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Early psychological intervention following recent trauma: A systematic review and meta-analysis

Neil P. Roberts, Neil J. Kitchiner, Justin Kenardy, Catrin E. Lewis and Jonathan I. Bisson

Abstract

Background: Post-traumatic stress disorder (PTSD) is a common and debilitating disorder which has a significant impact on the lives of sufferers. A number of early psychological interventions have been developed to try to prevent chronic difficulties.

Objective: The objective of this study was to establish the current evidence for the effectiveness of multiple session early psychological interventions aimed at preventing or reducing traumatic stress symptoms within three months of trauma exposure.

Methods: Randomized controlled trials of early multiple session psychological interventions aimed at preventing or reducing traumatic stress symptoms of individuals exposed to a traumatic event, fulfilling trauma criteria for an ICD or DSM diagnosis of PTSD were identified through a search of the Cochrane Common Mental Disorders Group Clinical Trials Registers database, the Cochrane Central Register of Controlled Trials, MEDLINE, Embase, PsycINFO and PILOTS. Two authors independently extracted study details and data and completed risk of bias assessments. Analyses were undertaken using Review Manager software. Quality of findings were rated according to ‘Grades of Recommendation, Assessment, Development, and Evaluation’ (GRADE) and appraised for clinical importance.

Results: Sixty-one studies evaluating a variety of interventions were identified. For individuals exposed to a trauma who were not pre-screened for traumatic stress symptoms there were no clinically important differences between any intervention and usual care. For individuals reporting traumatic stress symptoms we found clinically important evidence of benefits for trauma-focused CBT, cognitive behavioural therapy (CBT-T), brief EMDR and reprocessing (EMDR). Differences were greatest for those diagnosed with acute stress disorder (ASD) and PTSD.

Conclusions: There is evidence for the effectiveness of several early psychological interventions for individuals with traumatic stress symptoms following trauma exposure, especially for those meeting the diagnostic threshold for ASD or PTSD. Evidence is strongest for trauma-focused CBT.

Intervención psicológica temprana tras un trauma reciente: una revisión sistemática y meta-análisis

Antecedentes: El Trastorno de Estrés Postraumático (TEPT) es un trastorno frecuente y debilitante que tiene un impacto significativo en las vidas de los que lo padecen. Se han desarrollado una serie de intervenciones psicológicas tempranas para tratar de prevenir dificultades crónicas.

Objetivo: El objetivo de este estudio fue establecer la evidencia actual para la eficacia de intervenciones psicológicas tempranas con múltiples sesiones con el objetivo de prevenir o tratar síntomas de estrés traumático que comenzaron en los tres meses posteriores a la exposición al trauma.

Métodos: Se realizó una búsqueda bibliográfica basada en la base de datos de Cochrane de Estudios Clínicos de Trastornos Mentales Frecuentes, en el registro de ensayos controlados de Cochrane, MEDLINE, Embase, PsycINFO y PILOTS, para identificar ensayos controlados randomizados de intervenciones psicológicas tempranas de múltiples sesiones que tenían el objetivo de prevenir o reducir síntomas de estrés traumático en individuos expuestos a un evento traumático, y que cumplían los criterios de TEPT según la CIE o el DSM. Dos autores independientes extrajeron los detalles e información del estudio y completaron una evaluación de riesgo de sesgo. Se llevaron a cabo análisis usando el software Review Manager. La calidad de los hallazgos fue puntuada según los ‘Grados de Recomendación, Valoración, Desarrollo y Evaluación’ (GRADE pos sus siglas en inglés) y evaluada por su importancia clínica.

Resultados: Se identificaron sesenta y un estudios que evaluaban una variedad de intervenciones. Para aquellos individuos que estuvieron expuestos a un trauma que no tuvieron una pre-evaluación de síntomas de estrés traumático no hubo diferencia clínica importante entre cualquier intervención y cuidado usual. Para los individuos que reportaron síntomas de estrés...
1. Introduction

Numerous studies demonstrate that a range of traumatic experiences can cause psychological difficulties to those exposed (Berger et al., 2012; Brunet, Monson, Liu, & Fikretoglu, 2015; Dworkin, Menon, Bystrynski, & Allen, 2017; Lowe & Galea, 2017; Neria, Nandi, & Galea, 2008). For many, these difficulties are short lived or subclinical, and diminish over time without the need for medical or psychological intervention (Giannoula, Lennox, Dari, Costa, & Gabbe, 2018; McNally, Bryant, & Ehlers, 2003). However, psychological difficulties may develop and persist for some of those exposed. These difficulties include acute stress disorder (ASD) and post-traumatic stress disorder (PTSD). Around a third of individuals with PTSD at 4–6 weeks post trauma exposure remit by 3 months (Santiago et al., 2013); whilst for around another third of individuals symptoms become chronic and unremitting (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Santiago et al., 2013). Estimated life-time prevalence rates of PTSD have been found to vary from 1.3% to 8.8% (Atwoli, Stein, Koenen, & McLaughlin, 2015). Rates of PTSD also vary according to trauma type, with an estimated mean conditional risk following any trauma exposure of 4.0%, with much higher rates for some types of interpersonal trauma (Kessler et al., 2017) which tend not to show the same pattern of symptom reduction (Santiago et al., 2013). PTSD symptoms can have a considerable impact on the life trajectory of those exposed to trauma and their families (McFarlane, 2010; Shaley et al., 2019). Typically, symptoms affect social, occupational and interpersonal functioning, and physical health. PTSD is frequently associated with comorbidity and unhealthy coping mechanisms, which can become chronic and entrenched over time (Shaley et al., 2019). PTSD has a significant economic burden (Ferry et al., 2015; Greenberg et al., 1999).

As the effects of trauma exposure and the development of conditions such as PTSD have become better understood, there have been increasing efforts to develop psychological and pharmacological interventions that might prevent the onset of disorder or ameliorate early symptoms (Kearns, Ressler, Zatzick, & Rothbaum, 2012; McNally et al., 2003). For a time, psychological debriefing (also known as Critical Incident Stress Debriefing) was a widely used form of early intervention. However, its use has declined as evidence challenging its efficacy has emerged (Bastos, Furuta, Small, McKenzie-McHarg, & Bick, 2015; Rose, Bisson, Churchill, & Wessely, 2002). Over the past 20 years or so, a range of other approaches, mainly based on established cognitive-behavioural therapy (CBT) for PTSD, have emerged (Kearns et al., 2012). More recently some groups have started to evaluate telephone-based approaches and approaches based on new technology in order to increase accessibility to potentially effective interventions.

In 2009 we published a systematic review and meta-analysis of randomized controlled trials (RCTs) of psychological interventions aimed at preventing or treating PTSD within three months of a traumatic event.
This review included 25 studies. We found no evidence to support the use of preventative interventions offered to individuals irrespective of whether they were symptomatic or not. However, we did find evidence to support the use of trauma focused cognitive behavioural therapy (CBT-T) in studies targeting individuals with early traumatic stress symptoms. Effects were strongest for treatment of acute stress disorder and posttraumatic stress disorder. A subsequent review conducted by the US Agency for Health Care Research and Quality (AHRQ) identified a smaller pool of 19 studies but reported similar findings (Forneris et al., 2013). A review focusing specifically on individuals who suffered traumatic injury which included 26 mostly randomised controlled trials (RCTs) also found support for cognitive behavioural interventions, alongside small but significant effects for collaborative care based approaches (Giummarra et al., 2018). Neither of these reviews made a distinction between preventative interventions aimed at all individuals exposed and studies focusing specifically on individuals who were symptomatic. Since our previous review (Roberts et al., 2009), a range of new early interventions have been developed and evaluated, including brief EMDR, new technology based approaches and interventions aimed at those who have experienced serious illnesses. In light of new developments in the field, the purpose of this paper is to provide an update of our previous review of all available early intervention studies aiming to prevent or treat traumatic stress symptoms following exposure to an event fulfilling trauma criteria for an ICD or DSM diagnosis of PTSD. The review was undertaken as a part of the process for the International Society for Traumatic Stress Studies (ISTSS) Treatment Guidelines (Bisson et al., 2019).

2. Method

2.1. Data sources

Following on from the previous search, we undertook a systematic computerized literature search of the Cochrane Common Mental Disorders Group clinical trials registries databases for studies published from January 2008 to May 2016 using the search terms PTSD or posttrauma* or post-trauma* or ‘post trauma” or ‘combat disorder” or ‘stress disorder”. These databases are collated and updated on a weekly basis from MEDLINE, EMBASE and PsycINFO. A further search was undertaken in March 2018. We chose not to exclude any potential study based on date of publication, at any time point. Searches were undertaken as part of a search process to support development of new PTSD treatment guidelines for the ISTSS (Bisson et al., 2019). See Appendix 1 (online supplement) for details of the search terms and parameters. We checked the reference lists of studies identified in the search, related review articles and management guidelines. We contacted authors of unpublished studies that had completed recruitment when there was a registered protocol available on a trial register, such as Clinical Trials. We posted a list of identified studies on the website of the International Society for Traumatic Stress website and asked the membership to identify studies that we might have missed.

2.2. Study selection

Study selection followed the procedure in our previous review (Roberts et al., 2009). Study abstracts were read independently by two of the reviewers to determine if they potentially met the inclusion criteria. The full manuscript of all studies that either reviewer felt potentially met the criteria were obtained and read independently by two reviewers. To be included, a study had to be an RCT that considered one or more defined psychological intervention or treatment aimed at preventing or reducing traumatic stress symptoms in adults following events that appeared to fulfill criteria for a traumatic event according to DSM or ICD PTSD diagnostic descriptions (excluding single session preventative interventions), in comparison with a placebo, other control (e.g. usual care or waiting list control) or alternative psychological treatment condition. All studies had to have been completed and analysed by October 2018 with an available study manuscript. Presence or absence of symptoms, sample size, publication status and language of publication were not used to determine whether a study should be included. The review considered studies involving adults aged 18 and over only. In cases where there were a combination of adults and adolescents, at least 80% of the sample had to be 18 or over.

2.3. Data extraction

A data extraction sheet was designed to capture data which was then entered into Review Management 5 (RevMan-5.3) software (Review Manager [RevMan], 2014). Information extracted included demographic details of participants, inclusion and exclusion criteria, details of the traumatic event, the randomization process, the interventions used, drop-out rates and outcome data. Study quality was assessed with the Cochrane Collaboration’s tool for assessing risk of bias (Higgins et al., 2011) using the domains: sequence generation, allocation concealment (selection bias), blinding of assessors (detection bias), incomplete outcome data (attrition bias), selective outcome reporting, and other sources of bias. Data were extracted and quality assessed by two reviewers independently. Any disagreements were discussed with a third reviewer and a consensus achieved.
2.4. Data synthesis

In line with our previous review (Roberts et al., 2009) we separated trials into three separate groups:

(1) Studies that have offered intervention beginning within three months to any individual exposed to a traumatic event irrespective of their symptoms with the aim of preventing PTSD.

(2) Interventions begun within three months with the aim of preventing PTSD or ongoing distress in individuals with traumatic stress symptoms.

(3) Interventions begun within three months with the aim of treating ASD or PTSD in individuals who already met diagnosis.

In our previous review we combined data from all studies evaluating interventions aimed at any individual exposed to a traumatic event irrespective of their symptoms in one meta-analysis (Roberts et al., 2009). In contrast, in this review we only combined data from studies of similar interventions for all the above groupings. We previously identified several studies evaluating CBT-T for individuals with traumatic stress symptoms. We considered undertaking evaluation of CBT-T studies by specific intervention but we took the view that there were insufficient studies following a specific model to make this approach meaningful at this time. As previously, CBT-T was defined as any intervention that focused on the trauma using written, imaginal or in-vivo exposure therapy with or without cognitive therapy and other cognitive behavioural techniques.

Our primary outcome was PTSD symptom severity as this is the outcome most widely reported in the traumatic stress literature (Bisson, Roberts, Andrew, Cooper, & Lewis, 2013). When an individual study reported both a clinician-administered and a self-report measure, primacy was given to outcomes using the clinician-administered measure. PTSD diagnosis was our other outcome of interest. We undertook analyses with follow-up data where this was available. Time points were decided a priori as post-treatment, three to six months post-trauma, seven to 12 months post-trauma, one to two years post-trauma, and two years and beyond, based on our knowledge of commonly used follow-up points used in previous early intervention studies.

Data were analysed for summary effects using the Review Manager 5.3 program (RevMan, 2014). All continuous outcomes were analysed using standard mean differences (SMD), in order to compare effects across analyses. SMD assumes that all scales are measuring the same underlying symptom or condition. Relative risk was calculated for diagnostic status. 95% confidence intervals were calculated for all outcomes. Available case analysis and intent to treat analysis with imputation using the last observation carried forward method were performed when enough information was available. In cases where there was inadequate information within the paper to perform these analyses further information was requested from the lead author.

Heterogeneity between studies was assessed by considering the $I^2$ and chi$^2$ test of heterogeneity. This statistic measures the percentage of variation that is not due to chance (Fletcher, 2007). An $I^2$ of less than 30% was taken to indicate mild heterogeneity and a fixed effects model was used. When the $I^2$ was greater or equal to 30% a random-effects model was used. A visual inspection of the forest plots was used as a test of robustness of these findings. We decided a priori that if a minimum of 10 studies were available in a meta-analysis, we would prepare funnel plots and examine them for signs of asymmetry. Where asymmetry was indicated, we planned to consider other possible reasons for this. We assessed the quality of evidence using the ‘Grades of Recommendation, Assessment, Development, and Evaluation’ (GRADE) approach (Guyatt, Oxman, Schünemann, Tugwell, & Alonso, 2011; Guyatt et al., 2013; Langendam et al., 2013) using five factors: limitations in study design and implementation of available studies, indirectness of evidence, unexplained heterogeneity or inconsistency of results, imprecision of effect estimates, and potential publication bias. The quality of evidence for each comparison was graded according to our confidence that the estimate of effect would remain unchanged as a result of further research. A high rating indicates that further research is very unlikely to change our confidence in the estimate of effect; a moderate rating indicates that research is likely to have an important impact on the confidence in the estimate of effect and may change the estimate; low quality indicates that further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate; very low quality indicates that the estimate of effect is very uncertain. Finally, we rated findings in terms of clinical importance. We used a definition of clinical importance, which was developed by the ISTSS Treatment Guidelines Committee and approved by the ISTSS Board and membership (Bisson et al., 2019), building on previous work by the National Institute of Health and Care Excellence (National Collaborating Centre for Mental Health, 2005). To be rated clinically important, an early intervention had to demonstrate an effect size of $>0.5$ for continuous outcomes for wait list control comparisons, $>0.4$ for placebo control comparisons and $>0.2$ for active treatment control comparisons. For relative risk outcomes an effect size of $<0.8$ was required. When only one study, evaluating a specific intervention, was available its findings could not be judged as clinically important, unless the sample size was large ($>300$ participants). Non-inferiority RCT evidence alone was not sufficient to recommend an intervention as clinically important.
Following the procedure undertaken previously (Roberts et al., 2009), to determine the impact of quality on outcome we decided that we would undertake a sensitivity analysis for allocation concealment. Inadequate allocation concealment has been found to have influence the degree of effect in research trials and is thought to be one of the more important features of risk of bias (Hewitt, Hahn, Torgerson, Watson, & Bland, 2005). We therefore decided that we would investigate whether there was any indication of differential treatment effects through a sensitivity analysis to see if there was a change in the magnitude of effect and confidence intervals, excluding studies rated to have a high or unclear risk of bias for allocation concealment.

3. Results

Figure one displays the results of the systematic searches. In addition to the 25 studies and two long-term outcome studies included in the previous review, 6704 additional titles and abstracts were identified as a result of the search process and 204 papers were reviewed in detail by two of the authors independently to establish if they met the specified inclusion criteria. Thirty-six new studies were found to meet the inclusion criteria along with one paper reporting long term follow-up data for one of the newly identified studies, giving a total of 61 studies plus three long-term follow-up studies. Twenty seven of the 61 studies evaluated preventative interventions, aimed at anyone exposed to the relevant traumatic event; the other 34 studies evaluated early treatment interventions in individuals with early traumatic stress symptoms; of these 14 were studies where participants met diagnosis for ASD or PTSD. Fifty-nine studies were reported in English, one was in French (Andre, Lelord, Legeron, Reignier, & Delattre, 1997) and one in Persian (Taghizadeh, Jafarbegloo, Arbabi, & Faghizadeh, 2008). A flow diagram of the systematic review can be seen in Figure 1. The characteristics of all studies identified in this search and the previous review are described in Table 1, with inclusion and exclusion criteria in Table S1 (see online supplement).

3.1. Synthesis of results

The outcomes for individual studies are shown in Table 1. The post intervention and follow-up results of the meta-analyses for comparisons that included more than one study are shown in Table 2 with examples of Forest plots in Figures 2 and 3. The outcomes reported are severity of PTSD and rates of PTSD.

3.1.1. Studies offering intervention to individuals involved in a traumatic event irrespective of their symptoms

Twenty-seven studies (Als et al., 2015; Biggs et al., 2016; Borghini et al., 2014; Brom et al., 1993; Brunet et al., 2013; Cox et al., 2018; Curtis et al., 2016; Gamble, 2010; Gamble et al., 2005; Gidron et al., 2001, 2007; Holmes et al., 2007; Irvine et al., 2011; Jensen et al., 2016; Jones et al., 2010; Kazak et al., 2005; Lindwall et al., 2014; Marchand et al., 2006; Mouthaan et al., 2013; Rothbaum et al., 2012;...
| Source and Country | Intervention and Conditions | Mean Number of Sessions Attended | Population | Time Since Trauma at Start of Intervention | Severity Criterion | Traumatic Stress Outcome Measures | Randomized (n): Completers (n) | Follow-up Period | Significant Differences |
|--------------------|-----------------------------|----------------------------------|------------|-------------------------------------------|-------------------|----------------------------------|-------------------------------|-----------------|------------------------|
| Als, Nadel, Cooper, Vickers, and Garralda, 2015 UK | Telephone supported psychoeducation vs. TAU | 2.35 | Parents of children admitted to a paediatric intensive care unit (ICU) | Within 7 days of discharge. | None | IES | 31: 23 | 3–6 post discharge | Neutral |
| Andre et al., 1997 France | Up to 6 sessions of CBT vs. usual care | 2.35 | Assaulted bus drivers recruited via an urban bus company | At least 14 days | None | IES | 132: | 6 months | Neutral |
| Ben-Zion et al., 2018 Israel | Daily computerized neurobehavioral training (CNT) for 30 days vs a computerized games control vs a reading task control | Not reported | Physical injury from civilian trauma recruited from general hospital | At least 7 days | Probable PTSD diagnosis | CAPS, CAPS-5 | 97: 52 were identified as completers. | 3 and 6 months post trauma | CNT was reported to be better than the combined controls but analysis was only conducted on those completing intervention. |
| Biggs et al., 2016 USA | Four 2-hour interactive group based sessions based on Psychological First Aid vs. assessment only | 2.22 | Military mortuary attendants returning from deployment in the Middle East | One month | None | PCL | 126: 125 | 2, 3, 4, 7, and 10 months post deployment | Neutral |
| Bisson, Shepherd, Joy, Probert, and Newcombe, 2004 UK | Four 60 min. sessions of exposure based CBT vs. standard care | 3.30 | Physical injury from civilian trauma recruited from a hospital accident and emergency unit | 5–10 weeks | Acute psychological distress | CAPS, IES | 152: 124 completed to 3 months | 3 and 13 months post trauma | CBT-T better than standard care at 13 months only |
| Borghini et al., 2014 Switzerland | Three 60 minute parenting sessions over 6 months vs. standard care | Not reported | Mothers of infants born prematurely recruited through a neonatal intensive care unit | Within one week | None | Perinatal PTSD Questionnaire (PPQ) | 60: 55 | 42 weeks post conception and 4 and 12 months corrected infant birth. | Neutral |
| Brom, Kleber, and Hofman, 1993 Netherlands | Up to six sessions of individual preventative counselling vs. monitoring group | Not reported | Outpatient victims of MVA recruited through police records. | Not reported | None | IES, TSI | 738 randomized, 151 agreed to enter study: 121 completed | 3 months post treatment | Neutral |
| Brunet, Des Groselliers, Cordova, and Ruzek, 2013 Canada | Two sessions of dyadic CBT vs. assessment only | Not reported | Physical injury from civilian trauma recruited from emergency departments of public hospitals | Mean 26 days | None | IES-R, CAPS | 83 completed as per protocol | Post treatment, Dyadic CBT better than assessment only |
| Bryant, Harvey, Dang, Sackville, and Basten, 1998 Australia | Five 90 min. weekly sessions of exposure based CBT vs supportive counselling | Not reported | Outpatients recruited from a hospital PTSD clinic following MVA or industrial accident | Mean 9.9 days (CBT); 10.3 days SC | None | Acute Stress Disorder | IES, CIDI PTSD module | Unclear: 24 completed | 6 months and 4 years post trauma | CBT-T better than SC |
| Source and Country | Intervention and Conditions | Mean Number of Sessions Attended | Population | Time Since Trauma at Start of Intervention | Severity Criterion | Traumatic Stress Outcome Measures | Randomized (n): Completers (n) | Follow-up Period | Significant Differences |
|--------------------|-----------------------------|---------------------------------|------------|-------------------------------------------|-------------------|-------------------------------|-----------------------------|-----------------|-----------------------|
| Bryant, Sackville, Dang, Moulds, and Guthrie, 1999 Australia | Five 90 min. weekly sessions of prolonged exposure or prolonged exposure plus anxiety management vs. supportive counselling | Not reported | Outpatients recruited from a hospital PTSD clinic following MVA or non-sexual assault | Mean 10.3 days (exposure plus anx mgmt); 10.0 days (PE); 10.6 days (SC) | Acute Stress Disorder | CAPS, IES | 56: 45 completed | 6 months and 4 years post trauma | CBT-T and CBT-T plus AM better than SC |
| Bryant, Moulds, Guthrie, and Nixon, 2003 Australia | Five 90 min. weekly sessions of exposure based CBT vs. supportive counselling | Not reported | Outpatients with mild traumatic brain injury from MVA or non-sexual assault recruited from a hospital PTSD clinic | Mean 15.8 days (CBT); 13.5 days (CBT-hypnosis); 14.0 days (SC) | Acute Stress Disorder | CAPS, IES | 87: 69 completed | Post treatment and 3 years post trauma | CBT-T better than SC |
| Bryant et al., 2008 Australia | Five 90 min sessions of exposure therapy or cognitive restructuring vs. waiting list | Not reported | Outpatient victims of civilian trauma recruited from a hospital traumatic stress service | Mean 22.8 days | Acute Stress Disorder | CAPS, IES | 69 completed | Post treatment and 6 months post trauma | Exposure therapy and Cognitive restructuring better than WL. ET better than CR |
| Bugg, Turpin, Mason, and Scholes, 2009 UK | One face to face and two telephone sessions with a trauma related writing task and information intervention vs information only | Not reported | Outpatient victims of MVA, occupational injury or assault recruited from a hospital accident and emergency clinic | Mean 5–6 weeks | Acute Stress Disorder | PDS | 148 randomized: 67 available to initial follow-up | 3 and 6 months post trauma | Neutral |
| Cernvall, Carlbring, Ljungman, and von Essen, 2015 Sweden | Ten weeks of therapist supported internet and CBT based guided self-help vs. assessment only | Not reported | Parents of children with cancer recruited from paediatric oncology centres | Not reported | PTSD symptom positive | PCL-C | 58: 37 | Post-treatment | Guided self-help was better than assessment only |
| Cox et al., 2018 USA | Six 30 minute telephone and web CBT based sessions of coping skill training (CST) vs. education only | 2.7 for CST; 0.8 for education only | Patients admitted to an ICU and receiving > 48 hours of mechanical ventilation | 2 weeks post discharge | None | IES-R | 175: 136 | 3 and 6 months post baseline | Neutral |
| Curtis et al., 2016 USA | Provision of an inpatient patient/family communication facilitator vs. usual care | 9.4 contacts per family | Family members of patients in an ICU | Randomization occurred following admission | None | PCL | 268: 133 | 3 and 6 months following death or discharge of the patient | Neutral for PTSD |
| Source and Country | Intervention and Conditions | Population | Time Since Trauma at Start of Intervention | Traumatic Stress Outcome Measures | Randomized (n): Completers (n) | Follow-up Period | Significant Differences |
|--------------------|----------------------------|------------|------------------------------------------|---------------------------------|--------------------------------|-----------------|------------------------|
| Echeburua, de Corral, Sarasua, and Zubizarreta, 1996 Spain | Five 60 min. session of exposure based CBT vs. relaxation | Female victims of rape or sexual assault recruited from a psychological counselling centre for women | 1.4 months | Acute PTSD Scale of PTSD Symptoms | 20: 20 completed | Post treatment, 3, 6 and 12 months post treatment | CBT-T better than relaxation at 12 month follow-up only |
| Ehlers et al., 2003 UK | Twelve plus three 90 min. sessions of trauma focused CBT or self-help booklet vs. waiting list | Outpatient victims of MVA recruited from local accident and emergency departments | 4 months | Acute and chronic PTSD | 85: 80 completed | 3 and 9 months post baseline | CBT-T better than self help booklet and WL |
| Foa, Zoellner, and Feeny, 2006 USA | Four 2 hour sessions of exposure based CBT or supportive counselling vs. continuous assessment | Female victims of sexual and non-sexual assault recruited via emergency rooms, police officers, medical professionals, local victim assistance agencies, and media advertisements | 20.5 days to assessment | PTSD symptom criteria | 90: 66 completed | Post treatment, 2, 3, 6, 9 and 12 months post treatment | Neutral |
| Freedman, n.d. Israel; Freedman, Dayan, Kimelman, Weissman, and Eltan, 2015 | Five sessions of virtual reality and CBT based vs. waiting list | Motor vehicle accident (MVA) recruited via an emergency room | 14 days to assessment | PTSD symptom positive | 14: 14 | Post treatment, 6 and 12 months | Neutral |
| Freedman, in press Israel | Five sessions of telephone based CBT vs. waiting list | Physical injury from civilian trauma recruited via a hospital emergency department | 16 days to assessment | Diagnosis for acute PTSD apart from the duration criteria | 139: number completing not clear | 3 and 7 months post trauma | Neutral |
| Freyth, Elsesser, Lohrmann, and Sartory, 2010 Germany | Three 90 minute sessions of exposure based CBT vs supportive counselling | Various trauma exposed outpatients recruited from a university psychology department outpatient treatment centre | 20.5 days to assessment | Acute Stress Disorder | 46: 40 | Post treatment and 3 months post treatment | Neutral |

(Continued)
| Source and Country | Intervention and Conditions | Mean Number of Sessions Attended | Population | Time Since Trauma at Start of Intervention | Traumatic Stress Outcome Measures | Randomized (n): Completers (n) | Follow-up Period | Significant Differences |
|--------------------|-----------------------------|----------------------------------|------------|------------------------------------------|----------------------------------------|-------------------------------|-------------------|-------------------------|
| Gamble et al., 2005 Australia | 1 session of face to face counselling and 1 session of telephone counselling lasting up to 60 mins vs treatment as usual | Not reported | Mothers recruited via an ante-natal clinic following traumatic birth | Within 72 hours | None | MINI-PTSD | 103: 102 completed initial follow-up, 103 completed 3 month follow-up | 4–6 weeks and 3 months post-partum | Intervention better than treatment as usual at 3 months only |
| Gamble, 2010 Australia | 1 session of face to face counselling and 1 session of telephone counselling vs parenting support | Not reported | Mothers recruited via an ante-natal clinic following traumatic birth | 72 hours | None | PDS | 262: 219 | 6 weeks, 6 and 12 months post-partum | Neutral |
| Gidron et al., 2001 Israel | Two sessions of Memory structuring intervention vs. supportive listening | Not reported | Outpatient victims of an MVA recruited via an emergency department. | 24 hours | Heart rate greater than 95 beats per minute in emergency room | PDS | Number randomized unclear: 17 completed | 3–4 months post trauma | Memory structuring intervention better than supportive listening |
| Gidron et al., 2007 Israel | Two sessions of Memory structuring intervention vs. supportive listening | Not reported | Outpatient victims of an MVA recruited via a university medical centre. | Within 48 hours | Heart rate greater than 95 beats per minute in emergency room | PDS | Number randomized unclear: 34 completed | 3 months post trauma | Neutral |
| Holmes et al., 2007 Australia | Six sessions of Interpersonal Counselling vs. assessment only | 3.53 | Major physical trauma recruited via a hospital trauma centre | Screening occurred at 2 weeks. | None | PCL | 90: 84 completed intervention | 3 and 6 months post treatment | Neutral |
| Irvine et al., 2011 Canada | Eight sessions of telephone based CBT vs. treatment as usual | Not reported | Patients receiving implantable cardioverter defibrillator transplant recruited via a hospital | Unclear – normally soon after discharge | None | IES-R | 193: 171 (a further 8 participants died) | 6 and 12 months post baseline | Intervention was better than treatment as usual at 6 and 12 months for women and at 12 months for men. |
| Jarero, Artigas, and Luber, 2011 Mexico | One 130 minute session of EMDR vs delayed treatment | 1 | Earthquake survivors recruited via a private company | 16 days | Screened positive for PTSD | IES | 18: 18 | Post treatment | EMDR was better than delayed treatment |
| Jarero, Uribe, Artigas, and Givaudan, 2015 Mexico | Two 60 minute sessions of EMDR vs delayed treatment | Unclear | Exposure to a fatal factory explosion | 25 days | Screened positive for PTSD | SPRINT | Number randomized unclear: 25 completed | Post treatment | EMDR was better than delayed treatment |
| Jensen et al., 2016 Denmark | Three sessions of CBT based nurse led psychological intervention vs. usual care | 1.92: 34 intervention patients died during the intervention period | Patients admitted to ICU requiring mechanical ventilation | Within one month of discharge | None | Harvard Trauma Questionnaire | 386: 235 | 3 and 12 months post discharge | Neutral |
| Source and Country | Intervention and Conditions | Mean Number of Sessions Attended | Population | Time Since Trauma at Start of Intervention | Severity Criterion | Traumatic Stress Outcome Measures | Randomized (n): Completers (n) | Follow-up Period | Significant Differences |
|-------------------|-----------------------------|---------------------------------|------------|------------------------------------------|-------------------|----------------------------------|-----------------------------|----------------|------------------------|
| Jones et al., 2010 Denmark, Italy, Norway, Portugal, Sweden, UK | Feedback from an (ICU) admissions diary vs. delayed feedback | All randomized patients attended their feedback session | Admission to ICU ≥ 72 hours | Feedback was provided at 1 month post discharge | None | PDS, PTSS-14 | 352: 322 | 3 months post discharge | Diary feedback was better than delayed feedback |
| Kazak et al., 2005 USA | Three 45 min sessions of adapted CBT and family therapy intervention vs treatment as usual | Primary care givers: 2.22 Secondary care givers 2.33 | 38 caregivers and parents of children newly diagnosed with cancer recruited from a children’s hospital oncology service. | Median 6 days, range 0–10 days | None | IES-R | 38: 31 completed available to follow-up | 2 months post treatment | Neutral |
| Lindwall et al., 2014* USA | Three sessions of parent and child targeted psychoeducation, massage, relaxation and guided imagery vs. usual care | Not reported | Parents of children undergoing stem cell or bone marrow transplantation recruited via paediatric stem cell transplantation centres | Unclear, Recruitment occurred prior to transplantation. | None | IES-R | 113: | 24 weeks post admission | Neutral |
| Marchand et al., 2006 Canada | Two 1 hour sessions of adapted critical incident stress debriefing vs a no intervention control group | Not reported | Outpatient victims of armed robbery recruited via a convenience store chain. | 11.21 days | Meet criterion A1 and A2 for PTSD | SCID, IES | 75: 61 available at 1 month follow-up | 1 and 3 months post baseline | Intervention better than adapted CISD initially only |
| Mouthaan et al., 2013 Netherlands | Self-guided CBT based internet intervention vs care as usual | Mean log-ins was 1.7, 77.5% logged in once or more. | Hospitalized severe trauma patients recruited via a trauma centre | 1 week post injury | None | CAPS, IES-R | 300: 231 completed 1 month assessment, 189 completed 3 months assessment | 1, 3, 12 and 12 months post injury | Neutral |
| Nixon, 2012 Australia | Six 90 minute sessions of cognitive processing therapy vs. supportive counselling | Not reported | Mainly self-referring assault victims recruited via advertising, victims support agencies, police, and via general media alerts | Screening occurred within 4 weeks | ASD | CAPS, PDS | 30: 21 | Post-treatment and 6 months | Neutral |
| Nixon et al., 2016 Australia | Six 90 minute sessions of cognitive processing therapy vs. supportive counselling | 3.5 | Rape and sexual assault survivors recruited from a rape and sexual assault crisis centre | Screening occurred within 4 weeks | ASD | CAPS, PCL-S | 49: 32 | Post-treatment, 3, 6 and 12 months | Neutral |

(Continued)
Table 1. (Continued).

| Source and Country | Intervention and Conditions | Mean Number of Sessions Attended | Population | Time Since Trauma at Start of Intervention | Severity Criterion | Traumatic Stress Outcome Measures | Randomized (n): Completers (n) | Follow-up Period | Significant Differences |
|--------------------|-----------------------------|---------------------------------|------------|------------------------------------------|-------------------|-----------------------------------|-----------------------------|-----------------|------------------------|
| O'Donnell et al., 2012 Australia | Up to 10 sessions of CBT based stepped care vs. usual care | 6.3 | MVA and assault recruited from trauma units | Final screening and assessment occurred after 4 weeks | Clinically significant symptoms of PTSD, depression or anxiety | CAPS | 46: 42 | 6 and 12 months post baseline | CBT was better than usual care |
| O'Donnell, Lau, Howard, and Alkenemad et al., n.d. Australia | Up to 10 sessions of telephone CBT vs. usual care. | 6.2 | Trauma unit patients of MVA, accident or assault recruited from trauma services | Final screening and assessment occurred after 4 weeks | Clinically significant mental health problems | CAPS | 61: 54 | 6 and 12 months post injury | Neutral |
| Ost, Paunovic, and Gillow, n.d. Sweden | Sixteen 60 min. sessions of exposure based CBT vs. waiting list | 8.7 | Outpatient victims of violent crime recruited through local psychiatric units and the police | 6.8 weeks | Acute PTSD | CAPS, IES-R | 43: 41 | Post treatment only | CBT-T better than wait list |
| Rothbaum et al., 2012 USA | Three 60 min. sessions of modified prolonged exposure vs. assessment only | 2.61 | Trauma exposed individuals admitted to a hospital emergency department | 72 hours | None | PSS-I, PDS | 137: 102 | 4 and 12 weeks post enrolment | Mixed -CBT-T was better than waiting list for PSS-I scores but not PDS |
| Ryding, Wijma, and Wijma, 1998 Sweden | Two group sessions of counselling and education vs treatment as usual. | Not reported | Women following emergency caesarean section recruited via a hospital obstetrics and gynaecology department | Not clearly stated, a few days after giving birth | None | IES | 106: 100 completed | 6 months post-partum | Neutral |
| Ryding, Wiren, Johansson, Ceder, and Dahlstrom, 2004 Sweden | Two group sessions of counselling and education vs treatment as usual. | Not reported | Women following emergency caesarean section recruited via a hospital obstetrics and gynaecology department | 2 months | None | IES | 162: 147 available at initial follow-up | 6 months post-partum | Neutral |
| Shalev et al., 2012* Israel | Twelve 90 minute sessions of prolonged exposure (PE) vs cognitive therapy (CT) vs waiting list | Not reported | Mainly MVA and acts of terrorism survivors recruited via hospitals emergency services | Recruitment occurred at a mean of 19.8 days after trauma | PTSD or partial PTSD | CAPS, PSS-R | 196: 168 available at initial follow-up | 4 and 9 months post trauma | PE and CT were better than wait list. There was no difference between PE and CT |
| Shapiro and Laub, 2015 Israel | Two 90 minute sessions of EMDR vs delayed treatment | Not reported | Survivors of a missile attack recruited through the community | Screened positive for PTSD and/or depression | IES-R | 17: 17 | Post-treatment | EMDR better than delayed treatment | (Continued) |
| Source and Country | Intervention and Conditions                                                                 | Mean Number of Sessions Attended | Population                                                                 | Time Since Trauma at Start of Intervention | Traumatic Stress Outcome Measures | Randomized (n): Completers (n) | Follow-up Period | Significant Differences |
|--------------------|---------------------------------------------------------------------------------------------|---------------------------------|----------------------------------------------------------------------------|--------------------------------------------|---------------------------------|-----------------------------|----------------|------------------------|
| Shapiro, Laub, and Rosenblat, 2018 Israel | Three 90 minute sessions of EMDR vs delayed treatment                                         | Not reported                     | Treatment seeking individuals exposed to a rocket attack                    | Recruitment began 2–3 months after the incident.                                | PCL-S                           | 25: 24                   | Post-treatment          | EMDR better than delayed treatment |
| Shaw et al., 2013 USA | Six 50 minute sessions of CBT-T vs. usual care                                                | Not reported                     | Mothers of premature infants recruited from neonatal intensive care units   | Baseline assessment was at 1–2 weeks                                            | DTS                             | 105: 98                  | Post-treatment          | CBT-T better than usual care |
| Sijbrandij et al., 2007 Netherlands | Four 2 hour weekly sessions of exposure based CBT vs. waiting list                           | 3.30                             | Outpatient victims of civilian traumatic events referred via the emergency room and trauma unit of an academic medical centre, and by victim support workers, general practitioners, and company doctors | 40 days                                     | SI-PTSD                         | 143: 117                 | 1 week and 4 months post treatment | Neutral |
| Skogstad, Hem, Sandvik, and Ekeberg, 2015 Norway | Up to 6 60 minute sessions of nurse led CBT vs. usual care                                    | Not reported                     | Outpatient victims of trauma recruited from a hospital a trauma referral centre | Before 3 months                                                                | IES                             | 145: 85                  | 3 and 12 months post injury | Neutral |
| Taghizadeh et al., 2008 Iran | Up to 6 weeks of 60 minutes sessions of counselling vs. usual care                             | Not reported                     | Traumatic birth victims recruited via a hospital                             | Within 72 hours                                                                | None                            | 300: number of completers not reported | 4–6 weeks and 3 months post-partum | Neutral at 4–6 weeks, counselling better than usual care at 3 months CBT-T and writing intervention better than wait list |
| van Emmerik, Kamphuis, and Emmelkamp, 2008 Netherlands | Five 90 minute sessions of exposure based CBT, or a writing intervention vs. waiting list condition. | Not reported                     | Outpatients following civilian trauma referred to a university clinical psychology department | Mean of 119.40 days                                                            | ASD, acute PTSD, chronic PTSD   | 125: 85 completed        | No consistent point of long-term follow-up completed | Neutral |
| Wang et al., 2015 China | Eight 40 minutes sessions of group based creative arts using drawing and creative writing vs waiting list | Not reported                     | MVA victims recruited via a hospital emergency department                   | Not clearly stated. Recruitment occurred at 96 hours post injury > 4 weeks     | None                            | CAPS, IES-R               | 52: 46                  | 2, 6 and 12 months post enrolment | Neutral |
| Wagner, Zatzick, Ghesquiere, and Jurkovich, 2007 USA | Up to six 90 min. sessions of behavioural activation and treatment as usual vs. treatment as usual. | 5.75                             | Inpatients following civilian trauma recruited from a medical ward in a trauma centre | None                                                                          | Acute PTSD                      | PCL                         | 8: 8 completed         | Neutral |

(Continued)
| Source and Country | Intervention and Conditions | Mean Number of Sessions Attended | Population | Time Since Trauma at Start of Intervention | Traumatic Stress Outcome Measures | Randomized (n): Completers (n) | Follow-up Period | Significant Differences |
|--------------------|-----------------------------|---------------------------------|------------|------------------------------------------|---------------------------------|--------------------------------|------------------|------------------------|
| Wijesinghe et al., 2015 Sri Lanka | Psychoeducation session + one session CBT vs. psychoeducation only vs. assessment only | Not reported | Snakebite victims recruited via a hospital | At discharge from hospital after antivenom treatment | PSS-SR | 225: 202 | 6 months post discharge | Neutral |
| Wu, Li, and Cho, 2014 Hong Kong | Four 90 minute sessions of CBT-T vs. a self-help booklet | 2.45 | MVA victims recruited through the emergency department of a district medical centre | Baseline assessment at 1 month | IES-R | 60: 37 | 3 and 6 months post MVA | Neutral |
| Zatzick et al., 2001 USA | Collaborative care intervention, including assignment to trauma support specialist vs usual care | 92 minutes of clinical contact | Physically injured hospitalized MVA & assault victims recruited from a hospital trauma centre | Within 1 month | PCL | 34: 26 completed | 1 and 4 months post injury | Neutral |
| Zatzick et al., 2004 USA | Multifaceted collaborative care for PTSD and alcohol abuse vs usual care | 10.7 hours of clinical contact | Physically injured hospitalized MVA & assault victims recruited from a hospital trauma centre | Not clearly stated but soon after admission | PCL | 121: 106 retained at 1 month, 99 retained at 12 months | 1, 3, 6 and 12 months post admission | Neutral |
| Zatzick et al., 2013 USA | Multifaceted collaborative care for PTSD, alcohol abuse and other high risk behaviours vs usual care | Median 13.2 hours of clinical contact | Physically injured hospitalized trauma survivors recruited from a hospital trauma centre | Not clearly stated but soon after discharge | CAPS, PCL | 207: 164 retained at 3 months, 167 retained at 12 months | 1, 3, 6, 9 and 12 months post admission | Collaborative care better than usual care |
| Zatzick et al., 2015 USA | Technology enhanced collaborative care for PTSD, alcohol abuse and other high risk behaviours vs usual care | Median 2.25 hours of clinical contact | Physically injured hospitalized trauma survivors recruited from a hospital trauma centre | Not clearly stated but began during admission | PCL | 121: 108 retained at 1 month, 105 retained at 6 months | 1, 3, and 6 months post admission | Neutral |

*This study included an additional arm where intervention was offered only to the child. Data from this arm are not included.

**This study included two additional arms evaluating Escitalopram and placebo medication. Data for these arms are not included in this table.
Table 2. Summary of meta-analysis of results for interventions.

| Comparison                                                                 | Follow-up (and contributing studies) | Trials (n) | Sample (n) | Relative Risk (95% CI) | Standardized Mean Difference (95% CI) | Grade Rating |
|---------------------------------------------------------------------------|--------------------------------------|------------|------------|------------------------|---------------------------------------|--------------|
| **Interventions within one month for all exposed to the trauma**          |                                      |            |            |                        |                                       |              |
| Brief individual processing therapies vs usual care (PTSD severity)       | Post treatment (Brom et al., 1993; Gamble et al., 2005; Marchand et al., 2006; Rothbaum et al., 2012) | 4          | 465        | 0.04 (−0.34, 0.42)     | Very low                              |              |
| 3–6 months post trauma (Brom et al., 1993; Gamble et al., 2005; Marchand et al., 2006; Rothbaum et al., 2012) | 4          | 466        | −0.07 (−0.25, 0.12) | Very low                              |              |
| Brief individual processing therapies vs usual care (PTSD diagnosis)      | Post treatment (Gamble et al., 2005; Marchand et al., 2006; Rothbaum et al., 2012) | 3          | 262        | 1.10 (0.87, 1.40)      | Very low                              |              |
| 3–6 months post trauma (Gamble et al., 2005; Marchand et al., 2006; Rothbaum et al., 2012) | 3          | 251        | 0.73 (0.44, 1.22) | Very low                              |              |
| Brief dyadic therapy vs usual care (PTSD severity)                        | Post treatment (Brunet et al., 2013; Kazak et al., 2005) | 3          | 103        | −0.41 (−0.81, −0.02)*  | Very low                              |              |
| Brief individual trauma processing therapy vs supportive listening         | Post treatment (Gidron et al., 2001; Gidron et al., 2007) | 2          | 103        | −0.54 (−1.42, 0.34)    | Very low                              |              |
| **Interventions beginning within three months for individuals with traumatic stress symptoms** |                                      |            |            |                        |                                       |              |
| Trauma focused CBT vs waitlist (PTSD severity)                            | Post treatment (Bisson et al., 2004; Bryant et al., 2008; Ehlers et al., 2003; Foa et al., 2006; Öst et al., n.d.; Shalev et al., 2012; Shaw et al., 2013; Sijbrandij et al., 2007; van Emmerik et al., 2008) | 9          | 746        | −0.63 (−0.93, −0.32)*  | Low                                   |              |
| 7–12 months post trauma (Bisson et al., 2004; Foa et al., 2006)           | 2 years post trauma (Shalev et al., 2012) | 8          | 671        | 0.67 (0.47, 0.96)*     | Moderate                              | Moderate     |
| Trauma focused CBT vs waitlist (PTSD diagnosis)                           | Post treatment (Bisson et al., 2004; Bryant et al., 2008; Ehlers et al., 2003; Foa et al., 2006; Öst et al., n.d.; Shalev et al., 2012; Shaw et al., 2013; Sijbrandij et al., 2007; van Emmerik et al., 2008) | 4          | 309        | 0.61 (0.46, 0.82)*     | Low                                   | Very low     |
| 3–6 months post trauma (Ehlers et al., 2003; Foa et al., 2006; Shalev et al., 2012; Shaw et al., 2013; Sijbrandij et al., 2007) | 2          | 213        | −0.25 (−0.52, 0.02)   | Low                                   | Very low     |
| Cognitive therapy vs waitlist (PTSD severity)                             | Post treatment (Bryant et al., 2008; Shalev et al., 2012) | 2          | 172        | −0.68 (−1.00, −0.35)*  | Low                                   |              |
| 3–6 months post trauma (Shalev et al., 2012)                              | 1          | 92         | −0.13 (−0.55, 0.30)  | Very low                              |              |
| 2 years post trauma (Shalev et al., 2012)                                 | 1          | 57         | 0.05 (−0.47, 0.57)   | Very low                              |              |
| Cognitive therapy vs waitlist (PTSD diagnosis)                            | Post treatment (Bryant et al., 2008; Shalev et al., 2012) | 2          | 172        | 0.66 (0.39, 1.12)      | Low                                   |              |
| 3–6 months post trauma (Shalev et al., 2012)                              | 1          | 133        | 0.52 (0.30, 0.89)*   | Very low                              |              |
| 2+ years post trauma (Shalev et al., 2012)                                | 1          | 57         | 1.28 (0.63, 2.59)    | Very low                              |              |
| EMDR vs waitlist (PTSD severity)                                          | Post treatment (Freedman, in press; O'Donnell et al., n.d.) | 4          | 84         | −2.50 (−4.25, −0.75)*  | Very low                              |              |
| Telephone-based CBT-T vs waitlist (PTSD severity)                         | Post treatment (Freedman, in press; O'Donnell et al., n.d.) | 2          | 191        | 0.06 (−0.22, 0.35)     | Low                                   |              |
| 1-month post trauma (O'Donnell et al., 2004)                              | 1          | 61         | 0.28 (−0.32, 0.79)   | Very low                              |              |
| 3–6 months post trauma (O'Donnell et al., 2004)                           | 2          | 328        | −0.05 (−0.27, 0.17)  | Moderate                              |              |
| 3–6 months post trauma (O'Donnell et al., 2012; Zatzick et al., 2013; Zatzick et al., 2015) | 3          | 370        | −0.45 (−0.65, −0.24)* | Moderate                              |              |
| 1-month post trauma (Zatzick et al., 2013; Zatzick et al., 2015)           | 2          | 238        | −0.61 (−1.41, 0.20)  | Low                                   |              |
| Stepped collaborative care vs usual care (PTSD severity)                  | Post treatment (O'Donnell et al., 2012; Zatzick et al., 2013) | 1          | 106        | 0.85 (0.42, 1.69)      | Very low                              |              |
| 3–6 months post trauma (O'Donnell et al., 2012; Zatzick et al., 2013)      | 2          | 144        | 0.42 (0.14, 1.26)    | Very low                              |              |
| 7–12 months post trauma (O'Donnell et al., 2012; Zatzick et al., 2013)     | 2          | 122        | 0.55 (0.28, 1.09)    | Very low                              |              |
| Stepped collaborative care vs usual care (PTSD diagnosis)                 | Post treatment (O'Donnell et al., 2012; Zatzick et al., 2013) | 1          | 106        | 0.85 (0.42, 1.69)      | Very low                              |              |
| 3–6 months post trauma (O'Donnell et al., 2012; Zatzick et al., 2013)      | 2          | 144        | 0.42 (0.14, 1.26)    | Very low                              |              |
| 7–12 months post trauma (O'Donnell et al., 2012; Zatzick et al., 2013)     | 2          | 122        | 0.55 (0.28, 1.09)    | Very low                              |              |

(Continued)
Table 2. (Continued).

| Comparison | Follow-up (and contributing studies) | Trials (n) | Sample (n) | Relative Risk (95% CI) | Standardized Mean Difference (95% CI) | Grade Rating |
|------------|-------------------------------------|------------|------------|------------------------|----------------------------------------|--------------|
| Trauma Focused CBT vs Supportive Counselling (PTSD severity) | Post treatment (Bryant et al., 1998; Bryant et al., 2005; Bryant et al., 1999; Bryant et al., 2003; Foa et al., 2006; Freyh et al., 2010; Nixon, 2012; Nixon et al., 2016) | 8 | 331 | -0.61 (-1.01, -0.22)* | Low |
| | 3–6 months follow-up (Bryant et al., 1998; Bryant et al., 2005; Bryant et al., 1999; Bryant et al., 2003; Foa et al., 2006; Freyh et al., 2010; Nixon, 2012; Nixon et al., 2016) | 2 | 106 | -0.06 (-0.45, 0.32) | Very low |
| | 7–12 months post trauma (Foa et al, 2006; Nixon et al, 2016) | 2 | 94 | -0.72 (-1.16, -0.28)* | Very low |
| Trauma Focused CBT vs Supportive Counselling (PTSD diagnosis) | Post treatment (Bryant et al., 1998; Bryant et al., 2005; Foa et al., 2006; Nixon et al., 2016) | 6 | 281 | 0.61 (0.36, 1.04) | Low |
| | Post treatment (Bryant et al., 1999; Bryant et al., 2003; Foa et al., 2006; Nixon et al., 2016) | 5 | 200 | 0.37 (0.20, 0.67)* | Low |
| | Post treatment (Bryant et al., 1999; Bryant et al., 2003; Foa et al., 2006) | 2 | 170 | 0.68 (0.48, 0.96)* | Very low |
| | 3+ years post trauma (Bryant, Moulds, & Nixon, 2003) | 2+ years post trauma (Bryant et al., 2003) | 2 | 47 | -0.57 (-1.25, 0.11) | Very low |
| | 3–6 months post trauma (Bryant et al., 2008; Shalev et al., 2012) | 2 | 149 | -0.19 (-0.52, 0.14) | Low |
| | 2+ years post trauma (Shalev et al., 2016) | 1 | 60 | -0.02 (-0.53, 0.49) | Low |
| Trauma Focused CBT vs Cognitive Therapy (PTSD severity) | Post treatment (Bryant et al., 2008; Shalev et al., 2012) | 2 | 163 | 0.70 (0.40, 1.22) | Very low |
| | 3–6 months post trauma (Bryant et al., 2008; Shalev et al., 2012) | 2 | 163 | 0.87 (0.38, 1.97) | Low |
| | 2+ years post trauma (Shalev et al., 2016) | 0.60 (0.20, 1.78) | Very low |

Interventions for individuals with stress disorder or post-traumatic stress disorder

| Comparison | Follow-up (and contributing studies) | Trials (n) | Sample (n) | Relative Risk (95% CI) | Standardized Mean Difference (95% CI) | Grade Rating |
|------------|-------------------------------------|------------|------------|------------------------|----------------------------------------|--------------|
| Trauma Focused CBT vs Waitlist (PTSD severity) | Post treatment (Bryant et al., 2008; Ehlers et al., 2003; Öst et al., n.d.; Shalev et al., 2012; Sijbrandij et al., 2007; van Emmerik et al., 2008) | 6 | 387 | -0.89 (-1.23, -0.56)* | Low |
| | 3–6 months post trauma (Ehlers et al., 2003; Shalev et al., 2012) | 2 | 121 | -0.84 (-2.49, 0.80) | Very low |
| | 2 years + (Shalev et al., 2012) | 1 | 67 | 0.03 (-0.45, 0.51) | Very low |
| Trauma Focused CBT vs Waitlist (PTSD diagnosis) | Post treatment (Bryant et al., 2008; Ehlers et al., 2003; Öst et al., n.d.; Shalev et al., 2012; Sijbrandij et al., 2007; van Emmerik et al., 2008) | 6 | 410 | 0.54 (0.35, 0.82)* | Low |
| | 3–6 months post trauma (Ehlers et al., 2003; Shalev et al., 2012) | 2 | 168 | 0.59 (0.40, 0.87) | Very low |
| | 2 years post trauma (Shalev et al., 2012) | 1 | 67 | 0.91 (0.44, 1.90) | Very low |
| Cognitive therapy vs waitlist (PTSD severity) | Post treatment (Bryant et al., 2008; Shalev et al., 2012) | 2 | 172 | -0.68 (-1.00, -0.35)* | Low |
| | 3–6 months post trauma (Shalev et al., 2012) | 1 | 92 | -0.13 (-0.55, 0.30) | Very low |
| | 2 years post trauma (Shalev et al., 2012) | 1 | 57 | 0.05 (-0.47, 0.57) | Very low |
| Cognitive therapy vs waitlist (PTSD diagnosis) | Post treatment (Bryant et al., 2008; Shalev et al., 2012) | 2 | 172 | 0.66 (0.39, 1.12) | Low |
| | 3–6 months post trauma (Shalev et al., 2012) | 1 | 133 | 0.52 (0.30, 0.89)* | Very low |
| | 2+ years post trauma (Shalev et al., 2016) | 1 | 57 | 1.28 (0.63, 2.59) | Very low |
| Trauma Focused CBT vs Supportive Counselling (PTSD severity) | Post treatment (Bryant et al., 1998; Bryant et al., 2005; Bryant et al., 1999; Bryant et al., 2003; Nixon, 2012; Nixon et al., 2016) | 6 | 231 | -0.75 (-1.03, -0.47)* | Low |
| | 3–6 months post trauma (Bryant et al., 1998; Bryant et al., 2005; Bryant et al., 1999; Bryant et al., 2003; Nixon, 2012; Nixon et al., 2016) | 1 | 46 | -0.38 (-0.96, 0.21) | Very low |
| | 7–12 months post trauma (Nixon et al., 2016) | 2 | 94 | -0.72 (-1.16, -0.28)* | Very low |
| | 2+ years post trauma (Bryant et al., 2003; Bryant et al., 2006) | 7–12 months post trauma (Nixon et al., 2016) | Very low |

(Continued)
Table 2. (Continued).

| Comparison | Relative Risk (95% CI) | Standardized Mean Difference (95% CI) | Grade Rating |
|------------|------------------------|--------------------------------------|--------------|
| Trauma Focused CBT vs Cognitive Therapy (PTSD diagnosis) | | | |
| | | | |
| 3–6 months post trauma (Bryant et al., 1998) | 0.19 (0.52, 0.14) | Low | Very low |
| | | | |
| 3–6 months post trauma (Bryant et al., 2003) | 0.70 (0.40, 1.22) | 0.87 (0.38, 1.97) | Very low |
| | | | |
| 3–6 months post trauma (Bryant et al., 2005) | 0.67 (0.27, 1.22) | Low | Very low |
| | | | |
| 3–6 months post trauma (Shalev et al., 2008) | 0.15 (0.03, 0.67) | Low | Very low |
| | | | |
| 3–6 months post trauma (Shalev et al., 2012) | 0.60 (0.20, 1.78) | Low | Very low |

Relative risk = odds of diagnosis of PTSD. 1 = same as control, < 1 = intervention better, > 1 = control better.

Standardized mean difference = continuous PTSD symptom score, if SMD = 0 there is no difference between the intervention and the control. < 0 = intervention better, > 0 = control better. *Statistically significant difference at p < 0.05 level.

Ryding et al., 1998, 2004; Wang et al., 2015; Wijesinghe et al., 2015; Zatzick et al., 2001) evaluated brief psychological interventions aimed at preventing PTSD in individuals exposed to a specific traumatic event. All started within one month of the trauma. Seven studies (Brom et al., 1993; Gamble et al., 2005; Gidron et al., 2001, 2007; Marchand et al., 2006; Rothbaum et al., 2012; Ryding et al., 1998) used an approach which we grouped as ‘brief individual trauma processing’. These studies evaluated a number of brief therapies that were theoretically diverse but shared similar core treatment components. These included: psychoeducation and therapist directed reliving of the index trauma to promote elaboration of the trauma memory and help to contextualize or reframe aspects of the experience. We found no statistical difference between brief individual trauma processing approaches and usual care or a supportive listening control intervention at any time point (see Figure 2). We did find evidence to support the use of brief CBT based dyadic therapy over treatment as usual, at 3 months (Brunet et al., 2013; Kazak et al., 2005) but this effect was not judged clinically important. A single study showed a significant difference in PTSD severity for self-guided internet-based intervention over treatment as usual (Mouthaan et al., 2013) at 1 month (N = 300; SMD −0.38 CI −0.61 to −0.15; GRADE low) and 3–6 months post trauma (N = 300; SMD −0.27 CI −0.50 to −0.04; GRADE low) but not at 7–12 months (N = 300 SMD 0.00 CI −0.23 to 0.23; GRADE low). These effects were not judged clinically important. One single study showed no significant difference for intensive care diaries over delayed access to intensive care diaries at 3–6 months but did show a significant difference for PTSD diagnosis (N = 322; RR 0.38 CI 0.17 to 0.82; GRADE low). Another single study evaluating telephone-based CBT following cardioverter defibrillator transplant (Irvine et al., 2011) found no difference to usual care at 3–6 months but there was a difference at 7–12 months (N = 185; SMD −0.38 CI −0.67 to −0.09; GRADE low). This effect was not judged clinically important.

No differences were found for group counselling (Ryding et al., 2004), a three step parenting intervention following premature birth (Borghini et al., 2014), brief interpersonal counselling (Holmes et al., 2007), communication facilitator in an intensive care setting (Curtis et al., 2016), supported psychoeducation (Als et al., 2015), a nurse led intensive care recovery program (Jensen et al., 2016), or collaborative care (Zatzick et al., 2001). Six studies did not provide data that we were able to interrogate because data were not adequately reported in study papers and we were unable to obtain additional data from study authors (Andre et al., 1997; Biggs et al., 2016; Lindwall et al., 2014; Taghizadeh et al., 2008; Wang et al., 2015; Wijesinghe et al., 2015). Of these, one study (Taghizadeh et al., 2008) reported a difference in PTSD severity for counselling at 3–6 months over usual care (N = 300) for women who had experienced a traumatic
birth. Positive findings were not reported for PTSD outcomes in other studies.

3.1.2. Studies offering intervention to individuals with traumatic stress symptoms within three months of a traumatic event

Thirty-four studies (Ben-Zion et al., 2018; Bisson et al., 2004; Bryant et al., 1998, 1999, 2003, 2005, 2008; Bugg et al., 2009; Cernvall et al., 2015; Echeburua et al., 1996; Ehlers et al., 2003; Foa et al., 2006; Freedman, n.d., in press; Freyth et al., 2010; Jarero et al., 2011, 2015; Nixon, 2012; Nixon et al., 2016; O’Donnell et al., n.d., 2012; Öst et al., n.d.; Shalev et al., 2012; Shapiro & Laub, 2015; Shapiro et al., 2018; Shaw et al., 2013; Sijbrandij et al., 2007; Skogstad et al., 2015; van Emmerik et al., 2008; Wagner et al., 2007; Wu et al., 2014; Zatzick et al., 2004, 2013, 2015) evaluated interventions for individuals with traumatic stress symptoms beginning within three months of a traumatic event. Statistically significant differences were found in favour of CBT-T over wait list and supportive counselling at initial follow-up for PTSD severity (see Figure 3). Findings for both comparisons were judged to be clinically important. Follow-up data were incomplete but statistically significant differences

Figure 2. Forest plot of PTSD severity, post treatment for studies offering intervention to individuals involved in a traumatic event irrespective of their symptoms.

Figure 3. Forest plot of PTSD severity, post treatment for studies of interventions begun within three months with the aim of preventing PTSD or ongoing distress in individuals with traumatic stress symptoms.
were present at several time points. A post hoc subgroup analysis suggested that effects were largest for interventions of 12 or more sessions (K = 3; N = 181; SMD −1.11 CI-1.62, −0.61) when compared against wait list. Statistically significant differences for PTSD severity were also found for cognitive therapy without exposure and EMDR over wait list at initial follow-up. One single study (van Emmerik et al., 2008) showed a significant difference for structured writing therapy over wait list (N = 45; SMD −0.97 CI −1.59, −0.35; GRADE very low) but there was no difference when compared against psychoeducation only (Bugg et al., 2009) in another single study. Another single study (Cernvall et al., 2015) showed a significant difference for internet-based guided self-help over wait list (N = 58; SMD −0.66 CI −1.19, −0.13: GRADE very low). Findings for cognitive therapy and EMDR were judged as clinically important. No significant differences were found between telephone based CBT-T and wait list or, from single studies of behavioural activation (Wagner et al., 2007) and internet-based virtual reality therapy over wait list (Freedman, n.d.). No difference was found between computerized neurobehavioral training and a reading-based control condition (Ben-Zion et al., 2018). We found a significant effect for collaborative care over wait list at 3–6 months post-trauma but there was no effect at 1 month or 7–12 months. These effects were not judged clinically important. In head to head comparisons we found no difference between CBT-T and self-help or trauma focused CBT and cognitive therapy.

3.1.3. Studies offering intervention to individuals with a diagnosis of acute stress disorder or PTSD

Fourteen studies (Bryant et al., 1998, 1999, 2003, 2005, 2008; Echeburua et al., 1996; Ehlers et al., 2003; Nixon, 2012; Nixon et al., 2016; Öst et al., n.d.; Shalev et al., 2012; Sijbrandij et al., 2007; van Emmerik et al., 2008; Wagner et al., 2007) offered interventions to individuals with a diagnosis of acute stress disorder or PTSD, within three months of the traumatic event. Statistically significant differences were found in favour of CBT-T over a wait list control group and supportive counselling post treatment. Follow-up data were incomplete but statistically significant differences were present at some follow-up time points. There was also a significant difference in favour of cognitive therapy over waitlist. There was no difference in head to head comparison between CBT-T and cognitive therapy.

3.2. Methodological quality of included studies

Risk of bias judgements for individual studies are shown in Table S2 (see online supplement). Thirty-six studies adequately described a method of allocation judged to make no bias possible. Five studies were considered to be at high risk of bias. Reporting of adequate concealment procedures was present in 25 studies, with six studies considered to be at high risk of bias. Adequate blinding of the assessor of outcome measures was present in 42 studies, with 4 studies considered to be at high risk. Incomplete outcome data was considered low risk in 26 studies, with a further 22 studies judged to be at high risk of bias. Twelve studies, all published since 2010, were judged low risk for selective reporting. The majority of other studies were of unclear risk, with three studies being judged at high risk. Forty studies were judged at high risk for other bias. Reasons for possible other bias included author affiliation with one of the interventions being tested, small sample size, use of measures with inadequate validation, non-manualized intervention and poor treatment adherence. No risk of bias was indicated in only eight studies. There were insufficient studies in any of the meta-analyses to allow us to investigate for potential publication bias by preparing funnel plots.

To determine the impact of quality on outcome we undertook a sensitivity analysis for allocation concealment. Four studies with low risk of bias for allocation concealment evaluating CBT-T versus wait list were included in a sensitivity analysis. We compared the effect size and confidence intervals from this analysis with that of the full analysis to identify possible differences. There was little differences to the estimated effect size (N = 367, SMD −0.61 CI −1.05, −0.17) from that of the original analysis (N = 746, SMD −0.93, −0.32). We were unable to repeat this sensitivity analysis for CBT-T versus supportive counselling as no study was rated low risk of bias for allocation concealment.

4. Discussion

4.1. Main findings

There was little evidence that most multiple session intervention aimed at everyone, irrespective of their symptoms, following a traumatic event were effective. Where there was evidence of significant effects, these effects were judged as not being clinically important on our primary outcome measure.

CBT-T, cognitive therapy without exposure, EMDR, structured writing therapy and internet-based guided self-help all did significantly better than waitlist/usual care at reducing traumatic stress symptoms in individuals who were symptomatic at entry into the study. Findings for CBT-T, EMDR and cognitive therapy without exposure were judged as clinically important. CBT-T was the most frequently evaluated approach but EMDR showed the largest effects with positive findings from four small studies. Findings in relation to structured writing therapy and internet-based guided self-help were from single small studies. CBT-T was the only
approach to be thoroughly evaluated against an active control, with evidence of significant and clinically important effects in relation to supportive counselling. Only CBT-T and cognitive therapy were evaluated for individuals who were diagnosed with acute stress disorder or PTSD and the magnitude of effect was larger for these individuals. Evidence of the benefits of CBT-T for symptomatic individuals who did not meet full diagnostic criteria for these conditions was weaker. Although intervention in many of the positive trials included in this review began more than a month after the trauma, there was evidence of the benefit of both CBT-T and EMDR being offered within 2–4 weeks from a number of trials (Bryant et al., 1998, 1999, 2003, 2005, 2008; Jarero et al., 2011, 2015), suggesting that it is appropriate to offer early intervention, when indicated within this acute phase. With the exception of one study evaluating cognitive therapy based on the Ehlers & Clarke model (Ehlers et al., 2003), the majority of positive trials of CBT-T were based on adapted versions of prolonged exposure. Several well-controlled studies evaluated a collaborative/stepped care approach for individuals with traumatic stress symptoms beginning within three months of a traumatic event. In meta-analysis there was evidence of an effect at 3–6 months; findings were not judged clinically important. The GRADE ratings for most meta-analyses was low to very low suggesting that further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate, for findings rated low and findings should be considered uncertain for findings rated very low. There was considerable variability in the timing and collection of medium and long-term follow-up data which made it difficult to draw firm conclusions about the maintenance of effects over time. Although there was some inconsistent evidence of long-term benefit for CBT-T.

4.2. Heterogeneity

There was evidence of both clinical and statistical heterogeneity in the included studies. There were significant differences in the clinical populations across the included studies, especially with regards to the nature of trauma exposure and the psychiatric and physical severity of symptoms on entry into the studies. Of note, participants in some studies had experienced serious and life threatening medical conditions associated with a chronic illness and it is likely that intervention outcomes in these studies would be influenced by the degree and pace of physical recovery and enduring health problems (e.g. Cox et al., 2018; Irvine et al., 2011; Jensen et al., 2016; Jones et al., 2010). Studies also differed in the methodologies that they used, for example with regard to sources of recruitment and inclusion and exclusion criteria.

Although all the trials attempted to reduce traumatic stress symptoms, the nature of the interventions and target populations were diverse. This was partially dealt with by separating interventions into predetermined groups for studies offering intervention to individuals with traumatic stress symptoms within three months of a traumatic event and studies offering intervention to individuals with a diagnosis of acute stress disorder or PTSD, although some interventions did not fit with these pre-planned groups and this resulted in some unplanned categorizations. We attempted to group studies in a clinically meaningful way with regards to the intervention and the clinical populations included but recognize that this is not empirically based and would have contributed to heterogeneity. This should be borne in mind when interpreting our findings (Borenstein, Hedges, Higgins, & Rothstein, 2009). Some interventions and populations were so dissimilar that it was meaningless to group them at all, particularly for studies evaluating interventions aimed at any individual, regardless of symptoms.

As in our previous review (Roberts et al., 2009), there were more studies evaluating CBT-T than other interventions. Most CBT-T studies were based on a prolonged exposure paradigm, but the specific CBT-T interventions varied in their use of imaginal exposure, in-vivo exposure and cognitive techniques. Two studies were based on a cognitive processing therapy paradigm (Nixon, 2012; Nixon et al., 2016) and showed no effect when compared against supportive counselling. The total number of hours of intervention provided varied from around two hours to around 16 hours. A post hoc sub-group analysis suggested the effects were larger for studies offering more sessions of CBT-T. However, the largest treatment effect that we observed was for brief EMDR which at 2–4½ hours were amongst the shortest interventions that were included.

4.3. Methodological quality

The overall quality of the studies was varied. Using the Cochrane risk of bias criteria, the proportion of studies describing appropriate randomization, allocation concealment and blinding of assessors was higher than in our previous review. It is possible that other included studies also used appropriate randomization and allocation concealment procedures but reporting of these procedures was sometimes limited. The proportion of studies with low risk for incomplete outcome data was low (43%), suggesting that many studies had difficulties with retention. Pre-registration of trial protocols was an emerging issue at the time of our previous review and none of the studies previously included provided a pre-publication protocol. Only a third of the newly included studies provided pre-registered
study protocols and reported outcomes consistent with these protocols. Few studies were free of other biases. These biases included author affiliation with one of the interventions being tested, small sample size, use of measures with inadequate validation, non-manualized intervention and poor treatment adherence.

Many of the included studies had some methodological limitations. However, a sensitivity analysis of higher quality studies based on allocation concealment made little difference to the estimated effect of CBT-T. This suggests that study quality did not have a major effect in elevating apparent efficacy in this key comparison; although we could not undertake similar sensitivity analyses in other smaller comparisons. There is evidence that smaller studies can exaggerate intervention effects as they tend not to be conducted with the same methodological rigour as larger trials (Higgins & Green, 2011). Many of the trials in this review were small and this needs to be borne in mind when considering the large effects of some of our findings. For example, the large effect in favour of EMDR over waiting list was a result of 4 trials with a total of 84 participants.

Four studies evaluated a collaborative/stepped care approach (O'Donnell et al., 2012; Zatzick et al., 2004, 2013, 2015). The specific collaborative care models differed across these studies, with intervention potentially ongoing to 12 months in some trials. Intervention effects in one smaller study (O’Donnell et al., 2012) were noticeably larger than for the other studies. This study differed from the other studies in that participants were screened for elevated symptoms on two occasions which meant that only participants who demonstrated high symptom severity were randomized and then offered a menu of interventions. The other studies allocated patients at an earlier time point and it is likely that some patients would have experienced natural recovery. Whilst effects across these studies was small, it has been argued that collaborative care based approaches can have a larger population impact than early interventions such as CBT-T, when intervention reach is taken into account (Giummarra et al., 2018; Zatzick, Koepsell, & Rivara, 2009).

There was only very limited reporting of adverse events. Where adverse events were reported, this was mainly in trials where there was a high risk of mortality in included participants, resulting from chronic illnesses (e.g. Irvine et al., 2011-Jones et al., 2010). We did not see evidence of significant differences in rates of dropout between intervention and control conditions, which continues to suggest that adverse effects were not common. Despite our previous recommendation there was an absence of tolerability assessment, evaluating the acceptability of interventions, in new studies. We were unable to investigate for publication bias. Many of the studies reported in this review did report null results and we enquired about non-published studies that had registered a study protocol. However, we cannot exclude the possibility that some of our findings may have been influenced by some non-reporting of negative findings.

4.4. Implications for practice

Consistent with our previous review, the current findings suggest that psychological intervention offered to all individuals exposed to a traumatic event irrespective of their symptoms cannot be recommended for routine use following traumatic events. Several interventions – CBT-T, cognitive therapy without exposure, EMDR, structured writing therapy, and internet-based guided self-help – provided evidence of efficacy in reducing traumatic stress symptoms, when targeted at symptomatic individuals. Evidence was strongest for CBT-T and for those who fulfilled the diagnostic criteria for acute stress disorder or PTSD. We believe that this evidence is now sufficiently strong to recommend the provision of CBT-T, cognitive therapy or brief EMDR to individuals who are symptomatic following exposure to a traumatic event, as was recommended in the recent ISTSS PTSD Treatment Guidelines (International Society for Traumatic Stress Studies, 2018). However, we note that the National Institution for Health and Care Excellence had access to the same evidence base but only felt able to recommend CBT-T (National Institute for Health and Care Excellence, 2018). We also note that positive studies were mainly those including victims of accidental physical injury, such as industrial accidents and motor vehicle accidents; physical assault/violent crime; and terrorism. Only one small positive trial was undertaken following a natural disaster (Jarero et al., 2011). We did not identify any positive studies that were carried out with military personnel and studies conducted mainly or solely with victims of rape and sexual assault were not positive (Echeburua et al., 1996; Foa et al., 2006). This needs to be borne in mind when considering the generalizability of these findings.

Whilst no intervention aimed at all individuals exposed to a traumatic event provided clinically important findings for a reduction in traumatic symptoms, small significant differences were observed for brief CBT based dyadic therapy, self-guided internet-based intervention and intensive care diaries at 3–6 months. Given that many individuals experience improvement in traumatic stress symptoms without the need for intervention, it is possible that that these interventions may demonstrate a greater effect if targeted at symptomatic individuals. This should be examined further.
Findings from this review provide a strengthening case for early routine detection and assessment of individuals exposed to traumatic events and the provision of early psychological intervention when needed, although optimal models of care require further exploration. This is consistent with recent work which suggests that early structured clinician based PTSD assessment using the Clinician Administered PTSD Scale can predict the likelihood of developing long-term PTSD with a high degree of accuracy, across a number of different cultures (Shalev et al., 2019). Arguably, routine use of detection-based approaches would help to reduce the incidence of chronic disorders and associated secondary problems discussed earlier (McFarlane, 2010). Self-guided (Mouthaan et al., 2013) and guided self-help (Cernvall et al., 2015) potentially offer a flexible and cost-effective means of increasing availability of intervention and should be investigated further.

This review did not focus on the use of pharmacological early interventions. Other work that we have undertaken for the ISTSS Treatment Guidelines suggests that the evidence for such interventions is currently very limited (Astill-Wright et al., in press; International Society for Traumatic Stress Studies, 2018). However, we recognize that medication may still have a role in holistic patient care, when indicated, following trauma exposure.

4.5. Implications for research

Several interventions included in this review showed promising outcomes but have not been thoroughly evaluated in well-designed RCTs, with long-term follow-up. EMDR, cognitive therapy and structured writing therapy all require further evaluation and may benefit from head to head comparison with an evaluated CBT-T based intervention. A number of other interventions included in this review, such as behavioural activation (Wagner et al., 2007), have also not been adequately investigated and would benefit from further investigation. Optimal length of early intervention should also be explored further, given our finding that effects were larger for 12 or more sessions of CBT-T. Future reviews should consider whether the literature is sufficiently developed to evaluate CBT-T based interventions by treatment model. New technologies have the potential to increase the range of options and modes of delivery of early psychological interventions. We included several studies investigating these approaches in this review (e.g. Ben-Zion et al., 2018; Freedman, n.d.). Development and evaluation of these approaches are in their infancy but they potentially offer new ways of preventing and ameliorating early symptoms. A further limitation of this review is that we only focused on the prevention and early treatment of PTSD. Future studies and reviews should also focus on the prevention of other common mental health problems such as depression and anxiety disorders following from trauma.

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Disclosure statement

Jonathan Bisson has published one RCT that was included in the review. The other authors report no competing interests. Neil Roberts, Neil Kitchiner, Catrin Lewis and Jonathan Bisson have all been involved in the development of an internet based guided self-help intervention for PTSD called SPRING and may receive future profits if the intervention is monetized.

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