation to the treatment of PTSD symptoms from single traumatic events. On the other hand, the significant correlations between exposure duration and the improvement in child PTSD symptoms suggest that exposure played an important therapeutic role.

Methodological Considerations and Future Directions

Some key methodological limitations of the present study must be acknowledged such as the relatively small sample size, the selection bias resulting from the recruitment method, the use of a same therapist in both treatment conditions and the lack of independent or blind assessment. The present results should therefore be interpreted with some caution and future studies should obviously utilise larger unbiased population samples, multiple therapists and blind independent assessors.

The similarities between outcomes for the two treatment conditions examined here have confirmed the relevance of Lang's (1977, 1979, 1983) bio-informational theory of trauma processing for children afflicted by single event trauma. However, it would be useful for future studies to determine whether alternative or additional treatment components are necessary to achieve greater efficacy. For example, studies could compare the key elements of the bio-informational model (i.e. using either EMDR or Exposure Therapy) to an alternative CBT treatment.

In addition to the duration of exposure, other differences between the treatment conditions warrant further investigation. For example, the association between the duration of exposure and improvement in image clarity ratings in the EMDR group appears consistent with anecdotal evidence of rapid trauma memory processing in some children during EMDR (Tinker and Wilson, 1999). However, this contrasts with the findings from adult studies showing that eye movements reduce image clarity. It would therefore be useful to compare the effect of eye movements between children and adults.

It would also be interesting to determine whether providing children with choices about certain aspects of therapy (e.g., which trauma memory should be

targeted, how much longer the treatment should proceed, the targeted use of cognitive intervention) influences the duration of exposure and improvement in PTSD symptoms. Furthermore, the association between exposure duration and improvements in the validity of negative cognition ratings in the exposure group raises questions about the extent of exposure mediated cognitive change. The application of cognitive therapy in the present study was limited to addressing negative cognitions with just two themes (i.e., self-blame and persistent safety concerns); hence, it would be interesting to determine if these and other negative cognitions were more or less amenable to attenuation through exposure therapy alone.

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Table 1

The Shared and Unique Elements of the EMDR and Exposure Treatment Protocols

Component	SHARED TREATMENT ELEMENTS	
Treatment rationale (session one)	The treatment rationale was explained to the parent and child (e.g., the role of avoidance, importance of persistent exposure in a safe manner). Any questions discussed.	
Therapeutic rapport	The therapist worked to establish good rapport with the parent/child. For example, the treatment rationale and description made it clear that the child would be well prepared for exposure and prolonged distress was not necessary. Children were given some options (control) to help them persist with treatment/exposure (see below). In addition, the parent/s were included in a brief pre and post treatment review.	
The pre-session assessment (session one)	This assessment was the same for all sessions, except in session one the therapist elicited key negative cognitions associated with the trauma memory so that key positive cognitions could be identified and rated as process scores	
The pre-session assessment (all sessions)	The pre-session assessment included a review of the child's coping over the preceding week (after the last treatment session). The subsequent assessment of PTSD symptoms included some exposure to the trauma memory due to the rating of process scores. Image clarity and SUDS ratings were also obtained for the components of the trauma memory (i.e., these were the focus of therapy in the exposure group)	
Preparation of 'safe place' (session one)	In session one a 'safe place' was established during which the child recalled a positive memory (i.e., image, feelings, body reactions) whilst engaged in the concurrent exposure task (i.e., eye movements or relaxation/ slow breathing).	
Use of options/choices	In addition to establishing a safe place in session one, children were instructed in the use of a stop signal[1]. They were advised to use this stop signal "if they really needed to", but to "try to keep going with the exposure as much as possible". When a child was finding it difficult to commence or persist with exposure (e.g., they seemed avoidant, tired, distracted or bored), choices were offered[2] to help them continue with exposure (e.g., "would you like to complete 5, 10 or 15 more exposures?).	
Progression of exposure during treatment	The trauma memories continued to be processed until maximal desensitisation had occurred and the overall trauma memory was associated with a positive cognition/s that "felt" as valid as possible	
Limited use of cognitive therapy	Cognitive intervention, as defined for each of the protocols, was used when the child's negative beliefs appeared to be inhibiting the degree of recovery.	
	UNIQUE TREATMENT ELEMENTS	
Component	**EMDR**	**Exposure**
Traumatic memory	Image of worst part/s of the trauma and associated negative cognition/s, emotion and physiological arousal	Five elements of the trauma memory consisting of one stimulus and four response elements
Use of 'safe place' (session one)	The 'safe place' was used during the closure phase of treatment or to manage excessive distress	The 'safe place' (i.e., relaxation/ slow breathing + positive memory) was routinely used as the concurrent exposure task
Exposure sequence	The sequence of exposure targets was based on the EMDR protocol (the opportunity to choose a treatment target was limited).	The child was given a choice[3] of trauma memory components or they progressed from the least to most distressing.
Concurrent exposure task	Eye Movements	Relaxation (slow breathing)
Escape or distancing	The "free association" component EMDR facilitates distancing from trauma memories	Between exposure periods, participants were allowed to focus on non-trauma material[4]
Number of exposures/session	10 to 25	2 to 7
Duration of exposures/session	15 to 30 seconds	0.5 to 5 minutes

Note: [1]The stop signal was used in 3 out of 32 randomly selected sessions (EMDR – 2 sessions; Exposure – 1 session).
[2]The participants in 3 out of 32 randomly selected sessions (EMDR – 2 sessions; Exposure – 1 session) were given the option to choose when the session should end (i.e., remaining time, number of exposures).
[3]The participants in 13 out of 16 randomly selected sessions in the Exposure group chose an initial target for exposure. Nine of these chose a component/s of their trauma memory (three of these chose their most distressing component) and four session one participants chose a positive memory for setting up their safe place). The remaining two did not choose a target memory because there was only one component remaining.
[4]Distancing or non-trauma related activity (e.g., through play, conversation, drawing) was used in 5 out of 16 randomly selected sessions in the Exposure group.

Table 2

Trauma and Non-Trauma Measures and Process Scores Throughout Treatment

	Baseline	Pre Treatment	Post Treatment	3 Month Follow-up
Variable	**M ± SD**	**M ± SD**	**M ± SD**	**M ± SD**
Trauma Measures	N = 28	N = 28	N = 27	N = 23
Parent PTS-RI Total				
EMDR Group	26.86 ± 21.15	21.21 ± 21.24	12.08 ± 14.83[a]*	7.54 ± 6.85
Exposure Group	29.82 ± 16.39	19.43 ± 13.27	12.90 ± 8.20*	9.90 ± 5.20
Child PTS-RI Total				
EMDR Group	38.14 ± 12.84	33.00 ± 15.72	19.85 ± 12.20[a]***	15.65 ± 11.80[b]**
Exposure Group	32.77 ± 10.44	33.79 ± 15.45	11.90 ± 9.90***	9.70 ± 9.64**
Children's Revised Impact of Events Scale (CRIES)				
EMDR Group	39.14 ± 10.54	35.29 ± 13.86	16.53 ± 9.56[a]***	11.35 ± 6.82
Exposure Group	37.29 ± 8.22	37.79 ± 15.77	12.10 ± 7.32***	8.10 ± 5.93
Clinician rated No. of PTSD Criteria				
EMDR Group	3.64 ± 0.63	3.29 ± 1.07	2.64 ± 1.38[a]***	2.00 ± 1.29
Exposure Group	3.66 ± 0.60	3.36 ± 0.84	1.70 ± 0.82***	1.30 ± 0.48
Met clinician rated PTSD criteria				
Exposure				
EMDR Group	11	11	11	10
Exposure Group	14	14	13	9
Re-experiencing				
EMDR Group	14	13	7	6
Exposure Group	13	12	5	1
Avoidance				
EMDR Group	12	9	6	3
Exposure Group	9	11	4	0
Hyper-arousal				
EMDR Group	14	13	12	7
Exposure Group	14	10	5 [c]*	2
Met at least Three PTSD criteria				
EMDR Group	13	9	7	5
Exposure Group	13	10	4	0
Met Full PTSD criteria				
EMDR Group	10	8	5	2
Exposure Group	9	7	2	0

Note. [a] There was a significant main effect for time from pre to post treatment for all four trauma measures.
[b] There was a significant main effect for time from post treatment to three month follow-up for child PTS-RI Total.
[c] In comparison to the EMDR group, significantly fewer participants in the Exposure group met PTSD criteria for Hyper-arousal at post treatment (i.e., 38.5% versus 85.7%) [X^2 (1, n=27) = 6.45, p<.05)].
*p<.05. **p<.01. **p≤.001.

Table 2 cont..

Trauma and Non-Trauma Measures and Process Scores Throughout Treatment

	Baseline	Pre Treatment	Post Treatment	3 Month Follow-up
Variable	**M ± SD**	**M ± SD**	**M ± SD**	**M ± SD**
Process Scores				
Image Clarity (0-10)				
EMDR Group	7.93 ± 2.67	5.64 ± 3.43	6.58 ± 4.11	6.19 ± 3.73
Exposure Group	7.39 ± 2.24	7.21 ± 2.39	6.10 ± 3.78	5.55 ± 4.04
SUDS (0-10)				
EMDR Group	6.39 ± 3.55	6.75 ± 3.53	2.01 ± 2.04 a**	1.69 ± 2.10
Exposure Group	7.33 ± 2.14	6.68 ± 2.38	1.15 ± 1.76	0.70 ± 1.16
Number of Negative Emotions (0-9)				
EMDR Group	4.00 ± 2.32	4.79 ± 2.49	1.63 ± 1.89 a**	1.69 ± 1.65
Exposure Group	3.86 ± 1.56	3.50 ± 2.24	0.60 ± 1.07	0.60 ± 0.97
Mean Validity of Negative Cognition (0-7)				
EMDR Group	3.67 ± 1.69	4.23 ± 1.67	2.47 ± 1.16 a**	2.03 ± 1.13
Exposure Group	4.75 ± 0.91	3.48 ± 1.52	2.05 ± 1.45	1.98 ± 1.42
Mean Validity of Positive Cognition (0-7)				
EMDR Group	4.38 ± 1.85	4.44 ± 1.46	5.44 ± 1.79 a**	5.88 ± 1.86
Exposure Group	4.93 ± 1.11	4.45 ± 1.70	5.81 ± 2.12	5.91 ± 2.17
Non-trauma Measures				
Children's Depression Inventory				
EMDR Group	13.93 ± 8.99	13.02 ± 8.55	7.60 ± 5.53 a**	6.46 ± 7.00
Exposure Group	10.58 ± 5.47	9.67 ± 5.39	6.79 ± 3.96	3.80 ± 3.79
Children's Revised Manifest Anxiety Scale				
EMDR Group	16.71 ± 6.88	17.34 ± 6.20	13.69 ± 7.77 a**	9.54 ± 7.66 b*
Exposure Group	15.79 ± 5.82	16.05 ± 4.66	9.38 ± 6.32	7.10 ± 6.21
Child Behaviour Checklist				
Internalising Behaviour				
EMDR Group	9.21 ± 5.21	10.43 ± 7.51	9.64 ± 7.87 a*	6.69 ± 6.43
Exposure Group	11.92 ± 6.66	11.07 ± 7.41	6.08 ± 4.92	7.10 ± 5.00
Externalising Behaviour				
EMDR Group	9.00 ± 6.52	12.14 ± 9.94	11.00 ±10.78	7.69 ± 7.39
Exposure Group	9.49 ± 6.98	9.14 ± 7.19	8.62 ± 9.10	7.30 ± 7.39
Total Competence				
EMDR Group	21.46 ± 5.27	20.68 ± 5.22	20.82 ± 5.36	20.81 ± 4.28
Exposure Group	23.28 ± 4.67	22.96 ± 4.23	23.58 ± 4.04	22.80 ± 3.72

Note. [a] There was a significant main effect for time from pre to post treatment for process scores (except Image Clarity Ratings), the Children's Depression Inventory, Children's Revised Manifest Anxiety Scale and Child Behaviour Checklist - Internalising.
[b] There was a significant main effect for time from post treatment to three month follow-up for the Children's Revised Manifest Anxiety Scale.
*p<.05. **p<.01. **p≤.001.

Table 2 cont..

Trauma and Non-Trauma Measures and Process Scores Throughout Treatment

	Baseline	Pre Treatment	Post Treatment	3 Month Follow-up
Variable	**M ± SD**	**M ± SD**	**M ± SD**	**M ± SD**
Parent Self-report				
General Health Questionnaire – 12				
EMDR Group	4.43 ± 4.43	3.43 ± 4.18 $_{d**}$	2.86 ± 4.00	1.77 ± 3.77
Exposure Group	5.20 ± 4.26	2.36 ± 3.79	1.31 ± 1.65	1.40 ± 2.27
General Functioning Scale				
EMDR Group	20.86 ± 5.96	21.57 ± 6.54	21.18 ± 6.14	20.54 ± 5.65
Exposure Group	22.84 ± 8.63	21.86 ± 8.17	20.77 ± 8.37	24.40 ± 9.08
Impact of Events Scale				
EMDR Group	20.57 ± 21.97	16.43 ± 23.20 $_{d*}$	9.07 ± 17.35 $_{a***}$	5.62 ± 14.42
Exposure Group	22.00 ± 16.40	17.00 ± 17.21	9.77 ± 11.91	4.60 ± 7.26

Note. [a] There was a significant main effect for time from pre to post treatment for parent scores on the Impact of Events Scale.
[d] There was a significant main effect for time from baseline to pre-treatment for parent scores on the General Health Questionnaire-12 and Impact of Events Scale.
*p<.05. **p<.01. ***p≤.001.

Appendix A

Table A1

Pre-Treatment Comparisons: Demographic and Accident-Related Variables

Variable	EMDR Group	Exposure Group	X^2 or *t*	*df*	*p*
Mean Age (SD)	9.52 (2.51)	10.42 (2.13)	1.02	26	n.s
Gender					
Male	8	9	0.15	1	n.s.
Female	6	5			
Time elapsed since trauma					
Mean days post trauma at pre-treatment (SD)	89.64 (14.61)	90.86 (10.83)	0.25	26	n.s.
Details of Hospital Admission					
Transported to hospital by ambulance	4	9	3.59	1	n.s.
Mean triage code (1-5) (SD)	3.43 (0.51)	2.50 (0.86)**	3.48	26	**p<.01
Mean heart rate in emergency depart' (SD)	98.05 (15.29)	94.00 (16.54)	0.67	26	n.s.
Mean hrs in emergency department (SD)	4.42 (4.53)	3.08 (1.49)	1.05	26	n.s.
Injury severity score (SD)	3.36 (3.18)	3.36 (3.69)	0.00	26	n.s.
Admitted to Hospital	5	6	0.15	1	n.s.
Parent Completing Ratings					
Mother	11	12	0.24	1	n.s.
Father	3	2			
Child's perceptions and initial response					
Feared serious injury to:					
Self	11	14	3.36	1	n.s.
Parent	2	2	0.00	1	n.s.
Sibling	2	0	2.15	1	n.s.
Friend	0	0	0		
Other	2	2	0.00	1	n.s.
Feared death of:					
Self	4	8	2.33	1	n.s.
Parent	2	2	0.00	1	n.s.
Sibling	2	1	0.37	1	n.s.
Friend	0	0			
Other	1	0	1.04	1	n.s.
Initial response					
Fear	14	14			
Helplessness	13	13	0.00	1	n.s.
Horror	10	9	0.16	1	n.s.

Note. The test statistic refers to CHI square except where means and standard deviations are reported. Triage codes were significantly lower in the Exposure group compared to the EMDR group.
**p<.01.

Table A1 cont..

Pre-Treatment Comparisons: Demographic and Accident-Related Variables

Variable	EMDR Group	Exposure Group	X^2 or *t*	*df*	*p*
Parent's perception and initial response					
Feared serious injury or death:					
Serious injury	1	1	0.00	1	n.s.
Death	0	0			
Initial response					
Fear	8	11	1.47	1	n.s.
Helplessness	5	9	2.29	1	n.s.
Horror	5	6	0.15	1	n.s.
Child's history					
Birth & demographic details					
Born in Australia	12	13	0.37	1	n.s.
English speaking home	13	14	1.04	1	n.s.
Mother born in Australia	8	10	0.62	1	n.s.
Father born in Australia	5	10	3.59	1	n.s.
Aboriginal/Torres Strait Islander	0	0			
Past trauma/loss rated by child					
Past trauma	11	12	0.24	1	n.s.
Still affected by past trauma	4	3	0.19	1	n.s.
Past loss of person	4	6	0.62	1	n.s.
Still affected by loss of person	2	4	0.85	1	n.s.
Past loss of pet	10	10	0.00	1	n.s.
Still affected by past loss of pet	5	3	0.70	1	n.s.
Past trauma/loss rated by parent					
Past trauma	12	11	0.24	1	n.s.
Still affected by past trauma	3	4	0.19	1	n.s.
Past loss of person	4	6	0.62	1	n.s.
Still affected by loss of person	1	4	2.19	1	n.s.
Past loss of pet	7	9	0.58	1	n.s.
Still affected by past loss of pet	1	0	1.04	1	n.s.
Past behavioural/mental health problems reported by parent					
Current psychotropic medication	0	2	2.15	1	n.s.
Has previously seen a mental health professional	4	5	0.16	1	n.s.
Preschool temper tantrums/oppositional	6	4	0.62	1	n.s.
Past separation anxiety	7	3	2.49	1	n.s.
Pre-school/school refusal	4	0*	4.67	1	*p<.05

Note. Significantly more participants in the Exposure group reported a history of school refusal than in the EMDR group.
*p<.05.

Table A1 cont..

Pre-Treatment Comparisons: Demographic and Accident-Related Variables

Variable	EMDR Group	Exposure Group	X^2 or *t*	*df*	*p*
Parents education					
Mother					
Secondary school (no yr 12)	0	0			
Secondary school to yr 12	5	2			
Trade qualification	3	1	7.94	4	n.s.
Certificate or diploma	1	0			
Degree or higher	3	2			
Father					
Primary school	0	0			
Secondary school (no yr 12)	0	0			
Secondary school to yr 12	5	5	1.14	4	n.s.
Trade qualification	1	1			
Certificate or diploma	1	2			
Degree or higher	4	2			
Parent employed					
Mother	7	11	2.49	1	n.s.
Father	13	13	0.00	1	n.s.
Parents medical history					
Father					
Permanent medical/health problems	4	5	0.30	1	n.s.
Functional limitations	2	3	0.34	1	n.s.
Past mental health treatment	3	2	0.16	1	n.s.
Past mental health hospitalisation	0	1	1.12	1	n.s.
Recent mental health treatment	2	2	0.01	1	n.s.
Mother					
Permanent medical/health problems	4	4	0.00	1	n.s.
Functional limitations	3	1	1.17	1	n.s.
Past mental health treatment	6	4	0.62	1	n.s.
Past mental health hospitalisation	0	0			
Recent mental health treatment	2	1	0.37	1	n.s.

Table A1 cont..

Pre-Treatment Comparisons: Demographic and Accident-Related Variables

Variable	EMDR Group	Exposure Group	X^2 or *t*	*df*	*p*
Trauma Measures	N=14	N=14			
Parent PTS-RI Total	26.86 ± 21.15	29.82 ± 16.39	0.41	26	n.s.
Child PTS-RI Total	38.14 ± 12.84	32.77 ± 10.44	1.21	26	n.s.
Children's Revised Impact of Events Scale (CRIES)	39.14 ± 10.54	37.29 ± 8.22	0.52	26	n.s.
Clinician rated No. of PTSD Criteria	3.64 ± 0.63	3.66 ± 0.60	0.07	26	n.s.
Clinician rated PTSD criteria					
Met full PTSD criteria	10	9	0.16	1	n.s.
Met 3 or more PTSD criteria	13	13	0.00	1	n.s.
Met the following PTSD criteria:					
Exposure	11	14	3.36	1	n.s.
Re-experiencing	14	13	1.04	1	n.s.
Avoidance	12	9	1.71	1	n.s.
Hyper-arousal	14	14	0.00	1	n.s.
Process Scores					
Number if negative cognitions endorsed	12.29 ± 8.47	6.79 ± 4.56*	2.14	26	*p<.05
Image Clarity (0-10)	7.93 ± 2.67	7.39 ± 2.24	0.58	26	n.s.
SUDS (0-10)	6.39 ± 3.55	7.33 ± 2.14	0.84	21.3	n.s.
No of Negative Emotions (0-9)	4.00 ± 2.32	3.86 ± 1.56	0.19	26	n.s.
Mean Validity of Negative Cognition (0-7)	3.67 ± 1.69	4.75 ± 0.91*	2.10	26	*p<.05
Mean Validity of Positive Cognition (0-7)	4.38 ± 1.85	4.93 ± 1.11	0.95	26	n.s.
Non-trauma Measures					
Children's Depression Inventory	13.93 ± 8.99	10.58 ± 5.47	1.19	26	n.s.
Children's Revised Manifest Anxiety Scale	16.71 ± 6.88	15.79 ± 5.82	0.38	26	n.s.
Child Behaviour Checklist					
Internalising Behaviour	9.21 ± 5.21	11.92 ± 6.66	1.20	26	n.s.
Externalising Behaviour	9.00 ± 6.52	9.49 ± 6.98	0.19	26	n.s.
Total Competence	21.46 ± 5.27	23.28 ± 4.67	0.96	26	n.s.
Pre-Treatment Expectancy Ratings					
Child	3.00 ± 0.96	2.64 ± 1.32	1.19	26	n.s.
Parent	2.86 ± 0.77	2.89 ± 0.79	1.19	26	n.s.

Note. In comparison to the Exposure group, the EMDR group endorsed a significantly greater number of negative cognitions at pre baseline. However, the mean validity of negative cognition rating was significantly greater for Exposure group.
*p<.05.

Appendix B

(provided on request to interested readers)

Table B1

Trauma Measures and Process Scores During Treatment

	Session 1	Session 2	Session 3	Session 4
Variable	**M ± SD**	**M ± SD**	**M ± SD**	**M ± SD**
		N = 21		
Trauma Measure				
Children's Revised Impact of Events Scale (CRIES)				
EMDR Group	33.67 ± 13.81	29.00 ± 13.62	25.92 ± 13.98	23.83 ± 15.36**
Exposure Group	35.22 ± 12.35	31.44 ± 12.65	31.11 ± 20.27	25.11 ± 17.03**
CRIES - Intrusions				
EMDR Group	6.92 ± 5.90	5.67 ± 5.14	4.42 ± 4.54	4.08 ± 3.85
Exposure Group	9.22 ± 4.79	8.00 ± 4.44	7.56 ± 5.96	5.56 ± 6.29*
CRIES - Avoidance				
EMDR Group	13.33 ± 5.30	12.00 ± 5.61	10.00 ± 6.05*	10.25 ± 7.40*
Exposure Group	15.11 ± 4.17	12.78 ± 6.80	12.56 ± 8.34*	12.00 ± 7.60*
CRIES – Hyper-arousal				
EMDR Group	13.42 ± 6.84	11.33 ± 7.61	11.50 ± 7.19	9.50 ± 6.57
Exposure Group	10.89 ± 6.23	10.67 ± 5.83	11.00 ± 7.47	7.56 ± 5.92**
Process Scores				
Image Clarity (0-10)				
EMDR Group	5.67 ± 3.52	7.21 ± 3.58	7.32 ± 3.82	6.92 ± 4.23
Exposure Group	6.39 ± 3.00	6.06 ± 3.81	6.89 ± 3.79	6.61 ± 3.84
SUDS (0-10)				
EMDR Group	4.67 ± 3.87	4.79 ± 2.57	4.67 ± 2.50	2.67 ± 2.85**
Exposure Group	5.67 ± 1.73	5.61 ± 2.98	4.94 ± 3.81	3.61 ± 3.62
No of Negative Emotions (0-9)				
EMDR Group	3.92 ± 2.71	3.31 ± 2.39	3.61 ± 2.66	1.92 ± 1.83***
Exposure Group	2.67 ± 1.58	2.56 ± 2.51	1.56 ± 2.07	1.22 ± 1.72
Mean Validity of Negative Cognition (0-7)				
EMDR Group	2.97 ± 1.64	2.94 ± 1.70	2.81 ± 1.54	2.70 ± 1.42
Exposure Group	3.57 ± 1.44	3.58 ± 1.32	3.54 ± 1.53	2.64 ± 1.57*
Mean Validity of Positive Cognition (0-7)				
EMDR Group	4.75 ± 1.71	5.14 ± 1.83	5.30 ± 1.93	5.49 ± 2.01***
Exposure Group	4.93 ± 1.11	4.77 ± 1.75	5.12 ± 1.44*	6.10 ± 0.91

Note. Asterisks denote significant differences in comparison to session one.
*p<.05 **p<.01 ***p≤.001

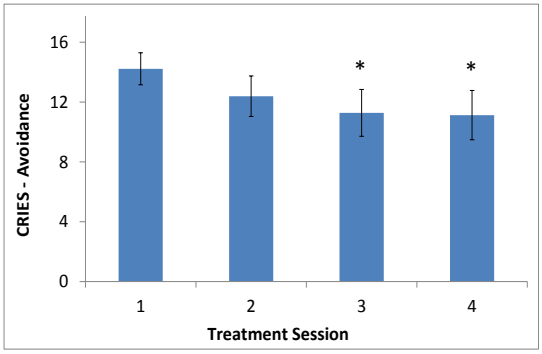

Figure 1A

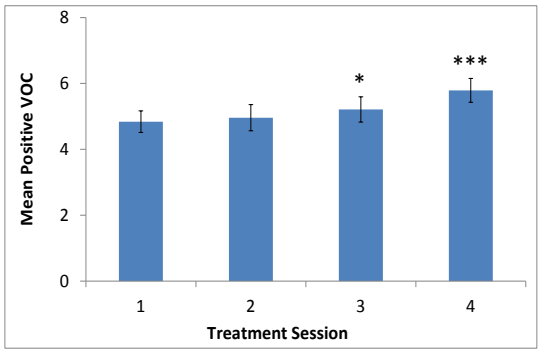

Figure 1B

Notes. CRIES = Children's Revised Impact of Events Scale.
VOC = Validity of Cognition Rating.
Asterisks denote significant differences in comparison to session one.
*p<.05 **p<.01 ***p≤.001

Figure 1 A-B. Avoidance and positive cognition scores (±SE) during treatment

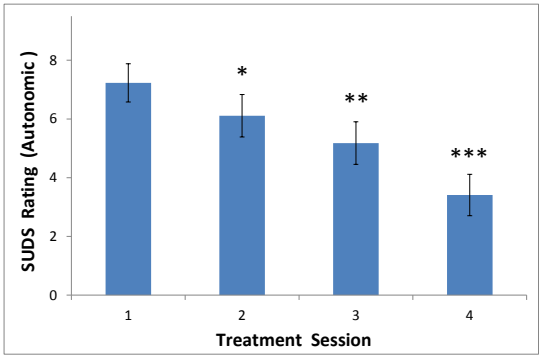

Figure 2A

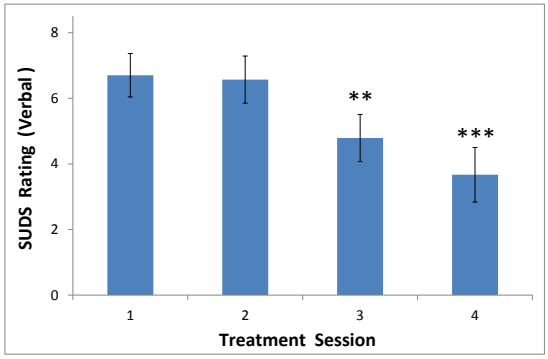

Figure 2B

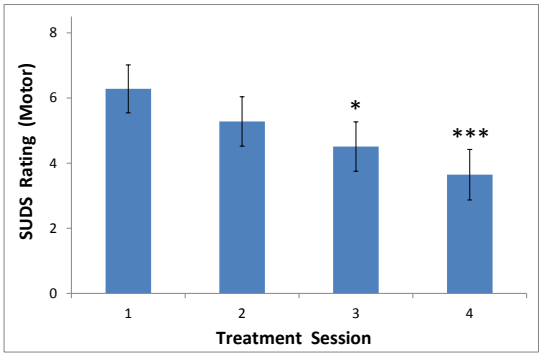

Figure 2C

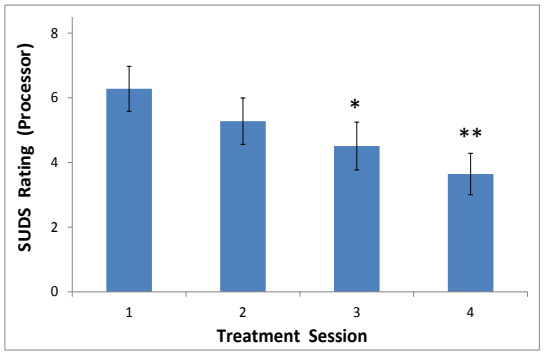

Figure 2D

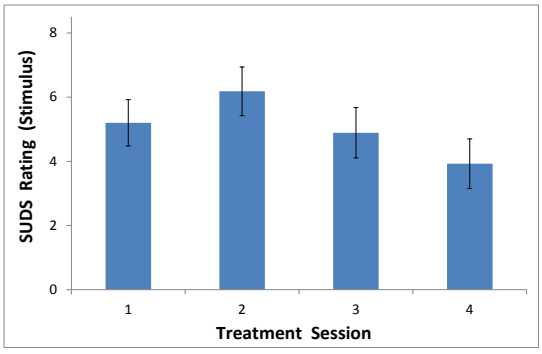

Figure 2E

Notes. For Figure 1E, the differences between SUDS ratings in session one and other sessions were non-significant.
Asterisks denote significant differences in comparison to session one.
*p<.05 **p<.01 ***p≤.001

Figure 2A-E. SUDS ratings (±SE) during treatment for each trauma image component

CHAPTER 6

General Discussion and Conclusions

6.1 General Discussion

This thesis focused on a paediatric population with PTSD symptoms from single event trauma. Apart from examining sample representation (see Study 2), this thesis aimed to investigate the efficacy of Eye Movement Desensitisation and Reprocessing (EMDR) and an exposure treatment based on Lang's (1977, 1979, 1983) bio-informational theory, which was ultimately compared to EMDR. The exposure therapy treatment (termed "Response Focused Exposure") was initially tested in the context of an assessment.

The first study demonstrated that four EMDR sessions were superior to a wait-list control condition for children from 6 to 12 years of age with persistent PTSD symptoms following a motor vehicle accident. In comparison to the wait list condition, EMDR resulted in significant improvements in process scores (i.e., SUDS and VOC ratings) and primary outcome measures (PTSD symptoms and diagnosis). Whilst 100% of participants met two or more PTSD criteria at pre-treatment, at post treatment this remained unchanged in the wait-list group and decreased to 25% in the EMDR group. These therapeutic gains were maintained at three and 12 month follow-up.

The third study confirmed that for children and adolescents with at least moderate PTSD symptoms, additional response focused exposure during a standard PTSD assessment facilitated an accelerated rate of recovery in avoidance symptoms from one week to two months later. There was also a reduction in the proportion of participants meeting the PTSD (DSM-IV) criterion for avoidance and in parent ratings of their child's somatic complaints. The response focused exposure involved the systematic exposure to as many cues as possible of the traumatic memory (i.e.,

the stimulus or image, distressing thoughts, emotions, and autonomic and motor responses).

Participants in the fourth study consisted of a sample of children and adolescents with persistent PTSD symptoms three months after their trauma (drawn from study two) from common single traumatic events (e.g., serious playground accidents, burns, anaphylaxis or falls). In line with the recommendation from study one, this study compared Eye Movement Desensitisation and Reprocessing (EMDR) to a Response Focused Exposure Therapy condition based on the assessment utilised in study three.

Both treatment conditions resulted in robust improvements in child, parent and clinician-rated PTSD measures, self-reported anxiety and depression, and parent-rated behavioural problems. The efficacy of the treatments is best explained by the use of vivid and repeated exposure to the trauma memory in a safe environment along with other non-specific elements (e.g., psycho-education about trauma reactions, establishment of a 'safe place' through relaxation and positive imagery, the participant was given some control over the exposure process, pre and post session review with parents/caregivers). Whilst there was no difference in the duration of the treatment sessions for each group, the exposure condition involved fewer exposure periods (4.75 versus 15.69) of longer duration (192 versus 24 seconds), and a longer total duration of exposure (12 versus 7 minutes) than the EMDR condition. This difference between the groups in total exposure time was unexpected and supports the potential role of eye movements or other aspects of the EMDR protocol in accelerating processing.

The second study compared participants recruited for a treatment study with a large number of non-participants from the same population on several measures of trauma and injury severity. These measures included the duration of hospital visit,

heart rate in the emergency department, emergency transport to hospital, admission to hospital, injury severity score, and triage code. Interestingly, the participants (i.e., those who attended an initial assessment appointment) were exposed to more severe trauma or injury than non-participants and within the non-participant group, those who had requested further information about the study ($N = 573$) were exposed to more severe trauma or injury than other non-participants ($N = 1760$). These findings were contrary to the view that non-participants could be more severely traumatised than participants, and the discovery of a gradient effect within non-participants suggests that participation or greater interest in participation may be associated with greater trauma and injury severity.

6.2 Methodological Limitations

With the exception of study two, the main methodological limitation of the studies presented in this thesis was that sample sizes were relatively small, and there was a lack of independent or blind assessment because a single therapist completed the treatment and outcome assessments. The positive outcomes could therefore be explained by the demand characteristics of the interventions (i.e., EMDR in study one, the Response Focused assessment in study three, and both EMDR and Response Focused Exposure in study four) and the particular characteristics of the small sample sizes. On the other hand, in relation to the small sample sizes, participants were randomised to each experimental condition. Hence, the pool of participants in this thesis is likely to reflect the general characteristics of the trauma exposed population. Indeed, the findings of study two indicate that the samples are likely to consist of children who were more exposed to severe trauma or injury than the population as a whole. Furthermore, the use of multiple trauma and non-trauma measures (child, parent and clinician) mitigated the problem of demand characteristics to some degree. There was also strong concurrent validity in study

three for PTSD diagnosis and two other PTSD measures (i.e., self-report and semi-structured interview) at three months post trauma. Study one and four included independent treatment fidelity ratings which verified the integrity of the experimental interventions. In addition, independent ratings of exposure duration were included in Study four, and both treatment fidelity and exposure duration were confirmed by strong inter-rater reliability.

Whilst a proportion of the study participants met DSM-IV diagnostic criteria for PTSD, subclinical population samples were used in both studies one and four, and this is likely to have resulted in floor effects. Thus, treatment effect sizes may have been underestimated in these studies.

Given the potential process of natural recovery in the few months following a traumatic event, the failure to include an assessment-delayed control group in study three may be considered a weakness of that study. However, the lack of significant correlations between the severity of PTSD symptoms at the initial assessment and the time elapsed since the trauma (range 7 to 49 days) mitigated this concern to some degree. Despite the small sample size, some benefits of response focused assessment were detected.

Whilst study two suggested some convergence between indices of injury severity and trauma-related psychological symptoms, it is important to emphasise that trauma-related psychological symptoms were not assessed directly. The exclusion of certain participants in study two (i.e., those exposed to events that resulted in death or serious injury of a significant other, serious head injury, and sexual or physical abuse) could have influenced the results. However, it is important to note that the categorisation of these excluded participants as ‘non-participants’ did not weaken the findings in regard to sample representation.

6.3 Conclusions

In study one, EMDR proved efficacious in comparison to a waitlist control condition for children (aged six to 12 years) exposed to motor vehicle accidents. The improvement in their PTSD symptoms and diagnostic status was maintained at three and 12 month follow-up. A subsequent study (study 4) with a representative population sample (confirmed by study 2) demonstrated that both EMDR and an exposure treatment condition (Response Focused Exposure Therapy) were efficacious for a broader age range of children (i.e., 6 to 16 years) following exposure to a diverse range of single traumatic events. Consistent with the findings of de Roos et al. (2011), EMDR involved less exposure time per session and was therefore more efficient than the comparative condition. Prior to this comparison study, Response Focused Exposure Therapy was tested in the context of a single session assessment for those with at least moderate PTSD symptoms (study 3). Results confirmed that the exposure based assessment component improved avoidance symptoms and somatic complaints and these subtle changes could shed light on the mechanism of change with this, and possibly other interventions.

6.4 Directions for Future Research

In the comparative treatment study (study 4), no attempt was made to limit the number or duration of exposure in the Response Focused Exposure condition. Thus, further research should evaluate whether less overall exposure has similar efficacy. In addition, the limited need for cognitive intervention in both the exposure and EMDR condition appears contrary to the recent findings of Nixon and colleagues (Nixon, Sterk & Pearce, 2012), and emerging support for the role of cognitive processes in the development and treatment of PTSD (Dalgleish, Meiser-Stedman & Smith, 2005; Ehlers, Mayou & Bryant, 2003; Meiser-Stedman, Dalgleish, Glucksman, Yule & Smith, 2009a; Stallard & Smith, 2007). However,

Nixon et al. (2012) note that the exposure and cognitive therapy components are not mutually exclusive. For example, just as the discussion of cognitive misappraisals may result in implicit exposure to the trauma memory (i.e., imaginal, emotional and physiological components), exposure therapy is likely to result in automatic or conscious reappraisals in line with the Adaptive Information Processing model (Shapiro, 1995, 2001, 2006; Solomon & Shapiro, 2008). The lack of importance of cognitive misappraisals in the comparative study (study 4) is also likely to relate to the uncomplicated nature of single event trauma populations.

The common elements of treatment for both conditions were likely to explain the therapeutic effects and these included psycho-education about trauma reactions, the creation of a 'safe place' through relaxation and positive imagery, allowing the participant some control over the exposure process, and pre and post session reviews with parent or caregivers. The importance of parent involvement in childhood PTSD interventions is well recognised, particularly in the treatment of childhood sexual abuse, but the empirical findings are mixed. For example, treatment effect sizes were similar for interventions with or without the involvement of the parent in the meta-analysis by Silverman et al. (2008). However, the meta-analysis by Trask, Walsh & DiLillo (2011) indicated that parent/caregiver involvement had a significant moderating effect consistent with the evidence for the involvement of several parent and family variables (McDermott & Cobham, 2012; McDermott, Berry & Cobham, 2012; Meiser-Stedman, Yule, Dagleish, Smith & Glucksman, 2006) in the aetiology and treatment of childhood PTSD. Cobham et al. (2012) note the need for parental involvement to vary on a continuum. Obviously, the comparative study (study 4) was at the low end of this continuum in contrast to the detailed description by Cobham et al. (2012) of two considerably more complex cases of parent and child intervention.

Interestingly, the common elements of the two treatment conditions in study four (including the limited role of cognitive intervention) are similar to the key intervention components suggested by Kramer & Landolt (2011) for future research into early interventions. Interestingly, the largest effect size for the seven studies included in this meta-analysis were for the longest intervention (i.e., four sessions in contrast to one or two sessions/weeks) which happen to consist of a mixed sample of type I and II trauma exposed children (Berkowitz, Stover & Marans, 2011).

Consistent with the discussion of treatment duration in the Introduction (see section 1.10.4), the relatively long treatment durations (i.e., 10 sessions) for exposure to single event trauma, seem to be associated with sample characteristics that are more in keeping with type II rather than type I trauma (e.g., exposure to past trauma, comorbidity and loss of significant others). Similarly, amongst the brief interventions (Chemtob, Nakashima & Carlson, 2002a; Chemtob, Nakashima, & Hamada, 2002b; de Roos et al., 2011; Goenjian et al., 1997, 2005), the six session intervention by Goenjian et al. (1997, 2005) was considerably less potent, most likely because of the type II trauma characteristics amongst participants (e.g., the loss of family and friends, and subsequent homelessness). There were some methodological limitations to the study by Goenjian et al. (1997, 2005) that were also likely to reduce the treatment effect (e.g., treatment was instigated 1.5 years after the earthquake, the post treatment assessment occurred approximately 18 months after the intervention, treatment fidelity ratings were lacking and the absence of a grief measure precluded an analysis of the relationship between grief, depression and recovery).

The continued comparison of treatments such as EMDR with short versions of CBT (e.g., with and without cognitive therapy) across different types of trauma would help us determine which treatments are most efficient and would help to identify the active components of treatment and optimal time for their delivery. The

use of an active control (e.g., non-specific therapy) or concurrent waitlist condition would help researchers account for any improvement in symptoms from therapeutic attention or the mere passage of time.

Despite the unclear role of cognitive reappraisals in the natural and treatment assisted recovery from PTSD, the cognitive dimension remains an important focus for future research. Therefore, the modified (and untested) version of the VOC Scale (Shapiro, 2001) used in this thesis may be worthy of further development as a clinician administered instrument for assessing cognitive appraisals specific to the child's trauma image or memory. Initially, this would involve a review of the language used in the questions to ensure maximum comprehension for younger children. A factor analysis would obviously be necessary to remove redundant items, and the Scale will need to be cross-validated with other cognitive assessment measures such as the Child Post-Traumatic Cognitions Inventory (CPTCI) (Meiser-Stedman et al., 2009b).

It will be interesting to see if the accelerated recovery in avoidance symptoms (and somatic complaints), observed soon after the intervention in study three, can be replicated in other samples (including type I and II trauma). The use of the same short term re-assessment methodology (i.e., a parent and child telephone assessment one week after the intervention component) may uncover the subtle or short term changes (e.g., reduced avoidance, cognitive reappraisals) associated with the delivery of specific components of intervention (e.g., psycho-education or cognitive therapy). This methodology, along with dismantling studies, would allow us to determine which components have the most potency and in what sequence they are best applied for maximum efficiency and therapeutic benefit.

There is merit in conducting further investigation into Lang's (1979, 1981, 1983) bio-informational theory with a particular focus on single event trauma.

Ideally, this would examine the degree to which additional and combined elements of the trauma memory (e.g., negative cognitions and autonomic responses) along with repeated response-focused assessment or exposure accelerates the recovery of PTSD symptoms, particularly the avoidance of traumatic memories or the sequence in which symptoms are alleviated.

Our understanding of the factors which influence the efficiency and effectiveness of single event trauma would be aided by reporting sample characteristics which appear to influence treatment duration (e.g., exposure to violence, level of exposure to past trauma, destruction of homes and death of significant others). The data for key predictive variables (see Trickey, Siddaway, Meiser-Stedman, Serpell & Field, 2012) should also be reported (e.g., exposure to past trauma, type of trauma exposure, parental distress and health concerns, loss significant others including but not limited to family).

Whilst the study of sample representation (study 2) confirmed that an elevated heart rate in the emergency department was indicative of trauma severity or injury, it was not practical to use physiological measures during the subsequent treatment studies. Nonetheless, the use of genetic, biological and physiological measures will become increasingly important to further our understanding of the assessment, aetiology, prevention and treatment of childhood PTSD. This is particularly important, in view of the cascade of neurobiological and long term health consequences that are known to result from chronic (type II) childhood trauma (Gerson & Rappaport, 2013). The degree to which these neurobiological consequences occur following type I trauma is yet to be determined and could provide vital clues about the aetiology and treatment of PTSD.

Finally, some new and innovative treatment modalities may well be suited to the treatment of single event trauma (e.g., virtual reality, telepsychiatry, internet

CBT). For example, internet CBT has recently shown some promise as an early intervention (Cox, Kenardy, & Hendrikz, 2010). Obviously more investigation is required, but these treatments offer potential advantages over existing treatments where local treatment services are limited or unavailable. They may also assist in overcoming PTSD-related avoidance because the participant can access treatment from their own home (Cloitre, 2009; Cukor, Spitalnick, Difede, Rizzo & Rothbaum, 2009). Ultimately, such treatments should be tested against efficacious treatments such as EMDR and CBT.

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