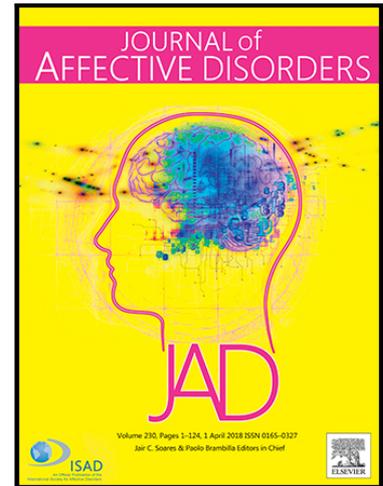


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A systematic review and meta-analysis of group treatments for adults with symptoms associated with complex post-traumatic stress disorder

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Highlights

- The efficacy of group interventions for symptoms associated with interpersonal trauma was explored.
- Trauma memory processing (TMP) was significantly more effective than usual care.
- Direct comparisons with non-trauma informed group treatments were not conclusive
- Direct comparisons between TMP and psychoeducation were not conclusive.
- Indirect comparisons suggest 'Psychoeducation Plus' treatments increase efficacy.

ACCEPTED MANUSCRIPT

A systematic review and meta-analysis of group treatments for adults with symptoms associated with complex post-traumatic stress disorder

Running head

Group treatments for complex interpersonal trauma

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Abstract

Background: No previous meta-analyses have specifically investigated the effectiveness of psychological group therapy for symptoms associated with complex interpersonal trauma, including whether trauma memory processing (TMP) therapies are superior to psychoeducational approaches alone. **Methods:** A systematic review identified 36 randomised control trials (RCTs) which were included in the meta-analysis. **Results:** Large significant effect sizes were evident for TMP interventions when compared to usual care for three outcome domains including: PTSD ($k=6$, $g=-0.98$, 95% CI -1.53, -0.43), Depression ($k=7$, $g=-1.12$, 95% CI -2.01, -0.23) and Psychological Distress ($k=6$, $g=-0.98$, 95% CI 1.66, -0.40). When TMP and psychoeducation interventions were directly compared, results indicated a small non-significant effect in favour of the former for PTSD symptoms, ($k=4$, $g=-0.34$, 95% CI -1.05, 0.36) and small non-significant effect sizes in favour of the latter for Depression ($k=3$, $g=0.29$, 95% CI -0.83, 1.4) and Psychological Distress ($k=6$, $g=0.19$, 95% CI -0.34, 0.71). **Limitations:** Heterogeneity and a limited number of high quality RCTs, particularly in the Substance Misuse and Dissociation domains, resulted in uncertainty regarding meta-analytical estimates and subsequent conclusions. **Conclusions:** Results suggest that TMP interventions are useful for traumatic stress whereas non-TMP interventions can be useful for symptoms of general distress (e.g. anxiety and depression). Thus, both TMP and psychoeducation can be useful for the treatment of complex interpersonal trauma symptoms and further research should unravel appropriate sequencing and dose of these interventions.

Key words: complex trauma; PTSD; meta-analysis; group treatment; abuse

Introduction

Post-traumatic stress disorder and complex post-traumatic stress disorder

Interpersonal violence refers to the traumatic events associated with emotional, sexual and physical abuse, neglect as well as other forms of intimate partner violence, and the atrocities committed in war, torture and exploitation. Emerging evidence has indicated that exposure to interpersonal violence, particularly during key developmental stages as well as repeated victimisation, frequently results in psychological distress that can have profound consequences throughout an individual's life (Courtois & Ford, 2013; Enlow, Egeland, Blood, Wright & Wright, 2013; Mauritz, Goossens, Draijer & van Achterberg, 2013). Indeed, the more frequent and numerous, the more complex and potentially disabling such experiences can be for an individual's social, psychological and interpersonal functioning (Felitti et al, 1998; Herman, 1992; Karatzias, Shevlin, Fyvie, Hyland, Efthymiadou, Wilson, Roberts, Bisson, Brewin, Cloitre, 2016; Wolff, Frueh, Shi, Gerardi, Fabrikant, & Schuman, 2011).

Across various clinical populations, histories of interpersonal violence and its negative psychological sequelae have long been recognised as having a profound impact on survivor's lives (Loewenstein & Brand, 2014, Herman, 1992, van der Kolk & van der Hart, 1989). The development of maladaptive coping strategies for these difficulties often includes a range of destructive behaviours such as substance misuse, self-harm and risk taking such as unsafe sexual practices and involvement in abusive relationships (e.g. Howard, Karatzias, Power & Mahoney, 2017; Saxena, Grella, & Messina, 2015). As such, not only do such behaviours prevent the appropriate processing of traumatic experiences through avoidance and numbing but they also lead to potential further traumatisation and an exacerbation of such difficulties (Courtois & Dord, 2013).

The recently published ICD-11 has formally recognised 'complex post-traumatic stress disorder' (CPTSD) as a disorder that can arise from chronic and often inescapable interpersonal violence (Cloitre, Garvert, Brewin, Bryant, & Maercker, 2011; Karatzias, Shevlin, Fyvie, Hyland, Efthymiadou, Wilson, Roberts, Bisson, Brewin, Cloitre, 2016). In this respect, CPTSD has been conceptualised as the core symptoms of PTSD plus 'disturbances in self-organisation', involving affect dysregulation, negative self-concept and disturbances in relationships (Maercker, Brewin, Bryant, Cloitre, van Ommeren, Jones, et al., 2013). The evidence suggests CPTSD may involve a distinct symptom profile, including symptom clusters associated with PTSD along with high levels of depression, psychological distress, dissociation and substance misuse (Brewin, Cloitre, Hyland, Shevlin, et al, 2017; Loewenstein & Brand, 2014; Mauritz, Goossens, Draijer & van Achterberg, 2013). It is therefore important to clearly evaluate the efficacy of PTSD interventions that have been offered to clinical

populations where there is high prevalence of CPTSD symptoms (Dorrepaal, Thomaes, Hoogendoorn, Veltman, Draijer, & van Balkom, 2014).

Phase based vs non-phase based interventions

A number of authors have advocated that trauma-focused treatments should be phase based in their application for CPTSD symptoms (Courtois & Ford, 2016; Cloitre, Koenen, Cohen, & Han, 2002; Bohus, Dyer, Priebe, Krüger, Kleindienst, Schmahl, et al, 2013; Herman, 1992). Efforts have been made to avoid symptom exacerbation through trauma memory exposure and instead psychoeducational interventions have been offered at the beginning of therapy (i.e. phase 1) and often focus on safety planning, coping, anxiety management or interpersonal difficulties (Dorrepaal et al., 2010; Zlotnick et al., 1997; Krupnick et al., 2008). Such interventions are inherently present focused, however, they can vary in terms of the focus that they bring towards managing or ameliorating symptoms (Dorrepaal, Thomaes, Smit, van Balkom, Veltman, Hoogendoorn & Draijer, 2012; Karatzias, Ferguson, Chouliara, Gullone, Cosgrove & Douglas, 2012) or specific clusters of symptoms (Falsetti, Resnick & Davis, 2008; Krakow, Hollifield, Johnston et al, 2001). In general, group based stabilisation interventions have tended to be brief and psychoeducational in their approach (Pelekis & Dahl, 2005). Indeed, such interventions have tended to be much briefer than the 6 month generally regarded as reasonable for this phase (Cloitre, Courtois, Ford, Green, Alexander, Briere et al, 2012).

In a recent review, de Jongh et al (2016) argued that the evidence for a special stabilization phase is weak. Therefore, there has been some scepticism as to whether phase 1 interventions achieve greater levels of symptom and behavioural stabilisation as opposed to phase 2 interventions that are more orientated towards trauma memory processing (TMP). Despite this, recent head-to-head trials have also questioned whether TMP treatments are necessarily more efficacious than phase 1 or 'non-trauma focused' interventions (Foa, McLean, Zang et al, 2018). As such, questions still exist as to whether a phased based approach or a general compassionate and therapeutic response might help survivors make more substantive progress in addressing symptoms and disorders resulting from interpersonal violence (Hoge & Chard, 2018).

Group versus individual treatment modalities

There is also considerable ambivalence and indeed disagreement about the benefits and treatment efficacy that might be derived from group based interventions for complex trauma. Several meta-analyses have reported that the largest reductions in PTSD symptoms is achieved through individual trauma-focused treatments (Ehring et al, 2014; Taylor & Harvey, 2010; Watts et al, 2013).

Historically, those advocating for the benefits of group based treatments have relied on clinical experience and theory (Fritch & Lynch, 2008; Herman, 1992; p. 214). It is thought that group approaches help to normalise symptoms, counteract isolation, provide peer support and observational learning, and ameliorate important shame based cognitions (Burlingame, Fuhriman & Mosier, 2003; Dorrepaal et al., 2010; Herman, 1992; Mendelsohn, Herman, Schatzow, Coco, Kallivayalil, & Levitan, 2011; Mendelsohn, Zachary, and Harney, 2007; McCrone, Weeramanthri, Knapp, Rushton, Trowell, Miles & Kolvin, 2005; Shea, McDevitt-Murphy, Ready, Schnurr, 2009; Zlotnick et al., 1997).

Short-term group psychotherapy has been a major treatment modality offered to people suffering from the psychopathology associated with complex interpersonal trauma such as child sexual abuse (Pelekis & Dahl, 2005). The potential of group based trauma-focused treatments to be an effective response to potentially large populations of survivors is an important consideration (Wolff, Huening, Shi, Frueh, Hoover & McHugo, 2015). However, along with these potential benefits come the challenges of implementing processes that maintain treatment replicability and fidelity (Najavitis & Hien, 2013). The aim of this review is therefore to produce a synthesis of the current evidence relating to the efficacy of group interventions, as a distinct treatment modality, for survivors of interpersonal trauma. Synthesising treatment outcomes according to a phase based approach may also help to develop a more nuanced understand of this modality's effectiveness across a range of symptoms.

Previous meta-analysis

To date a number of meta-analyses and systematic reviews have investigated the efficacy of PTSD treatments in general (Barrera et al, 2013; Bisson & Andrews, 2005, 2007; Bisson, Ehlers, Matthews, Pilling, Richards & Turner, 2007; Bisson, Roberts, Andrew, Cooper, & Lewis, 2013; Callahan et al 2004; DeJong & Gorey, 1996; Ehring et al, 2014; Pelekis & Dahl, 2005; Lenz, Haktanir & Callender, 2016; Roberts et al, 2015; Sloan et al, 2013; Taylor & Harvey, 2009; Taylor & Harvey 2010; Watts et al, 2013). In Bisson et al (2013) extensive review of psychological therapies for 'chronic' PTSD, 70 RCT studies were identified; this included 10 group based studies of which only one study was categorised as having a group non-Trauma Focused Cognitive Behavioural Therapy (non-TFCBT) arm. Bisson et al (2013) concluded that group TFCBT was superior to waitlist/usual care control conditions but that this was not the case for group non-TFCBT. Other meta-analyses have also highlighted that survivors with CPTSD symptoms, may present specific challenges to PTSD treatments (Dorrepaal et al, 2014; Greger, Munder & Bath, 2014), however, Torchalla, Nosen, Rostam & Allen (2012) also

demonstrated that individuals with concurrent substance misuse disorder and PTSD responded equally well to both integrated and non-integrated treatments.

Sloan et al (2013) and Barrera et al (2013) are currently the only meta-analytic reviews that have focused exclusively on the efficacy of group treatments for PTSD. However, Barrera et al (2013) was specifically limited to CBT group treatments ($n=12$). Given the preponderance of CBT studies within the PTSD treatment literature, there are of course similarities between this review and Sloan et al (2013) who identified 16 studies. Both reviews concluded that group treatments lead to large and significant pre-post treatment reduction in PTSD symptoms. However, Sloan et al (2013) concluded that there was no relative superiority for group treatments when compared to active treatment controls ($d=.09$, 95% CI [-.03, .22]). Nevertheless, group treatments were better than waiting list (WL) control comparisons ($d=.56$, 95% CI [.31, .82]). Barrera et al (2013) did not undertake an analysis according to the type of control used and reported that there were no significant differences in effect sizes between group treatments that included both in-group exposure and those that did not. Recent, meta-analyses have computed large effect sizes when individual trauma-focused (i.e. TMP) treatments are compared against minimal or no treatment arms. However, small or marginal effect sizes have been obtained when compared to other, non-trauma-focused active interventions, which has led to the efficacy of TMP treatments being questioned (Erford, Gunther, Duncan, Bardhoshi, Dummett, Kraft, Deferio, Falco & Ross, 2016; Lenz, Haktanir & Callender, 2017). Such comparisons have never been made in group therapies.

Although there is considerable evidence for the treatment of PTSD there has been no meta-analysis of the efficacy of the group based interventions for complex interpersonal trauma symptoms in the outcome domains of PTSD, Depression, Psychological Distress, Substance Misuse and Dissociation. Symptoms associated with these conditions are commonly reported in people with interpersonal trauma. Furthermore, no previous meta-analyses of interventions for complex interpersonal trauma have considered whether phase 1 interventions (i.e. psychoeducational approaches), as characterised by high levels of psychoeducation and stabilisation, are more effective than phase 2 approaches, which include TMP protocols.

Aims and hypothesis

The aim of this current systematic review and meta-analysis is to investigate previously unaddressed questions in the developing literature for group based treatments for populations with complex traumatisation. The following questions were considered across a range of common outcomes, including PTSD, depression, psychological distress, substance misuse and dissociation.

1. Are group based trauma interventions more effective than usual care?
2. Are group based trauma interventions more effective than other non-trauma group based treatments?
3. Are psychoeducational treatments more effective than usual care?
4. Are psychoeducational groups of greater intensity more effective than usual care?
5. Are TMP group treatments more effective than usual care?
6. Are TMP group treatments more effective than psychoeducational group treatments?

1. Method

1.1. Search and inclusion criteria

Search protocols were constructed with support from a senior healthcare research librarian and are detailed in the supplement. Inclusion criteria focused on identifying randomised clinical trials (RCT) of psychological interventions for people with histories of complex interpersonal trauma. The screening of articles not considered relevant to the literature review and the selection process is shown in Figure 1. Studies that focused exclusively on veteran populations were excluded to ensure that the primary focus was on participants with histories of interpersonal trauma and abuse.

A comprehensive search of relevant bibliographic databases included: Cochrane Database of Systematic Reviews, EMBASE, MedLine, PsychINFO, Social Services Abstracts, Sociological Abstracts, Web of Knowledge (including Science Citation Index and Social Science Citation Index), World Health Organisation ICTRP, CINAHL and Pubmed. This search process was undertaken in December 2016 and included all relevant available studies up until that date. The reference lists of earlier meta-analyses and systematic reviews were also screened for additional studies (Barrera et al, 2013; Bisson et al., 2007; Bradley et al., 2005; Taylor & Harvey, 2010; Sloan et al, 2013; Ehring et al 2014). As illustrated in Figure 1, n= 5476 studies were identified and screened, and 36 studies were included.

FIGURE ONE ABOUT HERE

1.2. Data extraction and categorisation

Interventions were classified as either *Psychoeducation*, *Psychoeducation Plus* or *TMP* treatments. In this review the former referred to phase 1 treatments with a defining focus on symptom stabilisation, safety and treatment relevant information and included interventions that were either interactive or skills based (Lubin, Loris, Burt & Johnson, 1998; UKPT, 2017; Wessely, Bryant, Greenberg, Earnshaw, Sharpley & Hughes, 2008). The category *Psychoeducational Plus* differentiated

more specific and substantive phase 1 treatments. Interventions in this category were defined as seeking to achieve a greater treatment responsiveness by focusing on specific symptoms and comorbidities. For example, *Seeking Safety*, designed to be a comprehensive intervention to treat comorbid substance use disorder (SUD) and PTSD would be included within this category (Najavits & Hien, 2013). However, briefer versions of this intervention that just focused on PTSD psychoeducation would not (Ghee, Bolling & Johnson, 2009). TMP interventions were defined as 'trauma focused' interventions that assisted survivors through the exposure (imaginal or in vivo) to traumatic memories as well as cognitive restructuring through discussing traumatic memories and their associated faulty appraisal (Lenz et al, 2017).

Each study was also categorised according to the type of comparator used. Control arms involving waiting list (WL), minimal attention control or treatment as usual (TAU) were all categorised as 'usual care'. The description by Devilly & McFarlane (2009, pg. 1162) was utilised for these arms as there was an assumption that participants had received 'routine care, whether this was specifically mentioned in the original article or not, as long as this did not include active, trauma-focused treatment'. Control interventions involving a degree of psychotherapeutic sophistication were classified as 'active'. Therefore, complementary therapies such as acupuncture were not considered active treatments (Hollifield, Sinclair-Lian, Warner & Hammerschlag, 2007). However, therapies that assisted participants in developing somatic regulation skills, such as trauma informed yoga and introspective awareness or mindfulness, were considered active psychological therapies and categorised as *Psychoeducational* interventions (Kelly et al, 2010; Garland et al, 2016; Mitchell et al, 2014; van der Kolk, 2014;).

Trials which had two or more group based treatment arms were combined following the Cochrane Handbook procedures (Higgins & Green, 2011, 7.7.3.8; 16.5.4). This approach was used when conducting meta-analyses comparing all group based treatments to usual care comparators. Where *TMP* and *Psychoeducational* arms had been combined, studies were categorised as *Psychoeducation Plus*. This included Alexander et al, 1989; Classen et al (2001); Classen et al (2011) and Yeomans et al (2010) and the combination was used in the overall analyses of group-based interventions compared to usual care as well as the subgroup analysis of different treatment types compared to usual care. In these circumstances, *Psychoeducation Plus* refers to both single arm studies within this category and studies with the combined arms. Where analyses were conducted between different trauma-focused treatment arms, *TMP* interventions were considered the treatment group and compared to *Psychoeducation* and *Psychoeducation Plus* interventions. See Appendix 2 [supplementary material published online] for decisions on categorisation.

1.3. Risk of bias and coding of methodological quality

The Cochrane Risk of Bias tool (Higgins & Green, 2011, version 5.1.) was used to assess overall methodological quality for each study. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) system (<http://www.gradeworkinggroup.org>) was used to rate the quality of outcomes and grade the strength of recommendations made across the various domains of clinical functioning (Thornton, Alderson, Tan, Turner, Latchem, Shaw, et al., 2013). The effect of randomisation and assessor blinding was also examined using moderator analyses.

Outcomes

The five outcome domains that were investigated included: *PTSD* (i.e. overall levels of trauma symptomatology); *Depression*; *Psychological Distress*; *Substance Misuse* and *Dissociation*. Where global measures of psychological distress were not available scores from anxiety and depression measures were combined following procedures detailed in the Cochrane Handbook (Higgins & Green, 2011). The online supplement (Appendix 4: GRADE Assessment of outcome) includes a detailed record of which studies were included within the comparisons undertaken for each domain.

A sequential hierarchy was devised to account for the different measures used by studies to assess the same treatment outcomes or symptoms. For example, the Clinician Administered PTSD Scale (CAPS, Blake, Weathers, Nagy, Kaloupek, Klauminzer, Charney, Keane, & Buckley, 2000) and similarly the Structured Interview for Disorders of Extreme Stress (SIDES, Pelcovitz, van der Kolk, Roth, Mandel, Kaplan, & Resick, 1997) were prioritised over other measures such as the Davidson Trauma Scale (Davidson, Tharwani & Connor, 2002). Substance misuse measures that were prioritised included biological testing and interview procedures over self-report reductions in use. Intent-to-treat (ITT) data was also prioritised over completer samples where available.

Primary effect sizes were calculated using data from the first available time point after treatment ended. Whilst this was usually described as 'post' treatment, research protocols between studies varied in terms of delayed data collection and therefore the first available post-treatment data following treatment completion as included.

1.4. Meta-analysis

Outcome data for individual trials was entered into the Comprehensive Meta-Analysis (CMA) version 3.3.070, (Borenstein, Hedges, Higgins & Rothstein, 2014) for Windows software. The authors of all included studies were contacted and additional data requested where required.

Hedges' g was used to calculate effect sizes from the reported standardized mean difference (SMD) for continuous data using CMA, together with 95% confidence intervals (CIs). Mean effect sizes were calculated using a random-effects model, since this accounts for the dispersion of effect sizes where studies are unlikely to be functionally equivalent (Borenstein, Hedges, Higgins, & Rothstein 2010; Taylor & Harvey, 2010). Effect sizes calculated using Hedges's g were conservatively interpreted using Cohen's (1988) conventions where 0.2, 0.5 and 0.8 indicated small, medium and large effects respectively. Two-tailed hypotheses were used throughout and statistical significance was assumed if the probability of the observed difference arising under a true null hypothesis was less than 5% ($p < 0.05$). Publication bias was investigated for each outcome domain using funnel plots and the definition of an outlier as described by Weisz, Weiss, Han, Granger, & Morton (1995) was used.

1.5. Heterogeneity

Higgins's I^2 was used to express the amount of heterogeneity among studies. Moderate heterogeneity was assumed if the I^2 statistic was 40% or above (Higgins & Green, 2011, 9.5.2).

In order to manage heterogeneity within the included studies subgroup procedures available in CMA were used (Cuijpers, 2016). Two subgroup analyses were conducted for each outcome domain, corresponding to the research questions above. The first subgroup analysed studies according to comparator (see Figure 2) and the second according to treatment type.

Additional analyses, both statistical and visual plot, investigated potential bias in the study synthesis. This included calculating the fail-safe N , the number of studies required to support the null hypothesis and to reduce an effect size to a specified level (Orwin, 1983). The trim and fill method was also used to investigate whether 'trimming' potentially 'biased' studies would change the effect size.

1.6. Moderator analysis

Meta-regression procedures available in CMA V3 were utilised using a random-effects procedure to examine the potential moderating influence of study and treatment characteristics on treatment effect size estimates. Choice of moderator variables was informed predominantly a priori from previous meta-analytic reviews (Taylor & Harvey, 2010) as well as post hoc from other characteristics apparent in the included studies. See Appendix 4, online supplement, for a full list of variables. A priori variables included publication details, participant characteristics, therapist context and the amount and type of treatment content. Variables were expanded post hoc in regards to treatment content variables and a prisons/forensic variable included in treatment settings as well as a summary risk of bias rating. Regression coefficients were calculated to identify which moderators

explained a significant proportion of between study variance (Borenstein et al, 2010; Bowman, 2012). Regression coefficients were the estimated change in g per unit in each predictor variable. The *Q*-statistic was also calculated as an indicator of heterogeneity.

2. Results

2.1. Study Characteristics

The PRISMA diagram details the search outcome (Figure 1). A total of 36 studies were identified and their characteristics are summarised in Table 1. This included 30 control WL/TAU (i.e. 'usual care') and 49 active treatment arms. Six were group based non-trauma active comparators, 15 arms were classified as *TMP* interventions and 28 were classified as interventions involving psychoeducation and the stabilisation of trauma related symptoms. In addition, one study presented results from psychoeducational and *TMP* arms combined (Classen et al, 2001). Within the psychoeducational arms, 8 were of sufficient intensity and focus to be classified as *Psychoeducation Plus* interventions. For example, Sikkema et al (2007, 2013) and Classen et al (2001, 2011) focused on addressing HIV risk behaviours whilst providing sufficient focus on treating trauma based symptoms. Non-trauma active comparators were defined as structured or manualised interventions that provided, often psychoeducational, treatment or support on other health or wellbeing issues not related to trauma. Stalker & Fry (1999) was the only RCT identified that compared *TMP* group treatment against individual based *TMP* treatment; as such this study was not included.

A distinct group of psychoeducational studies were based on mindfulness and yoga trauma informed therapeutic approaches (Garland et al, 2016; Kelly & Garland, 2016; Mitchell, Dick, DiMartino, Smith, Niles, Koenen & Street, 2014; van der Kolk, Stone, West, Rhodes, Emerson, Suvak & Spinazzoia, 2014). These therapies focused on affect tolerance and impulse regulation and differ from mainstream cognitive models through promoting somatic regulation and interoceptive awareness. Tables 2 and 3 provide summary data for study and participant characteristics.

TABLE TWO AND THREE ABOUT HERE

2.2. Methodological quality of included studies

Numerous 'unclear' ratings of study quality were made due to unexplained or insufficient detail. Primary publications often contained very little detail about randomisation or concealment, and there was a lack of clarity in reporting primary outcome data. Additional criteria adapted from Ehring et al (2014) and those from the Risk of Bias (RoB) tool are summarised in Table 4. The RoB and GRADE analysis and notes explaining these ratings can be accessed in Appendix 4

[supplementary material published online]. Table 5 includes the outcome quality ratings for the main analyses.

Only 3 studies were low risk on all RoB criteria (Ford et al, 2008; Hollifield et al 2007 and Kaslow et al, 2010). Most studies used a treatment manual (k = 34, 91.9%), however, fewer studies used a structured clinical interview to diagnose PTSD (k = 16, 43.2%). Similarly, in the other domains few studies used diagnostic procedures as part of their post symptom measurements. In addition, studies did not consistently report data on treatment integrity in respect of quality assurance/fidelity measures (k= 16, 43.2%). Approximately, half of the studies clearly reported the use of follow-up assessments, intent-to-treat analyses, or ensured that assessors were blinded (k= 19, 51.4%; k= 21, 56.7%; k= 19, 51.4% respectively).

GRADE quality ratings of each outcome were predominantly either low or very low. This partly reflected the variety of comparators included within the analyses and heterogeneity in methodological approach, including the use of different outcome measures, particularly in the Substance Misuse and Psychological Distress outcome domains. Similarly, it was also noted in the Substance Misuse domain that 'post' treatment data collection time points varied widely from 1.5 weeks to 24 weeks. Appendix 4 (online supplement) presents further detail of studies within each analysis and the mean 'post' data collection time frame. Quality was also reduced by inconsistency, in which an unclear direction of effect was observed, in addition to wide confidence intervals.

TABLE FOUR ABOUT HERE

2.3. Treatment effects

2.3.1. Group based trauma interventions compared to usual care

Studies that had two active group treatment arms were combined (Alexander et al, 1989; Classen et al, 2001; Classen et al, 2011; Garland et al, 2016; Sikkema et al, 2007; Yeomans, 2010) and compared to usual care. Medium to large significant effect sizes favouring group-based trauma interventions were found for four of the outcome domains with only Substance Misuse resulting in a small non-significant effect size (see Table 5). The I^2 statistic indicated significantly high levels of heterogeneity; apart from the Dissociation domain. Inconsistency and imprecision resulted in low to very low GRADE quality ratings apart from the Dissociation domain.

2.3.2. Group-based trauma interventions compared to non-trauma group-based treatments

In this set of analyses, trauma informed group treatments were compared to non-trauma group interventions, such as support groups. Marginal to small non-significant effect sizes in favour of the

non-trauma informed treatments were found, although these had significantly high levels of heterogeneity (Table 5). In the PTSD domain it was apparent that Garland et al (2016) was a considerable outlier with an effect size lying almost 2 standard deviations beyond the adjacent effect size value (see Figure 2). In this instance, a condensed version of Seeking Safety (psychoeducation) was compared against Mindfulness-Oriented Recovery Enhancement (MORE), which was classified as a non-trauma treatment. Removing this study resulted in a non-significant effect size marginally in favour of trauma-focused groups ($k=4$, $g=-0.15$, SE 0.26; 95% CI [-0.67 to 0.37] $p=0.571$; $I^2=20\%$, $p=0.288$). Although this study was not an outlier in other domains, similar marginal non-significant effect sizes in favour of trauma-focused treatments were apparent when removed.

2.3.3. *Psychoeducational group treatments compared to usual care*

For the three outcome domains with the largest number of studies contributing pre-post data (PTSD, Depression, Psychological Distress), *Psychoeducation* interventions computed various medium to large effect sizes in favour of treatment when compared to usual care; although only the first domain was statistically significant (see Table 5 and also Figure 2).

Garland et al (2016) was noted to be a considerable outlier in the Depression domain. Removal of this study from the *Psychoeducation* subgrouping reduced the effect size to $k=6$, $g=-0.28$, SE 0.32; 95% CI -0.91 to 0.35, $p=0.383$; $I^2=5\%$, $p=0.380$. Similarly, whilst not an outlier in the Psychological Distress domain the removal of Garland et al (2016) on the overall effect size reduced the effect size to $k=5$, $g=-0.28$, SE 0.30; 95% CI -0.87, 0.32; $p=0.361$; $I^2=0\%$, $p=0.456$. This was also the case in the PTSD domain $k=7$, $g=-0.25$, SE 0.21, 95% CI -0.66, 0.16; $p=0.225$; $I^2=0\%$, $p=0.453$. The I^2 statistic also reported significantly high levels of heterogeneity when Garland et al (2016) was included (as summarised in Table 5). The main quality rating, regardless of treatment type, across the domains was very low or very low except in the PTSD domain. Whilst reasons varied, this included the potential deficits involved in the combined measures utilised specifically in the Psychological Distress and Substance Misuse domains.

In the *Psychoeducation Plus* analyses only the PTSD and Dissociation domains reported significant moderate effect sizes ($k=10$, $g=-0.60$, 95% CI -1.00, -0.20; $k=2$, $g=-0.79$, 95% CI -1.19, -0.39 respectively). Depression and Psychological Distress domains reported moderate and small-moderate, but non-significant, effect sizes ($k=4$, $g=-0.77$, 95% CI -1.92, 0.39; $k=7$, $g=-0.91$, 0.15, respectively). Treatments for this category in the Substance Misuse domain, reported small non-significant effect sizes supporting usual care ($k=3$, $g=0.10$, 95% CI -0.70, 0.89).

TABLE FIVE ABOUT HERE

2.3.4. *TMP group treatments compared to usual care*

When compared to usual care, significant large effect sizes for *TMP* based treatments were evident in all outcome domains apart from Substance Misuse where there were no available studies. As noted in Table 5, whilst the I^2 statistic indicated significant levels of heterogeneity for the three domains with the largest number of studies. It was also noted that in the Depression domain that if Rieckert & Moller (2000), which was considered to have a particularly high risk of bias, was removed there would be a reduction in the effect size obtained in the *TMP* category ($k= 6$, $g= -0.89$, $SE 0.48$; $95\% CI -1.84, -0.06$, $p= 0.07$, $I^2= 81\%$, $p= 0.00$).

2.3.5. *Comparing TMP with Psychoeducation group treatments*

Few studies directly compared treatment arms categorised as *TMP* interventions with psychoeducation interventions and only one study reported data for the Substance Misuse and Dissociation domains (Classen et al, 2011). A small non-significant effect size in favour of *TMP* treatments was observed for PTSD ($k=4$, $g= -0.34$, $95\% CI -1.05, 0.36$), whereas small or marginal non-significant effect sizes were computed in favour of *Psychoeducation* treatments for Depression ($k=3$, $g= 0.29$, $95\% CI -0.83, 1.40$) and Psychological Distress ($k= 6$, $g= 0.19$, $95\% CI -0.34, 0.71$; see Table 5). As with the other subgroup analyses for treatment arm comparisons, the small number of available studies and considerable heterogeneity issues contributed to the very low GRADE quality ratings.

FIGURE TWO ABOUT HERE

2.4. Heterogeneity

As noted in Table 5, the I^2 statistic often reported significantly large amounts of heterogeneity. Subgroup procedures has been used in an attempt to manage heterogeneity; according to comparator and treatment type. It was however apparent that most I^2 analyses were over 40% and that reductions in heterogeneity appeared to reflect analyses with smaller numbers of available studies.

2.5. Publication bias

Inspection of funnel plots for studies compared to usual care indicated that there tended to be a wider dispersal of studies to the left of the mean; apart from the Dissociation domain, which showed the greatest symmetry (see online supplement). This indicates the potential presence of publication bias. Egger's test and the rank correlation test were not significant for all of the domains indicating that overall, smaller n studies did not seem to report higher effect size than the larger n studies.

Orwin's failsafe N indicated that additional studies ($n= 60$ to 45) would be needed to reach an effect size with a 'trivial' value (i.e., -0.20) for the domains with the larger number of included studies. Given that only 36 studies were identified this is unlikely in the near future. As such the current heterogeneity of treatment approaches, the diversity of psychological effects of complex interpersonal trauma, which of course may or may not be targeted in treatment, are likely to impact on the effect sizes computed. In the Substance Misuse domain, Orwin's failsafe N indicated that 7 missing studies would be needed to reach a modest 'trivial' value of -0.10 and in the Dissociation domain, 19 studies would be needed to reach a 'trivial' effect size at -0.20 . The trim and fill method suggested that for only two domains would additional studies be added to the left of the mean to give an adjusted effect size (Depression, $n=2$; Substance Misuse, $n=2$). The adjusted effect sizes would be $g= -1.09$ and $g= -0.30$ respectively.

2.6. Moderator analysis

Given the small number of studies involved in the Dissociation and Substance Misuse domains, it was difficult to meet the criteria as described by previous authors to identify potential moderators (Hedges, Tipton & Johnson, 2009). Scatterplot analysis also indicated that the significant moderators in the Substance Misuse domain were the result of the large effect size reported by Garland et al (2016). There were also no significant moderators in either the Psychological Distress or Dissociation domains.

Participants' mean age in the PTSD domain indicated that trials with older participants reported significantly lower effect sizes than trials with younger participants ($k=24$, $r= 0.10$, SE 0.04 ; 95% CI $[0.02$ to $0.17]$, $p= 0.0123$). Inspection of the relevant scatterplot noted that this was particularly robust finding. However, a similar inspection of the scatterplot for gender and treatment setting in the Depression domain again noted that Garland et al (2016) was a particularly influential study, for example, it was the sole study to include only male participants. When removed from the analysis these variables were no longer significant. Appendix 4, online supplement, presents a summary of the variables computed in the moderator analysis across the various domains.

3. Discussion

Summary of findings

The results from the three outcome domains with the largest number of studies (PTSD, Depression and Psychological Distress) indicate that *TMP* interventions had large significant effect sizes when compared to usual care comparators. Medium to large effect sizes were also found in these domains for *Psychoeducation Plus* and *Psychoeducation* interventions against usual care comparators;

although these were non-significant for Depression and Psychological Distress. However, when outliers were taken into account the effect sizes in favour of the *Psychoeducation* category were substantially reduced, and whilst still non-significant, heterogeneity was largely accounted for.

Therefore, when outliers were accounted for, indirect comparisons between treatment categories (i.e. *TMP*, *Psychoeducation Plus* and *Psychoeducation*) suggest incremental increases in effect sizes when compared to usual care. This would suggest that treatment efficacy should be defined by the inclusion of protocols that assist with the processing of the traumatic memories. However, when *TMP* and *Psychoeducational* interventions were directly compared there was no clear effect. Important between-study differences, for example baseline symptom severity, may have resulted in *TMP* studies having a larger effect size when compared to usual care. Given that direct comparisons are empirically more robust, greater weight should be placed on these analyses when considering the relative efficacy of *TMP* and psychoeducational treatments. Similarly, it is also important to note that whilst the results for group trauma treatments are favourable when compared to usual care this was not the case when other active non-trauma group comparators were used; although this may reflect the limited number of available studies ($k= 2$ to 5). In addition, the difficulty of treating comorbid substance misuse requires specific consideration, as no intervention was clearly effective at reducing this.

Are TMP treatments more effective than psychoeducational treatments?

The findings of this meta-analysis when interventions are compared to usual care correspond to a theoretical perspective that promotes the integration of *TMP* in treatments for symptoms and psychopathology associated with complex interpersonal trauma. However, a small number of studies have directly compared *TMP* with psychoeducational treatments and these findings present a mixed set of results. In these direct comparison studies in the PTSD domain returned a small non-significant effect size in favour of *TMP* interventions. Comparisons in the Depression and Psychological Distress domains resulted in small or marginal non-significant effect sizes in favour of psychoeducation. This suggests that *TMP* interventions, as designed, may have more impact on symptoms associated with PTSD but not the wider psychopathology associated with complex interpersonal trauma. Psychoeducation interventions appear to have equal if not more benefits in ameliorating these symptoms. Indeed, psychoeducational treatments might be useful for the treatment of general distress that survivors of interpersonal violence often report. This corresponds to the results, as already noted, when psychoeducational treatments were compared to usual care controls. Overall, results suggest that *TMP* interventions may be useful for traumatic stress whereas non-*TMP* interventions may be useful for symptoms of general distress (e.g. anxiety and depression).

Comparison of findings with other meta-analysis

The results of our review with respect to usual care comparators concur with previous meta-analysis where there has been a greater effect size for trauma memory focused interventions (Bisson et al, 2007, 2013). Previous reviews have not, however, investigated the efficacy of group treatments from a phase-based perspective (Barrera et al, 2013; Cloitre, et al, 2012; Mendelsohn et al, 2011; Sloan et al, 2013).

The results from this meta-analysis suggest that TMP group treatments are particularly effective for PTSD symptoms, when compared to usual care. These findings support results from meta-analyses on the effectiveness of individual treatment protocols; particularly where single-arm comparisons have produced larger effect sizes for TMPs (Bisson et al, 2007, 2013; Lenz, Haktanir & Callender, 2018; Roberts et al, 2015; Taylor & Harvey, 2010; Watts et al, 2013). Similarly, results also support the creation of a *Psychoeducation Plus* category to help explain the potential efficaciousness of a phase 1 'stabilising' intervention.

Importantly, the results from this meta-analysis also concur with studies reporting the relative efficacy of psychoeducational groups, and indeed non-trauma group interventions. In this respect, previous meta-analyses have highlighted that all psychotherapeutic responses generally promote recovery in PTSD symptoms (Erford et al 2016; Lenz, 2018). Similarly, this meta-analysis would seem to concur with previous findings that non-specific interventions are equally efficacious particularly for individuals with complex clinical presentations (Greger et al, 2014). Foa et al (2018) recent large scale RCT, comparing the effectiveness of individually delivered TMP and 'present centred' interventions, with active duty military personal also indicated that there was no significant difference between these arms. The synthesis of high quality RCTs, for both individual and group based treatment modalities, remains an important endeavour in psychological trauma reviews.

Implications for clinical practice

Arguments have been recently advanced questioning the potential impact of delaying essential trauma processing treatments (de Jongh et al, 2016). If considering this meta-analysis with respect to comparisons against usual care the results add weight to the superior effectiveness of TMP interventions particularly for PTSD, Depression and Psychological Distress symptoms. Similarly, as noted in the direct TMP and psychoeducation comparisons the former interventions were still demonstrated to be equally as effective for PTSD symptoms and therefore may still be the intervention of choice for treatment providers. However, the timing, nature and intensity of such processing elements should be subject to further research. As only post treatment effect sizes have

been used, this review does not provide a complete analysis of participants' treatment journeys including any potential for temporary symptom exacerbation (Crawford, Thana, Farquharson, Palmer, Hancock, Bassett, Clarke & Parryvan, 2016; Mott, Sutherland, Williams, Lanier, Ready, & Teng, 2013; Resick, Galovski, Uhlmansick, Scher, Clum, & Young-Xu, 2008; van den Berg, de Bont, van der Vleugel, de Roos, de Jongh, van Minnen, van der Gaag, 2016). There is clearly a need to investigate the long-term outcomes of both psychoeducational and TMP interventions.

Whilst the specific benefits of delivering interventions consisting solely of psychoeducational material have been questioned, it should also be noted that medium to large aggregated effect sizes were computed for these interventions. However, it is important to consider the impact that outliers had on these effect sizes. The inclusion of both CBT and mindfulness/interoceptive interventions into this category should also be considered. When outliers were removed, small, non-significant effect sizes across all outcome domains, except substance misuse, were noted in favour of psychoeducational treatments. This may be more than acceptable with respect to their public health utility particularly if large-scale programmes, with high degrees of treatment integrity, can be more easily delivered (Brookes, Barrett, Netten & Knapp, 2013). The accessibility of psychoeducational interventions, particularly for populations that have often been regarded as too chaotic or unstable for TMP interventions, also makes this an attractive option (Corrigan & Hull, 2015). Indeed, the dearth of TMP group treatments for comorbid substance misuse would suggest that such exclusion criteria already has an impact on how viable such treatment options are considered.

This meta-analysis suggests that early interventions that are offered as part of a phased approach or are either symptom specific or more intensive (i.e. *Psychoeducation Plus*) are potentially more effective than usual care in ameliorating PTSD (including Dissociative) symptoms. As such, although having the opportunity to safely process trauma based memories is important so too is ensuring that survivors have the specific skills in which to cope with their symptoms. It is therefore important that psychoeducational interventions are matched to an individual's treatment needs or of sufficient intensity that ensures substantial progress is achieved and maintained (Ali, Rhodes Moreea, McMillan, Gilbody, Leach, Lucock, Lutz & Delgadillo, 2017).

The only moderator of significance, after outliers were accounted for, was age within the PTSD domain. Whilst this requires further replication, it suggests that older participants, perhaps with greater histories of repeat traumatisation or symptom accommodation, represent an increased challenge to treatment programmes. This may raise important clinical considerations relating to age and its link to possible treatment resistance and whether current treatments are sufficiently responsive to older participants (Clapp & Beck, 2012; Pietrzak, Goldstein, Southwick, & Grant, 2012).

Implications for future research

Few studies in this review measured the impact of motivational, normative or empowerment processes that are commonly associated within a psychoeducational group treatment (Burlingame et al, 2003; DiClemente, Schlundt, & Gemmell, 2004; Herman, 1992; McCrone et al, 2005; Mendelsohn et al, 2011). Similarly, the disparity between the different measures used, particularly within the *Substance Misuse* domain, presents a challenge to research in addressing the heterogeneity within this area. It is, however, reasonable to conclude that survivors with co-morbid substance misuse difficulties present substantial clinical and research challenges. Najavits & Hien (2013) and this meta-analysis highlights the need for more high quality trials of full dose substantive interventions such as *Seeking Safety*. It should also be noted that the range of post treatment reporting times in this outcome domain was from 1.5 to 24 weeks with a number of the studies only providing data at 6 or 12 months after treatment (Classen et al, 2011; Meade et al 2010; Messina et al, 2010). This delayed reporting of treatment outcomes of course has a considerable impact on the understanding of post treatment efficacy. Further research is required before group treatments can be considered effective for comorbid substance misuse.

One of the strengths of this meta-analysis is the extensive consideration given to the categorisation of included treatment arms. The authors are aware that on occasions, decisions may prove to be somewhat controversial. Whilst we have provided evidence of these decisions within the supplementary material the potential for subjectivity should be considered and analyses replicated. Further research on drop-out rates and comparisons with treatment completers for different types of phase based group interventions could also be usefully undertaken. It should also be noted that there is a small number of RCT studies that have been conducted within prisons and forensic populations and it should not be assumed that trauma focused interventions are equally as effective when conducted in these challenging settings (Ball, Karatzias, Mahoney, Ferguson & Pate, 2013; Wolff et al, 2015). Until the evidence base develops further the inclusion of repeat measure studies within future meta-analyses for such populations may be inescapable. A similar meta-analysis could also be usefully conducted examining the effectiveness of group-based treatments on military and combat based trauma (Barrera et al, 2013; Bradley et al., 2005).

The use of the intragroup correlation (IGC) measure has been advocated by some authors to account for the extent to which group membership has created a dependency between observations. This is intended to avoid Type 1 errors by taking into account that additional variables might impact on group treatment outcomes (Baldwin, Murray, & Shadish, 2005). Criticisms have therefore been raised about using the individual participant as the unit of analysis (Shea et al, 2009; Sloan, 2013).

Although this meta-analysis focused on group level data across all included studies thereby to some extent negating some of these concerns such statistical procedures could be explored further (Barrera et al, 2013).

An important finding of this review is that there are currently far too few high quality RCT studies. Indeed, many studies have inadequately reported details of randomisation and blinding procedures [see Appendix 4, published online for GRADE and Risk of Bias summaries]. This very poor quality research literature necessarily impacts on the quality of this, and indeed any meta-analytic review, undertaken in this area of clinical research. As seen in this meta-analytic review the inclusion of poor quality studies creates uncertainty around meta-analytical estimates (Nelson, Simmons & Simonsohn, 2017). It is therefore increasingly incumbent on authors to conduct trials that improve on the quality of what is currently available. Trials that are single-blind, report their randomisation sequence and how they concealed it, are adequately powered, pre-registered, using valid/reliable measures, use ITT analysis and keep drop-out / missing data to a minimum (i.e., below 20%) are imperative. A clear improvement to this situation would be the accessibility of raw data within the public domain (Nelson et al, 2017).¹

Whilst heterogeneity issues were taken into account within the GRADE analysis the relatively few high-quality, randomised studies available is perhaps particularly evident in respect to direct TMP versus psychoeducational comparisons. It is crucial that multifaceted and dismantling studies are undertaken in which such treatments are directly evaluated as distinct arms utilising both group and individual treatment modalities. As noted in this review, we have only located one study that compared the same TMP based treatment in both group and individual treatment arms (Stalker & Fry, 1999). Comparing such treatment modalities to each other and to non-trauma focused skills based interventions and usual care should help further develop the evidence base. It should also help to ascertain whether psychoeducational interventions are a useful or indeed necessary step to enable survivors' readiness for TMP interventions. Similarly, pragmatic and clinically important questions remain as to which treatment model is likely to be the most effective for brief group based psychoeducational interventions; those based on CBT approaches or those based on mindfulness and interceptive awareness. The intensity and sequencing of such interventions should also be explored in further research.

Conclusions

There is increasing recognition of the profound impact that experiences of complex interpersonal trauma can have on the developmental trajectory and lives of survivors. Similarly, the debilitating

role that symptoms of complex traumatisation such as dissociation and other comorbidities, for example substance misuse, can have are also being increasingly recognised (UKPTS, 2017; Karatzias et al, 2016). Few high quality RCTs have examined the efficacy of treatments to ameliorate these important symptoms and they may require very different treatment approaches than have been seen to be effective with other symptoms. It is important to reflect on the impact that outliers had on the results of meta-analysis with usual care comparators. With this in mind, although psychoeducational approaches hold some promise for symptoms of general distress, it is also apparent that TMP interventions, which have been recognised as phase 2 interventions, hold the most promise particularly for symptoms of traumatic stress. Whether a phase based conceptualisation of treatment for complex trauma is actually preventing some clients from recovering as quickly as they could is difficult to ascertain from this review. Certainly, even small treatment effect sizes particularly in respect of general distress from large-scale trauma focused programmes may be welcome. However, further work is required to consider these issues in more depth.

Footnote page 20:

¹Although, not included in this review we would like to thank Stalker & Fry (1999) for making their unpublished data available.

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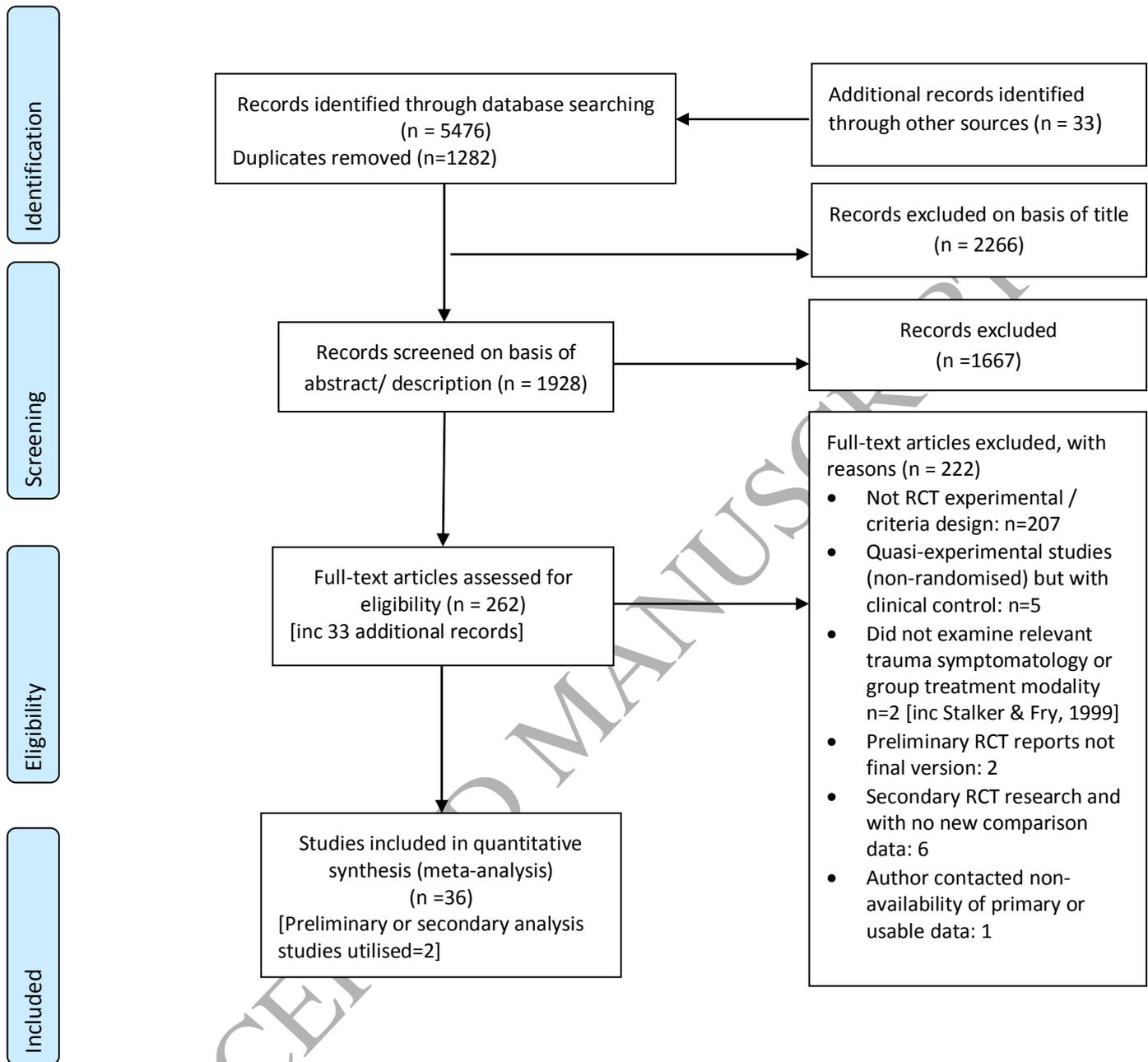
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Figure 1: PRISMA Flow Diagram

Table 1: Summary of Study Characteristics

Study	Population, Treatment Goal	Treatment Categorisation	No. planned sessions ²	<i>N</i> in study	<i>N</i> post ³	Sample and Trauma Details		
Type of group treatment and control condition(s)						Primary abuse details	% female	Age M (SD)
<i>Study relevant details</i>	<i>Symptom Domain</i>	(No. of psychoed sessions) ¹	(No. of individual sessions)	<i>ITT if Inc.</i>			(% full PTSD)	
Alexander et al (1989)	Incest survivors: treat CSA			65*		100% CSA	100%	36 (8.4)
Interpersonal transaction	<i>Dep, PDist</i>	Psychoed	10		16	(incest)		
Process (peer) group therapy		TMP	10		20			
WL		-	-		21			
<i>* Total n randomised given only</i>								
Bass et al (2013)	Low income country: conflict trauma					100%	100%	
Cognitive Processing Therapy		Psychoed Plus (1)	11 (1)	141	114	'sexual violence'		36.9(13.4)
Individual Support (TAU)	<i>PTSD, PDist</i>	-	(3)	182	156			33.8(12.4)
Bohus et al (2013)	Treatment resistant PTSD:			<i>ITT</i>		100% CSA	100%	35.1(10.6)
DBT plus Exposure	CSA and co-occurring	TMP (11)	65 (25)	36	29			
TAU ('any treatment of choice')	psychopathology	-	-	38	29			
	<i>PTSD, Dep, PDist, Diss</i>							
Bradley & Follingstad (2003)	Prison: treat PTSD from interpersonal violence					100% CSA	100%	36.7(8.3)
Narrative group and DBT skills		TMP (9)	18	24	13	and other		
WL ('no contact')	<i>PTSD, Dep, PDist, Diss</i>	-	-	25	18	abuse		
Chard (2005)	Treat CSA			<i>ITT</i>		100% CSA	100%	32.8(8.9)
Cognitive Processing Therapy	<i>PTSD, Dep, PDist</i>	TMP (1)	17 (10)	36	28			
WL ('minimal attention')		-	-	35	27			
Classen et al (2001)	Treat CSA					100% CSA	100%	38.4(11.7)
Present Focused / Trauma	<i>PTSD, Dep, PDist, Diss</i>	Psychoed	24 (1)	19	19			
Focused (results combined)		TMP	24 (1)					
WL				33	33			

Classen et al (2011) Present Focus Trauma Focus WL	Treat CSA and HIV risk behaviours <i>PTSD, Dep, PDist, SubM, Diss</i>	Psychoed TMP (2+) -	24 24 -	<i>ITT</i> 56 55 55	43 42 44	100% CSA 100%	100%	36.4 (9.7)
Cole et al (2007) Trauma Focused WL	Prison: treat CSA <i>PTSD, Dep, PDist, Diss</i>	TMP (4) -	16 -	4 6	4 5	60% CSA* 50% CSA*	100%	31 (9.8)
<i>*Surmised from data may be higher</i>								
Constantino et al (2005) Social Support Intervention WL (No treatment)	DV Shelter Residents: stabilise / alleviate distress <i>PDist</i>	Psychoed -	8 -	13 11	13 11	100% IPV	100%	35.5(7.3)
Crespo & Arinero (2010) Communication Skills Exposure	Treat IPV <i>PTSD, Dep, PDist</i>	Psychoed TMP (7)	8 8	28 25	DK	100% IPV	100% (0%*)	41(9.3)
<i>*Partial PTSD only included</i>								
Dorrepaal et al (2012) CBT WL-TAU ('individual psychotherapy')	Stabilise complex PTSD symptoms <i>PTSD</i>	Psychoed -	20	<i>ITT</i> 31 28	38 33	97% CSA 91% CSA	100%	40.3 (10.7) 37.1 (10.3)
Falsetti et al (2008) Multiple Channel Exposure WL	'Crime victims': treat panic disorder and PTSD <i>PTSD, Dep, PDist</i>	TMP (1) -	12	<i>ITT</i> 25* 23	22 31	69% CSA	100% (100%)	35 (9.8)
<i>*Completers only</i>								
Ford et al (2013) TARGET (Affect Regulation) Supportive Group Therapy	Prison: treat PTSD and stabilise <i>PTSD, PDist, Diss</i>	Psychoed NTG	12 12	41 39	38* 34	60% CSA	100% (82%) (74%)	34.6 (8.6) 38.0 (7.8)
<i>*Variations across different measures</i>								
Frisman et al (2008) TARGET (Affect Regulation +	Complex PTSD with substance misuse: treat	Psychoed (8-9)	34.1*	<i>ITT</i> 141	91**	DK	63.1%	38.0

TAU)	PTSD and stabilise	-	39*	72	50	(61.9%)	56.9%	
TAU (substance abuse care)	PTSD, Dep, PDist, SubM						(100%)	
*Mean of total sessions with TAU.								
Actual TARGET sessions = 3.4								
**Variations across different measures								
Garland et al (2016)	Homeless/previously			ITT		100%	0%	
Brief trauma informed CBT	incarcerated*: treat	Psychoed	10	64	45	traumatic	(20%)	37.7(10.4)
MORE (Mindfulness)	traumatic distress and	NTG	10	64	48	event;	(27%)	36.5(11.2)
TAU (Therapeutic Community)	substance dependence	-	DK	52	52	81.1%	(29%)	38.7 (9.8)
*Lifetime incarcerated months								
M(SD): 40.1 (55.9)	PTSD, Dep, PDist, SubM					violence		
Ghee et al (2009)	Residential substance					CSA: 'the		34.7(8.7)
Seeking Safety*	abuse clinic: reduce	Psychoed	6	51	36	majority'	100%	
TAU: 'standard' addiction	trauma-related symptoms	-	-	52	52			
treatment	PTSD, SubM							
*Condensed version plus TAU								
Graham-Bermann (2013)	Treat IPV traumatic stress					IPV 100%	100%	33.1 (5.3)
Moms Empowerment Program	symptoms	TMP (DK)	10	61	60		(72%)	
Children only	PTSD	-	10	62	56		(82%)	
WL (combined)		-	-	58	57		(86%)	
Hien et al (2009)	Treat substance abuse &			ITT		CSA:	100%	39.2 (SD
Seeking Safety	trauma	Psychoed	12 (1)	103	176	70.1%	(76.7%)	not
Women's Health Education	PTSD, SubM	NTG	12 (1)	96	177		(84.2%)	reported)
Hinton et al (2011)	Latino 'treatment			ITT		DK	100%	
Applied Muscle Relaxation	resistant': treat PTSD	Psychoed	14	12	12		(100%)	51.4 (5.9)
Culturally Adapted CBT	PTSD, PDist	TMP (DK)	14	12	12		(100%)	47.6 (8.2)
Hollifield et al (2007)	Treat PTSD					33%	47.8%	
CBT	PTSD, Dep, PDist	TMP (3)	12	21	24	CSA/CPA	(100%)	40.9(13.4)
Acupuncture		-	12	19	25			42.3(12.1)
WL (combined)		-		21	24			43.4(13.5)
Kaslow et al (2010)	Suicidal African					CSA 54%	100%	34.7 (9.4)
Nia: empowerment focused	Americans:	Psychoed	10	45	34, 31		(100%)	
TAU: 'standard psychiatric care'	Reduce PTSD symptoms	-		44	35, 31			
(including IPV support groups)	PTSD, Dep, PDist							

Kelly et al (2016) TI-MBSR (Mindfulness) WL	Reduced trauma symptoms, psychoeducation <i>PTSD, Dep, PDist</i>	Psychoed -	8 -	<i>ITT</i> 24 21	20 19	100% violence	100% (38%)	41.5 (14.6)
Krakow et al (2001) Imagery rehearsal for nightmares WL	Sexual Assault Survivors: treat chronic nightmares (PTSD)	Psychoed Plus (1) -	3	<i>ITT</i> 80 88	39* 41	54% CSA (72% CPA)	100% (95%)	36.0 (9.8) 40.2 (11.3)
Krupnick et al (2008) Interpersonal psychotherapy WL <i>*Completers with over 50% attendance</i>	Low income: treat 'highly chronic' PTSD <i>PTSD, Dep</i>	Psychoed Plus (4) -	16 (1)	<i>ITT</i> 32 16	20* 7	95.8% CSA	100% (100%) (100%)	32 (10.2)
Lau et al (2007) Systemic Group Therapy Analytical Group Therapy <i>*Mean number of sessions</i>	Treat CSA <i>PDist</i>	Psychoed Plus (8)* TMP	34* 46*	<i>ITT</i> 54 52	46 40	100% CSA (incest)	100% (100%)	32.4 (8.8) 34.2(10.5)
McWhirter (2011) Emotion-focused Goal-orientated <i>*Results from mothers only</i>	Treat IPV mothers and children* <i>Dep, SubM</i>	Psychoed NTG	5 5	<i>ITT</i> 22 24	21 21	100% IPV, CPA 89%*	100 (DK)	30 (18-47)
Messina et al (2010) Gender Responsive Treatment* TAU: Therapeutic Community <i>*Includes Beyond Trauma (11 session trauma programme ** 94 participants (83% of the total sample) completed 6mth measures.</i>	Prison: Treat substance misuse and reduce trauma symptoms <i>PDist, SubM</i>	Psychoed Plus (11) -	28 DK	<i>ITT</i> 60 55	94**	55% SA 71% PA	100% (25%) (26%)	35.9 (9.6)
Messina et al (2012) Gender Responsive Treatment* TAU: Drug treatment programme <i>*As described above ** 57% and 58% respectively</i>	Community drug misusing offenders: treat substance misuse and reduce trauma symptoms <i>PTSD</i>	Psychoed Plus (11) -	28+ DK	<i>ITT</i> 85 65	48** 38	55% SA	100% (31%) (26%)	36 (8.9)

Mitchell et al (2014) Yoga for PTSD / DBT skills WL	Treat traumatic stress and improve emotional regulation. <i>PTSD, Dep, PDist</i>	Psychoed -	12 -	14 12	20 18	88% CSA	100% (70.7%) (100%)	44.3 (12.3)
Rieckert & Moller (2000) REBT for CSA WL	Treat post abuse symptoms in the absence of PTSD diagnosis <i>Dep, PDist</i>	TMP (10) -	10	28 14	26 14	100% CSA	100% (0%)	28
Sikkema et al (2007, 2013) LIFT (trauma coping group) Support Group Waiting List	Treat traumatic stress, HIV and drug use. <i>PTSD, SubM</i>	Psychoed Plus (15) NTG -	15 15	124 123	73 77 48	100% CSA	54% (40%)	42.5(6.9)
Tirado-Munoz et al (2015) IPaVit-CBT TAU: 'outpatient drug centre' * <i>*various professionals'</i>	IPV safety and stabilisation; treat substance misuse and depression <i>Dep, SubM</i>	Psychoed -	10 -	7 7	7 6	IPV (100%)	100%	42 (5.6) 39.8 (11.6)
van der Kolk et al (2014) Trauma- informed yoga Woman's Health Education (WHE)	Treatment resistant PTSD: affect regulation, PTSD symptoms <i>PTSD, Dep, PDist, Diss</i>	Psychoed NTG	10 10	32 32	31 29	DK	100% (100%)	41.2 (12.2) 44.3 (11.9)
Yeoman et al (2010) 'Psychoed' workshop 'Non-Psychoed' workshop WL-ITT <i>*Full days</i>	Low income country: provision of culturally specific PTSD treatment <i>PTSD, PDist</i>	Psychoed TMP -	4* 4*	41 41 42	38 37 38	98.8% Combat trauma	44.4%	38.6 (12.8)
Zlotnick et al (1997) Affect Management* WL	Treat CSA <i>PTSD, Diss</i>	Psychoed -	15(DK) -	24 22	17 16	100% CSA	100% (100%)	39 (9.59)
Zlotnick et al (2009)	Prison*: treat PTSD and					Sexual	100%	34.6 (7.4)

Seeking Safety	substance misuse.	Psychoed Plus	15 (3)**	27	23	abuse	(83.5%)
TAU (residential 12 Step AA model)	PTSD, PDist, SubM	(15)	-	22	21	93.9%	

*Minimum security located in a residential treatment programme
 **Mean No. sessions planned 25(12)

Abbreviations used. TF-IT: Trauma Focused Interpersonal Transaction psychotherapy; CPT-SA: Cognitive Processing Therapy - Sexual Abuse; IPT: Interpersonal Therapy; Psychoed: psychoeducation; CBT: cognitive behavioural therapy; TF-CBT: trauma focused CBT; NTG: Non-Trauma-Group (active control); WL: Waiting List; TAU: Treatment As Usual. *Symptom domain abbreviations used.* PTSD: Post Traumatic Stress Disorder; Dep: Depression; PDist: Psychological Distress; SubM: Substance Misuse; Diss: Dissociation. *Treatment categorisation abbreviations used.* Psychoed: Psychoeducation; Psychoed Plus: Psychoeducation Plus; TMP: Trauma Memory Processing.

¹ Psychoeducational content within TMP and Psychoed Plus interventions that specifically relates to PTSD / CPTSD symptoms as specified or estimated from available information.

² Total number of group sessions planned unless otherwise indicated as mean sessions M (SD).

³ N: N based on completers (i.e. completers analysis) at post intervention evaluation

Table 2: Summary of study and treatment characteristics

	Frequency	Percentage		Frequency	Percentage
<i>Year of Publication</i>			<i>Number of group sessions</i>		
≤ 1999	2	5.6%	<10	7	19.4%
2000-2010	19	52.7%	10-20	22	61.1%
2011-2016	15	41.6%	>20	7	19.4%
<i>Country of Origin</i>			<i>Session Length</i>		
United States	29	80.6%	50-60 mins	2	5.5%
United States / Africa	2	5.6%	61-90 mins	17	47.2%
Europe	4	11.1%	91-180 mins	17	47.2%
Other	1	2.8%			
<i>RCT Comparator</i>			<i>Frequency</i>		
Waiting List / Minimal Contact only	12	33.3%	Once per week	27	75.0%
Treatment As Usual only	9	25.0%	Twice per week	4	11.1%
Active Comparison only	8	22.2%	Three or more times per week	5	13.9%
Active Comparison and WL/TAU	7	19.4%			
<i>Pre-therapy group differences</i>			<i>Treatment duration</i>		
None	23	63.9%	<10 weeks	12	33.3%
Some, unclear importance	6	16.7%	10-20 weeks	22	61.1%
Some, important	7	19.4%	>20 weeks	2	5.6%
<i>Drop/out completer differences</i>			<i>Structure</i>		
None	30	83.3%	Manualised	34	94.4%
Some / unclear importance	3	8.3%	Semi-structured	2	5.6%
Some, important	3	8.3%			
<i>Setting</i>			<i>Therapy Process</i>		
Community	24	66.7%	Instructional/Psychoed	18	50.0%
Inpatient / Shelter	6	16.7%	Dialogue based	5	13.9%
			Exposure only	5	13.9%
			Mixed	8	22.2%

Forensic (Prisons/Probation)	6	16.7%	<i>Number of Psychoeducational Sessions</i>		
<i>Treatment Type*</i>			0 -dk	2	5.6%
Cognitive Behavioural	30	69.8%	1-5 sessions	11	30.6%
Insight orientated	7	16.3%	6-10 sessions	13	36.1%
Eclectic	2	4.7%	11-20 sessions	10	27.7%
Mindfulness / Yoga	4	9.3%	<i>Therapist experience</i>		
<i>Modality</i>			Students, Assistant Practitioners	3	8.3%
Group only	34	94.4%	Students and practitioners	2	5.6%
Combined group and individual	2	5.6%	Standard Practitioners	7	19.4%
			'Experienced' Practitioners only	24	66.6%

Note: Frequencies that do not add to 36 indicate missing data (i.e. not applicable or not reported) or multiple arms

Table 3: Summary of participant characteristics

	Frequency	Percentage		Frequency	Percentage
<i>Age</i>			<i>Marital Status</i>		
50% 28-35 years	16	44.4%	>50% married/partnered	10	27.8%
50% 36-40 years	14	38.9%	>50% single	3	8.3%
50% 41- 48 years	6	16.6%	>50% divorced separated	1	2.8%
<i>Gender</i>			All less than 50%	14	38.9%
100% women	31	86.1%	Dk	8	22.2%
50%+ women	3	8.3%	<i>Index trauma/abuse</i>		
50%+ men	1	2.8%	Child Sexual Abuse	12	33.3%
100% men	1	2.8%	Adult Sexual Abuse	3	8.3%
<i>Ethnicity</i>			Intimate Partner Violence	6	16.6%
>50% white/Caucasian	22	61.1%	War (non-combat)	1	2.8%
>50% African American	2	5.6%	Mixed traumas	14	38.9%
>50% Hispanic American	1	2.8%	<i>Frequency of abuse events</i>		
All (above) less than 50%	7	19.4%	> 50% less than 10 child abuse events only	2	5.6%
100% African	4	11.1%	> 50% more than 10 child abuse events only	6	16.6%

<i>Education</i>			Child and Adult abuse events	3	8.3%
>50% less than high school	2	5.6%	Adult abuse only	3	8.3%
>50% some high school	19	52.8%	> 50% more than 10 adult abuse events only	2	5.6%
>50% some tertiary	4	11.1%	DK	20	55.6%
Mixed (all less than 50%)	6	16.7%	<i>Mean age of onset of abuse</i>		
Dk	5	13.9%	12 years or less	13	36.1%
<i>Annual income</i>			Older than 12 years	-	-
All 'low income'	27	75.0%	18 years plus	-	-
Mixed levels of income	1	2.8%	DK	23	63.9%
Dk	8	22.2%			

Note: DK: Don't know, indicates missing data (i.e. not reported).

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Table 4: Cochrane risk of bias ratings and methodological quality for included studies

Study	Random sequence generation: selection bias	Performance bias: masking of participants and personnel	Detection bias: masking of assessments	Incomplete outcome data: attrition bias	Selective reporting: reporting bias	Other bias	Manualised Treatment	Data on ¹ Treatment Integrity	ITT Analysis
Alexander et al (1989)	Unclear	Unclear	Unclear	Unclear	No	No	No	No	No
Bass et al (2013)	No	Unclear	No	No	No	No	Yes	Yes	No
Bohus et al (2013)	Unclear	No	No	No	Unclear	No	Yes	No	Yes
Bradley et al (2003)	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Yes	No	No
Chard (2005)	Unclear	No	No	Yes	Unclear	No	Yes	Yes	Yes
Classen (2001)	Unclear	No	No	Yes	Yes	Unclear	Yes	No	No
Classen (2011)	No	No	No	Unclear	Unclear	No	Yes	Yes	Yes
Cole (2007)	Unclear	Unclear	Unclear	Yes	Yes	Yes	Yes	No	No
Constantino et al (2005)	No	Unclear	Yes	Yes	No	Unclear	Yes	No	No
Crespo & Arinero (2010)	No	Unclear	Unclear	Yes	No	Yes	Yes	Yes	No
Dorrepaal et al (2012)	No	No	No	No	No	Unclear	Yes	Yes	Yes
Falsetti et al (2008)	Unclear	No	No	Unclear	Unclear	Unclear	Yes	Yes	Yes
Ford et al (2013)	No	No	No	No	No	No	Yes	Yes	No
Frisman et al (2008)	Unclear	Yes	Unclear	Yes	Unclear	Yes	Yes	Unclear	Yes
Garland et al (2016)	No	No	No	No	No	Unclear	Yes	Yes	Yes
Ghee et al (2009)	Unclear	Unclear	Unclear	Unclear	No	Unclear	Yes	No	No
Graham-Bermann (2013)	Unclear	Unclear	Unclear	Unclear	Unclear	No	Yes	No	No
Hien et al (2009)	No	No	No	No	No	No	Yes	Yes	Yes
Hinton et al (2011)	Unclear	Unclear	Unclear	No	Unclear	Unclear	Yes	Unclear	No
Hollifield et al (2007)	No	No	No	No	No	No	Yes	Yes	Yes
Kaslow et al (2010)	No	No	No	No	No	No	Yes	Yes	No
Kelly et al (2016)	Unclear	No	No	Unclear	No	No	Yes	No	Yes
Krakow et al (2001)	No	Yes	No	No	No	No	Yes	No	Yes
Krupnick et al (2008)	Unclear	Unclear	Unclear	No	No	Unclear	Yes	Unclear	Yes
Lau et al (2007)	No	No	No	No	No	Unclear	Yes	No	Yes
McWhirter (2011)	No	No	No	No	No	Unclear	Unclear	No	Yes

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Messina et al 2010	Yes	No	Unclear	Yes	Unclear	No	Yes	No	Yes
Messina et al 2012	Unclear	Unclear	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes
Mitchell et al (2014)	No	Unclear	Unclear	No	No	Unclear	Yes	No	Yes
Rieckert & Moller (2000)	Yes	Unclear	Yes	Yes	Yes	Unclear	Yes	No	No
Sikkema (2007/2013)	Unclear	Unclear	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes
Triado-Munoz (2015)	No	Unclear	Yes	Yes	Yes	Unclear	Yes	Yes	Yes
van der Kolk 2014	Unclear	No	No	No	Unclear	Unclear	Yes	No	Yes
Yeomans et al (2010)	No	No	No	No	No	No	Yes	No	No
Zlotnick et al (1997)	Unclear	Unclear	Unclear	Yes	No	Unclear	Yes	Yes	No
Zoltnick et al (2009)	No	Unclear	Unclear	No	No	No	Yes	Yes	No

¹Data on treatment integrity specifically refers to the reporting of quality assurance/fidelity measures as opposed to patient therapy ratings.
ITT= Intent to Treat

Table 5: Effect size estimates for different treatment categorisations and comparisons

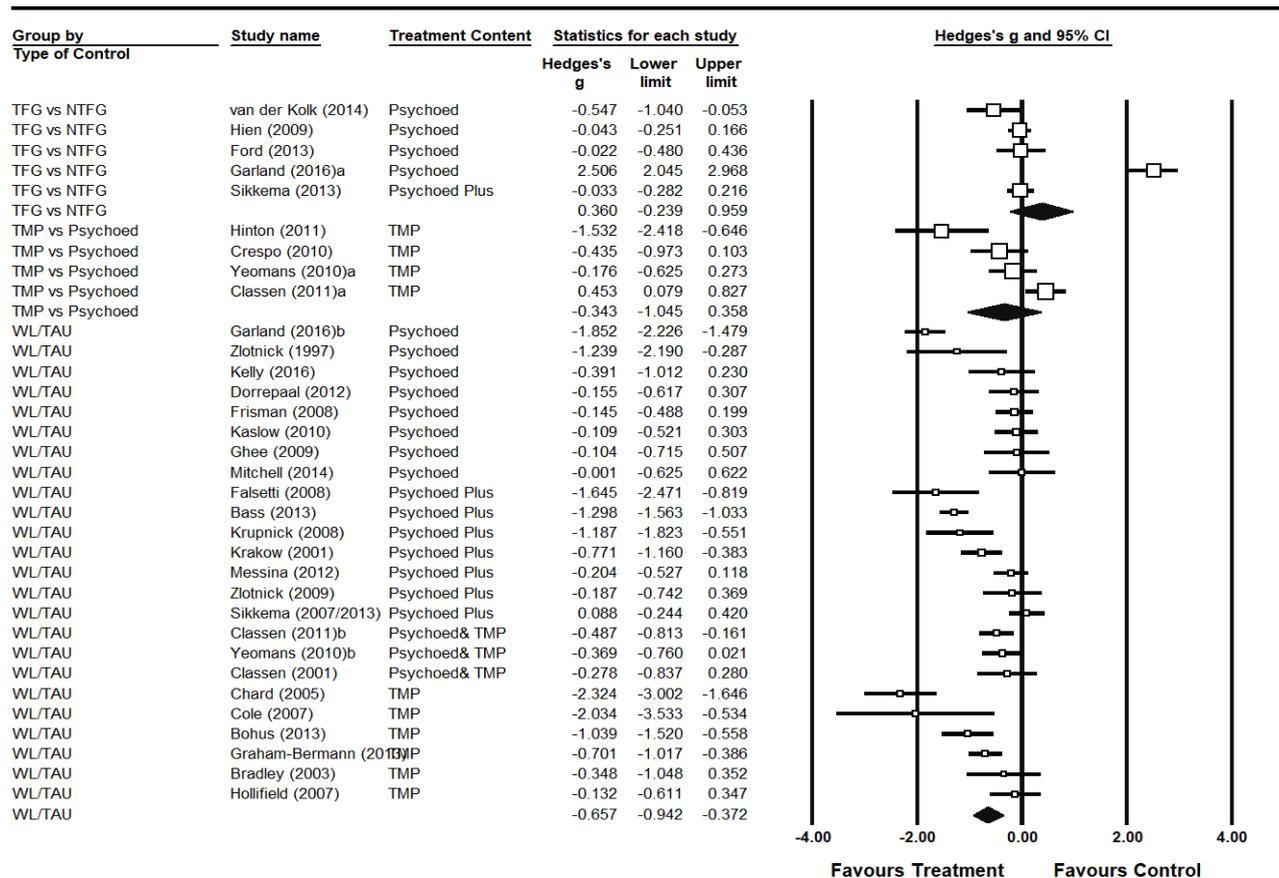
Outcome Domain	k	N group 1	N group 2	Hedges's g	95% CI, p =	I ² , p=	Quality (GRADE)
Group-based trauma interventions compared to usual care							
PTSD	24	1253	976	-0.66	-0.94, -0.37 (p=0.000)	86% (p=0.000)	Low
Depression	17	667	498	-0.95	-1.43, -0.48 (p=0.000)	93% (p=0.000)	Low
Psychological Distress	20	959	715	-0.60	-0.89, -0.32 (p=0.000)	88% (p=0.000)	Very low
Substance Misuse	7	413	260	-0.03	-0.56, 0.50 (p=0.909)	87% (p=0.000)	Very low
Dissociation	7	227	193	-0.70	-1.05, -0.35 (p=0.000)	11% (p=0.346)	Moderate
Group-based trauma interventions compared to non-trauma group-based treatments							
PTSD	5	433	431	0.36	-0.24, 0.96 (p=0.238)	96% (p=0.000)	Very Low
Depression	3	118	120	0.05	-1.06, 1.16 (p=0.926)	75% (p=0.019)	Very Low
Psychological Distress	3	126	127	0.06	-0.66, 0.78 (p=0.865)	4% (p=0.353)	Very Low

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Substance Misuse	4	386	388	0.45	-0.21, 1.12 (p=0.182)	94% (p=0.000)	Very Low
Dissociation	2	61	62	0.18	-0.43, 0.80 (p=0.563)	92% (p=0.001)	Very Low
<i>Psychoeducation group treatments compared to usual care</i>							
PTSD	8	379	252	-0.49	-0.94; -0.03 (p=0.037)	89% (p=0.000)	Moderate
Depression	6	315	192	-0.90	-1.85; 0.05 (p=0.064)	97%(p=0.000)	Low
Psychological Distress	6	321	196	-0.51	-1.09; 0.08 (p=0.091)	88% (p=0.000)	Very low
Substance Misuse	4	267	161	-0.14	-0.86; 0.59 (p=0.714)	92%(p=0.000)	Very low
Dissociation	1	16	17	-0.82	-1.60; -0.04 (p=0.041)	0% (p=1.000)	Very low
<i>Psychoeducation Plus group treatments compared to usual care</i>							
PTSD	10	707	472	-0.60	-1.00; -0.20 (p=0.003)	86% (p=0.000)	Moderate
Depression	4	198	125	-0.77	-1.92; 0.39 (p=0.192)	91%(p=0.000)	Very low
Psychological Distress	7	484	338	-0.38	-0.91; 0.15 (p=0.161)	93% (p=0.000)	Very low
Substance Misuse	3	146	99	0.10	-0.70; 0.89 (p=0.813)	0% (p=0.609)	Very low
Dissociation	2	130	88	-0.79	-1.19; -0.39 (p=0.000)	0% (p=0.331)	Moderate
<i>TMP group treatments compared to usual care</i>							
PTSD	6	167	256	-0.98	-1.53; -0.43 (p=0.000)	85% (p=0.000)	Moderate
Depression	7	154	181	-1.12	-2.01;-0.23 (p=0.014)	86% (p=0.000)	Low
Psychological Distress	7	154	181	-0.98	-1.66; -0.40 (p=0.001)	77%(p=0.000)	Very low

Substance Misuse	-	-	-	-	-	-	-
Dissociation	4	81	88	-0.61*	-0.97; -0.24 (p=0.001)	34% (p=0.205)	Moderate
<i>TMP group treatments compared to Psychoeducational group treatments</i>							
PTSD	4	132	131	-0.34	-1.05; 0.36 (p=0.337)	85% (p=0.000)	Very Low
Depression	3	103	97	0.29	-0.83; 1.4 (p=0.607)	88% (p=0.000)	Low
Psychological Distress	6	204	201	0.19	-0.34; 0.71 (p=0.491)	83% (p=0.000)	Very Low
Substance Misuse	1	30	33	1.10	-0.28; 2.48 (p=0.118)	0% (p=1.000)	Very Low
Dissociation	1	55	56	-0.12	-0.92; 0.67 (p=0.759)	0% (p=1.000)	Very Low

Note. CI = confidence interval, I^2 = I statistic.



Note. Psychoed= Psychoeducation, TMP= Trauma Memory Processing, TFG= Trauma Focused Group, NTFG= Non-Trauma Focused Group (Active Control). Classen (2011)a. TMP arm compared against Psychoeducation arm. Classen (2011)b. Combined TMP and Psychoeducation arm compared against WL arm. Garland (2016)a. CBT Psychoeducation arm compared against NTFG Psychoeducation: Mindfulness-Oriented Recovery Enhancement (MORE). Garland (2016)b. Combined CBT and MORE arms compared to TAU. Sikkema (2007) 'Preliminary' outcome study utilised for WL/TAU comparator. Sikkema (2013) Psychoed Plus compared against NTFG. Yeomans (2010)a. Psychoeducation compared to a TMP arm. Yeomans (2010)b. Combined Psychoeducation and TMP arms compared to WL arm. [See supplementary online material for categorisation decisions]

Fig. 2. Forest plot for PTSD symptoms post treatment effect sizes estimates as grouped by comparators