

**DVA Applied Research Program Project 1131:
Systematic Review and Meta-analysis of Gender
Differences in Outcomes Following Trauma-
focussed Interventions for Posttraumatic Stress
Disorder**

Final Report

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Executive Summary

This research project was funded by the Department of Veterans' Affairs Applied Research Program.

The aim of this study was to undertake a systematic review and meta-analysis to examine whether gender modifies the intervention effect of trauma-focussed psychological interventions for PTSD.

After conducting a systematic review of the literature, 56 studies provided data for the meta-analysis: 31 mixed gender, 19 female only, and six male only.

The findings showed that trauma-focussed interventions were effective in reducing PTSD symptoms for both males and females.

There was some evidence that gender modified the effect of interventions, with females experiencing greater reductions in PTSD symptoms compared with males. This finding was confirmed in a direct effects meta-analysis of studies that provided data on both females and males.

There was some limited evidence that males had greater reductions in PTSD symptoms compared with females at long-term follow-up, although the lack of available data for males suggests that this finding should be treated with caution.

The significant heterogeneity observed in these analyses, and the potential impact of not including some studies because of a lack of available gender-specific data, as well as variability in the reported quality of included studies, suggest the need for caution in interpreting the results of this review.

Further well-designed controlled trials of trauma-focussed interventions are required that recruit women and men who have been exposed to the same type of trauma, with collection of additional data to more fully examine factors hypothesised to influence gender differences in treatment outcomes.



Introduction

Women account for a significant proportion of the Australian Defence Force (ADF), and the Department of Defence has commenced actively recruiting women to the ADF. Women already make up a significant proportion of ADF members on overseas deployments, and by the year 2016, all gender restrictions will be removed from employment categories within the ADF [1]. As a result, increasing numbers of women will be deployed and exposed to combat situations. Deployment and combat exposure have been associated with physical and mental conditions as well as health care utilisation [2-4]. Of note, it is known that women appear to be at increased risk for the development of PTSD, irrespective of trauma type [5]. Therefore, given increasing numbers and the changing roles of women in the ADF, the Departments of Defence and Veterans' Affairs (DVA) can expect increased demand for intervention and support services from serving or ex-serving female military personnel with PTSD and related mental health problems in the years to come.

Despite much conjecture and opinion, there is currently no firm evidence to determine whether women respond better or worse than men to psychological interventions for PTSD. If such a difference does exist, then this will necessitate further efforts to identify gender-related factors that influence intervention response to facilitate optimal psychological intervention for women and men with PTSD. A recent descriptive review by Blain and colleagues [6] concluded that the available research shows support for equivalent outcomes on primary PTSD symptoms for women and men. However, the authors acknowledged significant limitations of their review, including the descriptive and qualitative nature of their review that was limited to studies reporting the effects of gender. A review by Cason and colleagues [7] examined effect sizes of psychological interventions for PTSD from mixed gender, female only and male only controlled studies and concluded that women fared as well if not better than men in reduction of PTSD symptoms. A limitation of this study is that the methodological approach did not enable the authors to quantitatively synthesise gender-specific findings from the studies included in their review.

The aim of this study was to undertake a systematic review and meta-analysis to examine whether gender modifies the intervention effect of trauma-focussed psychological interventions for PTSD. A meta-analysis is a quantitative method of



combining the results of independent studies and synthesising findings from those studies to examine a specific issue or hypothesis. The findings will provide a significant contribution to our understanding of how women and men respond to psychological interventions for PTSD.



Method

The Cochrane Collaboration systematic review methodology was used as a guide for this study, as outlined in the *Cochrane Handbook for Systematic Reviews of Interventions* [8].

Types of studies

The current review considered for inclusion any published or unpublished English language randomised controlled trial (RCT) that tested the efficacy of a trauma-focussed psychological intervention for PTSD, including the recommended trauma-focussed cognitive behavioural therapy (TF-CBT) and Eye Movement Desensitization and Reprocessing (EMDR) [9]. Single gender studies (i.e. female only or male only) or mixed gender studies (i.e. both females and males) were eligible for inclusion. Sample size was not used to determine eligibility for inclusion. Studies with multiple intervention arms (e.g., psychological and pharmacotherapy) were included if at least one intervention arm was of a trauma-focussed intervention. Studies which compared two trauma-focussed interventions only (without any other comparison group) were excluded.

Types of participants

For participants, the following inclusion criteria applied:

- Mean age of participants was at least 15 years old
- At least 70% of participants had a primary diagnosis of PTSD or primary subclinical PTSD as defined by at least one symptom in each of the three symptoms clusters (re-experiencing, avoidance and arousal), or any acceptable and equivalent definition adopted by the authors
- A diagnosis of PTSD or subclinical PTSD was made based on structured diagnostic or clinical interview using DSM or ICD criteria, or a self-report measure of PTSD using a cut-off score pre-defined by the authors
- The duration of PTSD symptoms was at least one month.



Types of interventions

Trauma-focussed psychological intervention was defined as any intervention that encouraged the individual to confront their traumatic memory or situations avoided since the traumatic event, or that challenged the person's unhelpful thoughts or beliefs about their traumatic experience. Trauma-focussed interventions include trauma-focussed cognitive behavioural therapy (CBT) or cognitive therapy, Cognitive Processing Therapy (CPT), Prolonged Exposure (PE), Eye Movement Desensitisation and Reprocessing (EMDR), and narrative exposure therapy. There were no restrictions in terms of the mode of delivering the intervention which meant that studies that examined individual, group, face-to-face, self-help, internet and virtual reality interventions were all considered for inclusion.

Types of comparison conditions

The comparison conditions were categorised as follows: wait list or no intervention, usual care, attention control, pharmacotherapy, and non-trauma-focussed psychological interventions. These individual comparison conditions were also combined into an 'any comparison' condition.

Wait list or no intervention included placement on a wait list for intervention or no intervention at all.

Usual care included interventions or services that would normally be offered in the absence of the study.

Attention control included non-directive interventions such as person-centred therapy or non-specific supportive counselling, psychoeducation, or some other intervention that was judged to primarily provide an equivalent period of contact time as the trauma-focussed intervention.

Pharmacotherapy included pharmacotherapy without any psychological intervention.

Non-trauma-focussed interventions included skills-based interventions that did not explicitly encourage the individual to confront their traumatic memory or situations, or challenge the person's unhelpful thoughts or beliefs about their traumatic experience. These include non-trauma-focussed cognitive and/or behavioural therapy, interpersonal



psychotherapy, problem solving therapy, social skills training, relaxation training, emotion regulation training, and motivational interviewing.

Types of outcome measures

The primary outcome measure was severity of PTSD symptoms using a standardised clinician-rated measure. Clinician-rated measures are widely regarded as the 'gold standard' outcome measure in RCT's.

Secondary outcome measures included self-rated severity of PTSD symptoms, and severity of depression symptoms, using standardised self-report measures.

Search methods for identification of studies

Electronic search

Systematic bibliographic searches were performed to find relevant studies from the following electronic databases:

- The Cochrane Central Register of Controlled Studies (CENTRAL)
- EMBASE
- MEDLINE
- PsychINFO.

Each database was searched separately from inception to our cut-off date of 11th July 2012. The following keywords were used to form the basis of the search strategy: *'Posttraumatic Stress Disorder' OR 'Post-traumatic Stress Disorder' OR 'Stress disorder' OR 'Traumatic stress' AND 'Randomi*ed Clinical Study' OR 'Clinical study' OR 'Meta-Analysis' OR 'random' OR 'random allocation' OR 'Control study'.*

An example of the search strategy conducted in the MEDLINE database is included in Appendix 1.

Other searches

In addition to searching electronic databases, hand-searches were undertaken of the abstracts of the International Society for Traumatic Stress Studies conferences for the years 2008 – 2012, as well as the reference list of the revised Australian Guidelines for the Intervention of Adults with Acute Stress Disorder and Posttraumatic Stress [9].



Data collection and analysis

Assessment and selection of studies

Abstracts of all records retrieved via the search of electronic databases and other sources were independently read by two independent reviewers (D.K. and T.V.) to make a judgment on inclusion or exclusion. Once the record screening was completed, full-text manuscripts for studies judged as definitely or possibly meeting inclusion criteria were retrieved for closer examination. Where a full-text publication was not available, authors were contacted directly to request a manuscript.

Following close examination of these manuscripts, those studies that were deemed potentially suitable for inclusion were independently assessed by two reviewers (D.K and T.V.). Any disagreements about inclusion or exclusion of studies were resolved by discussion with the other review authors (S.H and D.W.).

Data extraction

Data were extracted from all included studies following the full-text assessment. Extracted data included demographics of participants, number of participants randomised, trauma type, characteristics of interventions used, and outcome data. A data extraction sheet was used to record the data. One reviewer (D.K.) extracted the data and two others (T.V. and D.W.) checked the data, with any disagreement resolved by discussion.

Assessment of risk of bias in included studies

Studies were assessed for risk of bias with regard to random sequence generation, allocation concealment and blinded assessment of outcomes in line with the Cochrane Handbook [8]. The risk of bias regarding blinding of outcome assessors was rated as high for studies with self-rated but not clinician-rated PTSD data. Studies were further assessed for percentage of data missing for the meta-analysis, and whether no missing or intent-to-treat (ITT) data, or completer data, were available for the meta-analysis. Missing data were calculated as the percentage of participants randomised in each study who had PTSD data available at the first available follow-up time-point. For studies with both clinician-rated and self-rated PTSD data, missing data calculations were based



on the former. The percentage of missing data was subsequently categorised as 15% or less, or more than 15%. One reviewer (D.K.) carried out the assessment of the risk of bias. A second reviewer (D.W.) independently checked all of the assessments, with any disagreement resolved by discussion.

Measures of treatment effect

The primary and secondary outcome measures of severity of PTSD and depression symptoms were continuous measures and were analysed as standardised mean differences (SMDs) with 95% confidence intervals to allow for ease of comparison across studies that used different measures of the same outcomes.

Unit of analysis issues

For studies with multiple treatment arms that tested two trauma-focussed interventions the data were merged by calculating the total number of participants, and the overall mean and standard deviation, for both intervention conditions.

For studies with more than one comparison condition, data from one of the following comparison conditions were prioritised for inclusion in the 'any comparison' group in the following order: wait list or no intervention, usual care, attention control, pharmacotherapy, and non-trauma-focussed psychological intervention.

Outcome data were sought for the following time-points: post-intervention, short-term follow-up (i.e. one to five months following intervention), and long-term follow-up (i.e. six or more months following intervention). When two sets of outcome data were available for a single follow-up time-point, preference was given to the data collected at the earlier point in time. For example, if outcome data were available at both one and three months post-intervention for a study, then the data at one month was recorded at short-term follow-up.

Dealing with missing data

For mixed gender studies that did not report results separately for females and males, the authors were contacted directly to request gender-specific outcome data including the number of participants and the means and standard deviations of PTSD outcome measures. We did not specifically request data on depression outcome measures to



minimise the demand on study authors. For female only and male only studies that did not report required PTSD outcome data, we contacted authors to request this data. In cases where data was reported in a form unsuitable for meta-analysis (e.g. where standard errors were reported rather than standard deviations) we imputed the required information using the standard errors and sample sizes provided by authors.

Assessment of heterogeneity

A visual inspection of the forest plots was initially used to examine potential heterogeneity. Statistical heterogeneity was assessed on the basis of the Cochrane Handbook's recommendations: I^2 values of 0-40% may not be important; 30% to 60% may represent moderate heterogeneity; 50% to 90% may represent substantial heterogeneity; and 75% to 100% represents considerable heterogeneity [8]. The observed I^2 value depends on (i) the magnitude and direction of effects and (ii) the strength of evidence for heterogeneity in addition to the I^2 value [10]. Therefore, we have presented the results of the chi-square test and its p value and have considered the direction and magnitude of intervention effects.

Data synthesis

For all meta-analyses, no missing or ITT data were combined with completer data and the random effects model was used. In general, random effects are more conservative than fixed-effects models because they take the heterogeneity among studies (that is, the statistical variation between studies caused by clinical, methodological or unknown differences of studies) into account. With decreasing heterogeneity the random effects approach moves towards a fixed-effects model. We made the decision to use a random-effects model given the inclusion of ITT and completer data, as well as the expected heterogeneity of trauma-focussed psychological interventions between studies.

When possible, separate meta-analyses were undertaken comparing a trauma-focussed intervention with the following:

- any comparison condition
- waitlist or no intervention
- usual care
- attention control
- pharamacotherapy



- non-trauma-focussed intervention.

These analyses were based on available data at post-intervention, and short-term and long-term follow-up.

Subgroup analyses

In order to examine whether gender modified the treatment effects of trauma-focussed interventions, planned subgroup analyses were undertaken on the subgroups of females versus males.

Sensitivity analyses

Sensitivity analyses based on subgroup comparisons were planned to assess the robustness of findings regarding the assessment of risk of bias in studies. In separate analyses, the following comparisons were planned:

1. Studies with a low rating of bias versus those with a high or unclear rating of bias on random sequence generation
2. Studies with a low rating of bias versus those with a high or unclear rating of bias on randomisation allocation concealment
3. Studies with a low rating of bias versus those with a high or unclear rating of bias on blinded assessment of outcomes
4. Studies with 15% or less versus those with more than 15% missing data available for analysis
5. Studies with no missing or ITT data versus those with completer data available for analysis.

Further, an analysis was planned to assess whether gender modified the effect of trauma-focussed interventions for PTSD when studies were restricted to those that evaluated a trauma-focussed intervention more likely to be provided by practitioners in routine practice, that is, an individual-based, face-to-face and multiple-session intervention. For this purpose, an intervention was required to meet the following criteria:

1. The intervention is not exclusively group-based (but can involve group sessions).
2. The intervention is not exclusively self-help or delivered online (but can be online assisted)



3. The prescribed number of sessions in the intervention is between 5 and 20.

In addition, a planned direct effects meta-analysis included only those studies that provided data on both males and females within the same study. A direct effects analysis avoids the potential for bias and inflated intervention effects when only indirect evidence is used, that is, when the intervention effect from male only studies is compared to the intervention effect from female only studies. We calculated the mean difference between the intervention effect of males and females and the standard error of this difference. The pooled mean difference was calculated using inverse variance weighting. DerSimonian and Laird's method of moments estimator was used to estimate between-study variance [11].

A second planned meta-analysis of direct comparisons included only those mixed gender studies where participants experienced the same trauma type to examine the impact of gender on the intervention effect without the potential confound of trauma type.

All sensitivity analyses were based on trauma-focussed interventions compared with any comparison condition using clinician-rated PTSD symptoms at post-intervention.

Statistical software

All meta-analyses were performed and pooled effect estimates obtained using the Review Manager statistical software program [12].



Results

Results of the search

Searches of electronic databases and hand searches of other sources identified 2,102 records after exclusion of duplicates. After screening and assessment of full-text articles for eligibility, 112 articles were included. Of these, there were secondary papers of 26 studies, leaving 86 primary studies that met the study inclusion criteria: 57 mixed gender, 20 female only, eight male only, and one of unknown gender. We were unable to obtain data for 30 (34.9%) of the 86 studies.

As a result, 56 studies provided data for inclusion in the meta-analysis: 31 mixed gender, 19 female only, and six male only. A flowchart of the search for studies is shown in Figure 1.

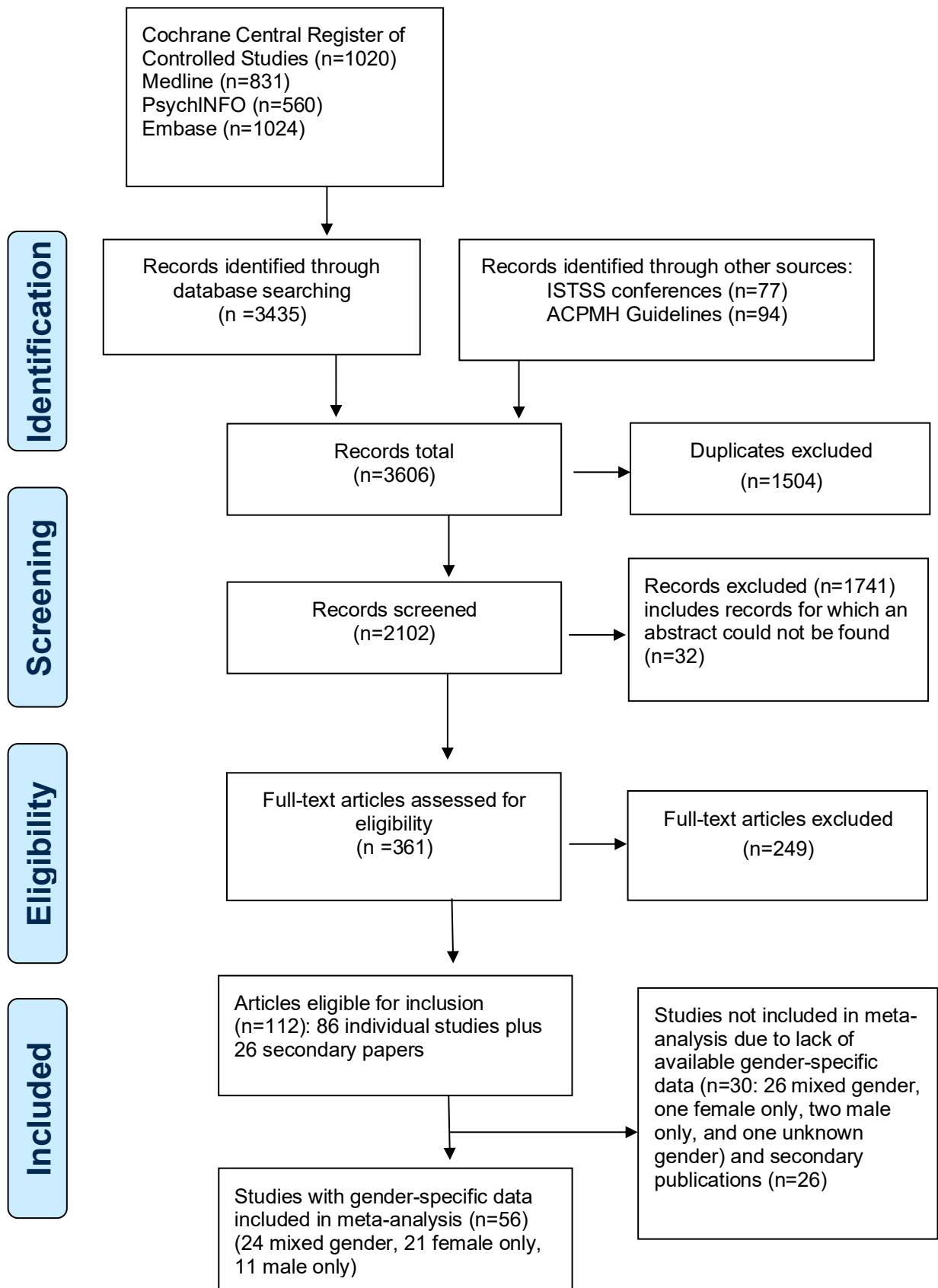


Figure 1. Flowchart of search for studies



Description of studies

Studies not included

Of the 30 studies not included in the meta-analysis, 26 studies had a mixed gender sample, two a male only sample, one a female only sample, and in one study the gender composition of the sample was unknown.

These studies evaluated a range of trauma-focussed interventions including seven studies of cognitive and/or behavioural therapy, six of EMDR, three of PE, two of Narrative Exposure Therapy, two of brief eclectic psychotherapy, one of Cognitive Processing Therapy, one of group therapy including EMDR, one of directed therapeutic exposure, one of implosive flooding, one of image habituation training, one of single session self-exposure, one of written emotional disclosure, one of expressive writing, one of online based interapy therapy, and one of single session testimony.

There were 16 studies with a wait list or no intervention comparison condition, three with a usual care condition, three with an attention placebo condition, two with a pharmacotherapy condition, and five with a non-trauma-focussed intervention condition.

The trauma types experienced by the participants in these studies included: four combat-related (no further details were provided on the exact nature of the trauma), three motor vehicle accidents, one study where participants either had combat-related trauma or sexual assault related trauma; two civil war conflict related; two disaster related; two employment related (i.e. one study where trauma was experienced while working as a police officer and one study where trauma was experienced while working for a public transportation organisation); one serious illness; one terrorism; one where participants experienced sexual or physical assault; and 13 studies were categorised as mixed trauma type with more than three trauma types experienced by the sample.

Studies included

Of the 56 studies included in the meta-analysis, 31 were of mixed gender, 19 female only, and six male only. We obtained usable data for females only in two mixed gender studies [13, 14], and males only in five mixed gender studies [15-19]. Details of each of the studies included in the meta-analysis are shown in Table 1.



The trauma-focussed interventions evaluated in these studies were as follows: 18 studies of cognitive behavioural therapy (CBT), 10 of Prolonged Exposure (PE), five of Narrative Exposure Therapy, four of Eye Movement Desensitisation and Reprocessing (EMDR), four of Cognitive Processing Therapy (CPT), two of cognitive therapy, two of single-session CBT, one of written disclosure, and one of affect and interpersonal regulation skills plus PE.

In addition, there were nine studies that evaluated two trauma-focussed interventions in addition to a comparison condition and for which the data were merged in the meta-analysis. The combination of interventions in these studies included one of each of the following: EMDR and PE plus cognitive restructuring [20], CPT and PE [21], EMDR and PE [22], PE and cognitive therapy [23], PE and PE plus stress inoculation training [24], PE and PE plus cognitive restructuring [25], two types of written disclosure (emotional expression and assimilation) [26], TF-CBT and a structured writing therapy [27] and STAIR (affect and interpersonal regulation) plus PE and supportive counselling plus PE [28]. The duration of interventions lasted between one day and 30 weeks.

Twenty-three studies included a wait list or no intervention comparison condition, nine included usual care, four included attention control, one included pharmacotherapy, and eight studies included a non-trauma-focussed intervention.

Nine studies described the trauma types experienced by participants as military related. Of those nine, five were combat-related, two were combat- and terrorism-related, and two were a combination of multiple traumas: combat-related, sexual traumas, physical assaults and serious accidents. Trauma types of the remaining 48 individual studies were described as rape or sexual assault (nine studies), child sexual or physical abuse (seven studies), motor vehicle accident (three studies), disaster (two studies) and serious illness (two studies), terrorist attacks or motor vehicle accidents (one study) and sudden death of a close person or sexual assault (one study), abduction as child soldiers (one study), genocide (one study), intimate partner abuse (two studies), accidents, assault or witnessing death (one study). In addition, there were 13 mixed trauma type studies, where the participants were identified as having experienced three or more different trauma types. Lastly, four studies did not report the trauma type experienced by participants.



Several different measures were used to assess clinician rated PTSD symptoms: 32 (57.1%) studies used the Clinician Administered PTSD Scale (CAPS); seven (12.5%) studies used the PTSD Symptom Scale Interview (PSS-I); and one study used each of the PTSD Diagnostic Scale- Interview (PDS-I), Scale of Severity of PTSD interview, the Structured Interview for PTSD (SI-PTSD), and a clinical interview based on DSM-III-R criteria.

Of the 56 included studies, 43 (76.8%) reported clinician-rated PTSD data and 37 (66.1%) reported self-rated PTSD data at post-intervention. Twenty-four (42.9%) studies reported both clinician-rated and self-rated PTSD data at post-intervention.

At subsequent follow-up time-points, 21 (37.5%) studies reported clinician-rated PTSD data at short-term follow-up and 15 (26.8%) studies reported this data at long-term follow-up. Similarly, 15 (26.8%) studies reported self-rated PTSD data at short-term follow-up and 13 (23.2%) studies reported this data at long-term follow-up.

Twenty-eight (50.0%) studies reported self-rated depression outcomes at post-intervention, with only 10 (17.9%) at short-term follow up and 8 (14.3%) at long-term follow-up.



Table 1. Characteristics of randomised controlled studies of psychological intervention for PTSD

Study reference and country sample was drawn from	N randomised	Males N (%)	Mean age (SD)§	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
<i>Male only</i>										
Aherns [29] (US)	38	38 (100%)	16.4 (range 15-18)	Not specified	CPT WL	8 / 1 h / 12 weeks		PSS-SR	BDI	Post-intervention
Carlson [30] (US)	35	35 (100%)	EMDR: 52.7 (8.6) WL: 45.4 (3.5) BioFeed: 46.9 (4)	Military combat-related	EMDR WL Biofeedback assisted relaxation	12 / 1-1.5 h / 6 weeks		M-PTSD	BDI	Post-intervention ST: 3 mths ² LT: 9 mths ²
Jensen [31] (US)	29	29 (100%)	43.1 (2.8)	Military combat-related	EMDR WL	3 / not reported / 10 days	SI-PTSD	M-PTSD	n/a	Post-intervention
Ready [32] (US)	11	11 (100%)	VRE: 57 (3.0) PCT: 58 (3.1)	Military combat-related	Virtual reality exposure PCT	10 / 1.5h / not reported	CAPS	IES	BDI	Post-intervention LT: 6 mths
Schnurr [33] (US)	360	360 (100%)	TFGT: 50.6 (3.7) PCT: 50.8 (3.8)	Military combat-related	Trauma-focussed group therapy PCT (group)	30 / 1.5h / 30 weeks PLUS 5 booster sessions / 20 weeks	CAPS	PCL	n/a	Post-intervention ST: 5 mths



Study reference and country sample drawn from	N randomised	Males N (%)	Mean age (SD)§	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
Vera [34] (Peurto Rico)	14	14 (100%)	45.8 (not reported)	Not specified	PE UC	15 / 1.5-2 h / 15 weeks	CAPS		n/a	Post-intervention
Female only										
Bohus [35] (Germany)	74	0 (0%)	DBT: 35.1 (10.6) TAU: 36.7 (9.8)	CSA	Dialectic behavioural therapy (DBT) plus group therapy UC	23 individual and 68 group sessions / 0.4-1.5 h / 12 weeks	CAPS	PDS	BDI-II	Post-intervention ST: 18 weeks LT: 24 weeks
Chard [36] (US)	71	0 (0%)	32.8 (8.9), 18-56	CSA	CPT-SA (individual and group therapy) Minimal attention	Group therapy 17 / 1.5 hr / 17 weeks PLUS individual therapy sessions 9/ 1 h / 9 weeks	CAPS	MPSS-SR	BDI-II	Post-intervention ST: 3 mths ² LT: 12 mths ²
Cloitre [37] (US)	58	0 (0%)	34 (7.2)	CSA, child physical abuse	STAIR WL	16 / 1-2 h / 17 weeks	CAPS	MPSS-SR	BDI	Post-intervention



Study reference and country sample was drawn from	N randomised	Males N (%)	Mean age (SD)§	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
Cloitre [28] (US)	104	0 (0%)	STAIR/exposure: 33.2 (CI: 29.9-36.4) STAIR/support: 37.1 (CI: 34.1-40.1) Support/exposure 38.7 (CI: 35.4-42.0)	CSA, child physical abuse	STAIR/Exposure STAIR+ supportive counselling Supportive counselling+ exposure	16 / not reported / 16 weeks	CAPS		BDI	Post-intervention ST: 3 mths LT: 6 mths
Echeburua [38] (Spain)	20	0 (0%)	22 (6.9)	Rape, attempted rape	CR and specific coping-skills training Progressive muscular relaxation	5 / 1 h / not reported	Severity of PTSD interview		BDI	Post-intervention ST: 1 mths LT: 6 mths
Falsetti [39] (US)	53	0 (0%)	35 (9.8)	Mixed	Multichannel exposure therapy (group therapy) MA	12 / 1.5 h / 12 weeks		MPSS-SR	BDI	Post-intervention
Feske [40] (US)	27	0 (0%)	43.1 (not reported)	Mixed	PE UC	12 / 1.5 h / 12 weeks	PDS-I		BDI	Post-intervention ST: 3 mths



Study reference and country sample d was drawn from	N randomise d	Males N (%)	Mean age (SD)§	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
Foa [24] (US)	96	0 (0%)	34.9 (10.1)	Sexual assault, physical assault	PE WL PE+SIT SIT	9 / 1.5 h / 4.5 weeks	PSS-I		BDI	Post-intervention ST: 3 mths LT: 6 mths
Foa [25] (US)	179	0 (0%)	31.3 (9.8)	Sexual assault	PE WL PE+ cognitive restructuring	12 / 1.5 h / 12 weeks	PSS-I		BDI	Post-intervention ST: 3 mths ² LT: 6 mths ²
Foa [41] (US)	45	0 (0%)	PE: 32 (9.6) WL: 29 (6.3) SC: 34.2 (9.8) SIT: 32.7 (7.3)	Rape	PE WL Supportive counselling SIT	9 / 1.5 h / 4.5 weeks	A clinical interview based on DSM-III-R criteria		BDI	Post-intervention ST: 3.5 mths
Katz [42] (US)	51	0 (0%)	42 (not reported)	Sexual trauma	PE PCT Holographic Processing	Not reported		PCL	BSI-Depression	Post-intervention
Kubany [43] (US)	37	0 (0%)	36.4 (9.1)	Intimate partner abuse	Cognitive trauma Therapy for battered women WL	11 / 2 h / 6 weeks	CAPS		BDI	Post-intervention ST: 3 mths ²



Study reference and country sample was drawn from	N randomised	Males N (%)	Mean age (SD)§	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
Kubany [44] (US)	107	0 (0%)	42.2 (10.1)	Intimate partner abuse	Cognitive Trauma Therapy for battered women WL	8-11 / 2 h / 6 weeks	CAPS		BDI	Post-intervention ST: 3 mths LT: 6 mths
McDonagh [45] (US)	74	0 (0%)	CBT: 39.8 (9.9) WL: 42 (9.8) PCT: 39.6 (9.6)	CSA	CBT WL PCT	14 / 2 h / 14 weeks	CAPS		BDI	Post-intervention ST: 3 mths ² LT: 6 mths ²
Resick [21] (US)	171	0 (0%)	32 (9.90)	Rape	CPT Minimal attention PE	12 / 1.5 h / 6 weeks	CAPS	PSS	BDI	Post-intervention ST: 3 mths LT: 9 mths
Rothbaum [46] (US)	21	0 (0%)	EMDR: 31.6 (9.8) WL: 37.5 (11)	Rape	EMDR WL	3 / 1.5 h / 3 weeks	PSS-I	IES	BDI	Post-intervention ST: 3 mths ²
Rothbaum [22] (US)	72	0 (0%)	33.8 (11)	Rape	EMDR WL PE	9 / 1.5 h / 4-5 weeks	CAPS	IES	BDI	Post-intervention LT: 6 mths ²
Scheck [47] (US)	67	0 (0%)	20.9 (range 16-25)	CSA, child physical abuse, child emotional abuse	EMDR Active listening	2 / not reported / 2 weeks	CAPS	IES	BDI	Post-intervention SR: 3 mths ²



Study reference and country sample was drawn from	N randomised	Males N (%)	Mean age (SD)§	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
Schnurr [48] (US)	284	0 (0%)	PE: 44.6 (CI:43.1-46.2) PCT: 44.9 (CI:43.4-46.5)	Military sexual trauma, physical assault, combat-related	PE PCT	10 / 1.5 h / 10 weeks	CAPS	PCL	BDI	Post-intervention ST: 3 mths LT: 6 mths
Mixed gender studies										
Asukai [13] (Japan) ³	24	3 (13%)	PE 27.1 (5.4) SC 31.4 (8.8)	Sexual assault, physical assault, accidents	PE Supportive counselling	8-15 / 1.5 h / not reported	CAPS	IES	CES-D ⁵	Post-intervention ²
Basoglu [14] (Turkey) ³	59	9 (15%) ⁴	36.3 (11.5)	Earthquake survivors	Single session modified behavioural intervention WL	1 / 1 h / once	CAPS		BDI ⁵	Post-intervention
Beck [49] (US)	44	8 (18%)	GCBT: 55.1 (9.2); MA: 52.9 (10)	MVA	Group CBT MA	14 / 2 h / 14 weeks	CAPS	PSS-SR	BDI ⁵	Post-intervention ST: 3 mths
Difede [15] (US) ⁶	31	30 (97%) ⁴	45.77 (7.72)	Disaster work related to terrorism	CBT UC	12 / 1.3 h / 12 weeks	CAPS	PCL	BDI ⁵	Post-intervention ST: 3 mths



Study reference and country sample was drawn from	N randomised	Males N (%)	Mean age (SD)§	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
DuHamel [50] (US)	89	40 (45%)	CBT: 52.2 (10.5) Assessment only: 49.4 (13.4)	Stem-cell procedure for cancer	CBT Assessment only	10 / 1 h / 10 weeks		PCL-C	BDI ⁵	Post-intervention LT: 9 mths
Dunne [51] (Australia)	26	13 (50%) ¹	32.5 (7.1)	MVA with whiplash associated disorders	TF-CBT WL	10 / 1 h / 10 weeks		PDS	DASS depression ⁵	Post-intervention LT: 6 mths
Ehlers [52] (UK)	85	22 (26%) ⁴	Not reported (targeted 18-65)	MVA	Cognitive therapy Repeated Assessment Self-Help Cognitive Therapy	12 / 1.5 h / 12 weeks	CAPS	PDS	BDI ⁵	Post-intervention LT: 9 mths
Ehlers [53] (UK)	28	13 (46%)	CT: 35 (11) WL: 38 (11)	Accidents, assault, witnessing death	Cognitive therapy WL	12 / 1 h / 13 weeks	CAPS	PDS	BDI ⁵	Post-intervention LT: 6 mths
Ertl [54] (Uganda)	85	37 (48%) ⁴	18 (not reported)	Abducted child soldiers	NET WL Academic catch-up with counselling	8 / 1.5-2 h / not reported	CAPS		MINI ⁵ (clinician-rated)	Post-intervention LT: 6 mths
Forbes [16] (Australia) ⁶	59	57 (96%)	CPT: 53.1 (14) TAU: 53.6 (13.3)	Not specified	CPT UC	12 / 1 h / 24 weeks	CAPS	PCL	n/a	Post-intervention ST: 3 mths



Study reference and country sample was drawn from	N randomised	Males N (%)	Mean age (SD) [§]	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
Jensen [55] (Norway)	156	26 (23%) ⁴	15.1 (2.2)	Mixed	TF-CBT UC	12-15 / not reported / not reported	CAPS-CA	PSS (Child)	MFQ ⁵	Post-intervention
Knaevelsrud [56] (Germany)	96	8 (8%) ⁴	35 (range 18-68)	Sudden or violent death of close person, sexual assault	Online CBT WL	10 / 0.75 h / 5 weeks		IES	BSI – Depression ⁵	Post-intervention ST: 3 mths
Litz [17] (US) ⁶	43	19 (44%) ¹	Online CBT: 38.6 (7.7) Online counselling: 39.6 (7.72)	Military-related, terrorism	Self-managed online CBT Supportive online counselling	No prescribed number of sessions: M= 36.92 (SD=22.82)	PSS-I	PCL	BDI ²	Post-intervention ST: 3 mths LT: 5 mths
McGovern [57] (US)	53	23 (43%)	CBT + SC: 39.1 (11.3) Addiction counselling + UC: 35.5 (9.4)	CSA, child physical abuse, sexual assault	CBT + standard care Addiction counselling + UC	14 / 0.75-1 h / 14 weeks	CAPS		BDI ⁵	Post-intervention LT: 6 mths
McLay [18] (US) ⁶	20	18 (90%) ⁴	Virtual reality exposure: 28 (range: 22.43) TAU: 28.8 (range: 21.5)	Military-related combat	Virtual reality exposure UC	20 / not reported / 10 weeks	CAPS		n/a	Post-intervention
Monson [58] (US)	60	45 (75%) ⁴	CPT: 54.9 (6.5) WL: 53.1 (6.1)	Military-related	CPT WL	12 / not reported / 6 weeks	CAPS	PCL	BDI ⁵	Post-intervention ST: 1 mths



Study reference and country sample d was drawn from	N randomise d	Males N (%)	Mean age (SD)§	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
Monson [59] (Canada and US)	80	8 (10%) ⁴	Conjoint CBT: 40.4 (11.3) WL: 33.8 (10.5)	Mixed	Conjoint CBT WL	15 / not reported / 12 weeks	CAPS	PCL	BDI ⁵	Post-intervention ST: 3 mths
Mueser [60] (US)	108	91 (84%)	44.21 (10.6)	Mixed	CBT WL	12-16 / not reported / not reported	CAPS		BDI ⁵	Post-intervention ST: 3 mths LT: 6 mths
Nacasch [19] (Israel) ⁶	30	26 (87%) ⁴	PE: 34.8 (11.4) UC: 33.7 (11.9)	Military-related combat, terrorism	PE UC	15 / 1.5-2 h / 15 weeks	PSS-I		BDI ⁵	Post-intervention LT: 12 mths
Neuner [61] (Germany)	32	22 (69%)	NET: 31.1 (7.8) UC: 31.6 (7.7)	Mixed	NET UC	Median 9 / 2 h / not reported		PDS	HSCL-25-depression n ⁵	Post-intervention
Neuner [62] (Uganda)	277	135 (49%)	NET: 34.4 (12.2) Monitoring: 35.6 (14) TC: 35.2 (12)	Not specified	NET Monitoring Trauma counselling	6 / 1-2 h / not reported		PDS	n/a	Post-intervention ST: 3 mths
Neuner [63] (Uganda)	43	16 (37%)	NET: 31.9 (6.7) PsychEd: 34.2 (6.9) SC: 33.8 (7.9)	Mixed	NET Psycho-education Supportive counselling	4 / 1.5-2 h / 3 weeks		PDS	n/a	Post-intervention ST: 4 mths LT: 6 mths



Study reference and country sample was drawn from	N randomised	Males N (%)	Mean age (SD)§	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
Pacella [64] (US)	60	20 (34%) ⁴	46 (range 31-61)	HIV and non-HIV related trauma	PE Weekly monitoring	10 / 1.5-2 h / 5 weeks	PSS-I		CESD ⁵	Post-intervention LT: 6 mths
Power [20] (UK)	105	29 (28%)	EMDR: 38.6 (11.8) WL: 36.5 (11.6) PE+CR: 43.2 (11)	Mixed	EMDR WL PE+CR	10 / 1.5 h / 10 weeks	CAPS		HADS and MADRS ⁵	Post-intervention
Schaal [65] (Rwanda)	26	10 (38%)	19.4 (3.6)	Genocide	NET Interpersonal group psychotherapy	4 / 2 h / 4 weeks	CAPS		HDRS ⁵	Post-intervention LT: 6 mths
Schnyder [66] (Switzerland)	30	16 (53%)	39.5(16.9)	Mixed	Brief eclectic psychotherapy Minimal attention	16 / 0.8 h / not reported	CAPS	PDS	HADS ⁵	Post-intervention LT: 6 mths
Shalev [23] (Israel)	242	94 (39%)	PE: 40.1 (12) WL: 37.3 (11.9) CT: 39.5 (12.2) SSRI: 39.8 (11.7)	Terrorism, MVA	PE WL Cognitive therapy SSRI	12 / 2 h / 12 weeks	CAPS	PSS-SR	n/a	Post-intervention ST: 4 mths



Study reference and country sample was drawn from	N randomised	Males N (%)	Mean age (SD) [§]	Trauma type ¹	Types of intervention and comparison	Number of sessions / Session length / Duration intervention	PTSD Clinician-rated	PTSD Self-rated	Depression measures ²	Follow-up time points (ST=Short-term; LT=Long-term)
Sloan [26] (US)	85	21 (9%) ⁴	Emotional expression: 18.5 (0.8) Control writing condition: 18.3 (0.9) Insight and assimilation: 19 (1.3)	Mixed	Written disclosure-emotional expression Control writing condition Written disclosure - insight and cognitive assimilation	3 / 0.3 h / 3 days		PDS	BDI ⁵	Post-intervention
Sloan [67] (US)	47	11 (13%) ⁴	18.9 (1.1)	Mixed	Written emotional disclosure Control writing condition	3 / 0.3 h / 3 days	PSS-I		BDI ⁵	Post-intervention
Spence [68] (Australia)	44	8 (18%)	42.6 (13.1)	Mixed	CBT (online) WL	7 / not reported / not reported		PCL-C	PHQ-9 ⁵	Post-intervention ST: 3 mths
van Emmerik [27] (Netherlands)	125	16 (10%) ⁴	CBT: 38.8 (11.5) WL: 38.9 (11.4) SWT: 42.8 (12.7)	Mixed	CBT WL Structured writing therapy (SWT)	5-10 / 2 h / 5-10 weeks		IES	BDI ⁵	Post-intervention LT: 12 mths (M=381 days)

[§] Age is reported by group where possible. Where group data were not available, age is reported for the total sample. ¹ Mixed refers to instances where more than three different types of trauma were experienced by the sample. ² Measures are self-rated unless otherwise indicated. ³ Only data for female gender was used in MA. ⁴ At post-intervention. ⁵ Data not included in meta-analysis. ⁶ Only data for male gender was used in MA. BDI: Beck Depression Inventory; BSI-Depression: Brief Symptom Inventory – Depression subscale; CAPS: Clinician Administered PTSD Scale; CBT: cognitive-behavioural therapy; CES-D: Center for Epidemiologic Studies – Depression scale; CIDI: Composite International Diagnostic Interview;



CPT (SA): cognitive processing therapy (sexual abuse); CSA: child sexual abuse; CR: cognitive restructuring; DSS: Depression Symptom Scale; DTS: Davidson Trauma Scale; EMDR: eye movement desensitisation and reprocessing; HADS – Hospital anxiety depression scale; HDRS: Hamilton depression rating scale; HSCL-25 (Depression): Hopkins Symptoms Checklist – 25 (Depression); HOPE: helping to overcome PTSD through empowerment; HTQ: Harvard Trauma Questionnaire; IES(R): Impact of Event Scale (Revised); MADRS: Montgomery-Asberg Depression rating Scale; MFQ: Mood and feelings questionnaire; MINI: Mini-International Neuropsychiatric Interview; MMPI: Minnesota Multiphasic Personality Interview; MPSS-SR: Modified PTSD Symptom Scale – Self- report; M-PTSD: Mississippi measure of combat related PTSD; NET: narrative exposure therapy; PCL(C): PTSD Checklist (Civilian version); PDS (I): PTSD Diagnostic Scale (Interview); PCT: person centred therapy; PE: prolonged exposure; PHQ-9: Patient Health Questionnaire; PSS (I, SR): PTSD Symptom Scale (Interview, Self-Report); PTSD: Post-traumatic stress disorder; SCID: Structured Clinical Interview for DSM-IV; SCL- 90-R: Symptom Checklist 90-Revised; SIT: stress inoculation training SI-PTSD: Structured Interview for PTSD; SSRI: selective serotonin reuptake inhibitor; SUD: substance use disorder; STAIR: skills training in affect and interpersonal regulation; TF-CBT: trauma-focussed cognitive-behavioural therapy; UC: usual care; WL: wait list;



Risk of bias in included studies

A summary of the ratings made regarding the risk of bias of included studies is shown in Table 2. The limited information provided in the publications about random sequence generation and randomisation allocation concealment often made it difficult to judge the risk of bias on these methodological aspects of the studies.

The risk of bias for random sequence generation was judged low for 28 (50.0%) studies, high for one (1.8%) study, and unclear for 27 (48.2%) studies.

The risk of bias regarding randomisation allocation concealment was judged low in 14 (25.0%) studies and unclear in 42 (75.0%) studies.

The risk of bias regarding blinding of outcome assessors was judged low in 49 (87.5%) studies, high in five (8.9%) studies, and unclear in 2 (3.6%) studies.

Figure 2 shows a summary of the ratings of risk of bias for the 56 studies included in the meta-analysis.

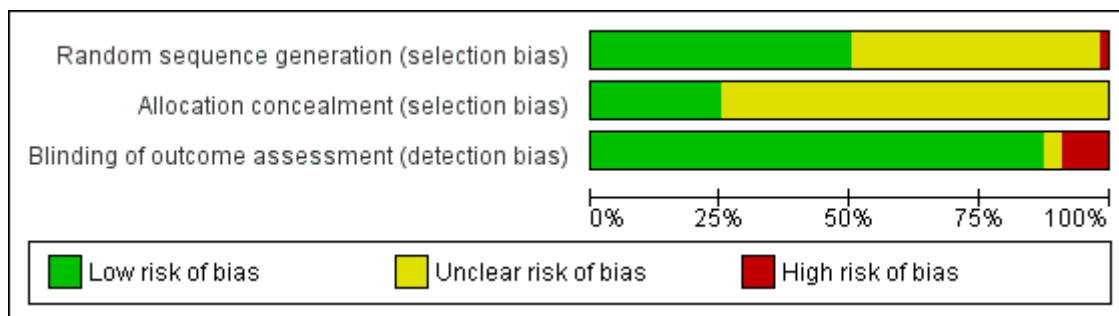


Figure 2: Risk of bias graph

The percentage of participants randomised in each study who did not have data at the first available time-point included in the meta-analysis ranged from 0 to 57%. Thirty-six (65.5%) of the studies had 15% or less missing data at the first available time-point.

Forty (71.4%) studies provided completer data for inclusion in the meta-analysis, 10 (17.9%) studies provided ITT data, and 6 studies (10.7%) had no missing data.

**Table 2. Risk of bias of randomised controlled studies of psychological interventions for PTSD**

Study reference and country	Random sequence generation	Randomisation allocation concealment	Blinding of outcome assessors	Missing data in meta-analysis >15%	% Missing data in meta-analysis ¹	Data used in the meta-analysis
<i>Male only studies</i>						
Aherns [29] (US)	Unclear	Unclear	Low	No	0	No missing
Carlson [30] (US)	Unclear	Unclear	Low	No	3%	Completer
Jensen [31] (US)	Unclear	Unclear	Unclear	No	14%	Completer
Ready [32] (US)	Unclear	Unclear	Low	Yes	18%	Completer
Schnurr [33] (US)	Low	Unclear	Low	No	10%	Completer
Vera [34] (Peurto Rico)	Unclear	Unclear	Low	No	14%	Completer
<i>Female only studies</i>						
Bohus [35] (Germany)	Unclear	Unclear	Low	No	0	ITT, LOCF
Chard [36] (US)	Unclear	Unclear	Low	Yes	23%	Completer
Cloitre [37] (US)	Unclear	Unclear	Unclear	Yes	21%	Completer
Cloitre [28] (US)	Low	Low	Low	No	0%	ITT, multiple imputation
Echeburua [38] (Spain)	High	Unclear	High	No	0%	No missing
Falsetti [39] (US)	Unclear	Unclear	Low	No	12%	Completer



Study reference and country	Random sequence generation	Randomisation allocation concealment	Blinding of outcome assessors	Missing data in meta-analysis >15%	% Missing data in meta-analysis ¹	Data used in the meta-analysis
Feske [40] (US)	Unclear	Unclear	High	Yes	22%	Completer
Foa [24] (US)	Unclear	Unclear	Low	No	14%	Completer
Foa [25] (US)	Low	Unclear	Low	No	0%	ITT, LOCF
Foa [41] (US)	Unclear	Unclear	Low	Yes	18%	Completer
Katz [42] (US)	Unclear	Unclear	Low	Yes	27%	Completer
Kubany [43] (US)	Unclear	Unclear	Low	No	0%	ITT, LOCF
Kubany [44] (US)	Unclear	Unclear	Low	No	0%	ITT, LOCF
McDonagh [45] (US)	Unclear	Unclear	Low	No	0%	ITT, LOCF (post-intervention), Completer (follow-up)
Resick [21] (US)	Unclear	Unclear	Low	No	0%	ITT, LOCF
Rothbaum [46] (US)	Unclear	Unclear	Unclear	Yes	19%	Completer
Rothbaum [22] (US)	Unclear	Unclear	Low	Yes	17%	Completer
Scheck [47] (US)	Low	Low	Low	Yes	15%	Completer
Schnurr [48] (US)	Low	Low	Low	No	0%	ITT, multiple imputation



Study reference and country	Random sequence generation	Randomisation allocation concealment	Blinding of outcome assessors	Missing data in meta-analysis >15%	% Missing data in meta-analysis ¹	Data used in the meta-analysis
Mixed gender studies						
Asukai [13] (Japan)	Low	Unclear	Low	Yes	29%	Completer
Basoglu [14] (Turkey)	Low	Low	Low	No	0%	No missing
Beck [49] (US)	Unclear	Unclear	Low	Yes	23%	Completer
Difede [15] (US)	Low	Low	Low	No	0%	ITT, LOCF
DuHamel [50] (US)	Low	Unclear	Low	Yes	45%	Completer ²
Dunne [51] (Australia)	Unclear	Unclear	Low	No	12%	Completer ²
Ehlers [52] (UK)	Low	Low	Low	No	6%	Completer
Ehlers [53] (UK)	Low	Unclear	Low	No	0%	No missing
Ertl [54] (Uganda)	Unclear	Unclear	Low	No	8%	Completer
Forbes [16] (Australia)	Low	Unclear	Low	No	0%	ITT, multiple imputation
Jensen [55] (Norway)	Low	Unclear	Low	Yes	26%	Completer ²
Knaevelsrud [56] (Germany)	Low	Unclear	Low	No	8%	Completer ²



Study reference and country	Random sequence generation	Randomisation allocation concealment	Blinding of outcome assessors	Missing data in meta-analysis >15%	% Missing data in meta-analysis ¹	Data used in the meta-analysis
Litz [17] (US)	Unclear	Unclear	Low	Yes	49%	Completer
McGovern [57] (US)	Unclear	Unclear	High	Yes	57%	Completer ²
McLay [18] (US)	Low	Low	High	No	5%	Completer
Monson [58] (US)	Low	Unclear	Low	No	15%	Completer ²
Monson [59] (Canada and US)	Low	Low	Low	No	13%	Completer ²
Mueser [60] (US)	Low	Low	Low	Yes	45%	Completer ²
Nacasch [19] (Israel)	Low	Low	Low	No	10%	Completer ²
Neuner [61] (Germany)	Low	Unclear	Low	No	6%	Completer ²
Neuner [62] (Uganda)	Low	Unclear	Low	Yes	57%	Completer ²
Neuner [63] (Uganda)	Low	Unclear	Low	No	6%	Completer ²
Pacella [64] (US)	Low	Unclear	Low	Yes	29%	Completer ²
Power [20] (UK)	Low	Low	High	Yes	31%	Completer
Schaal [65] (Rwanda)	Low	Unclear	Low	No	0	No missing
Schnyder [66] (Switzerland)	Unclear	Unclear	Low	No	0	No missing



Study reference and country	Random sequence generation	Randomisation allocation concealment	Blinding of outcome assessors	Missing data in meta-analysis >15%	% Missing data in meta-analysis ¹	Data used in the meta-analysis
Shalev [23] (Israel)	Low	Unclear	Low	No	13%	Completer
Sloan [26] (US)	Unclear	Unclear	Low	No	5%	Completer
Sloan [67] (US)	Unclear	Low	Low	No	11%	Completer
Spence [68] (Australia)	Low	Low	Low	No	11%	Completer ²
van Emmerik [27] (Netherlands)	Low	Low	Low	Yes	51%	Completer ²

¹ Data reported from the first available time point. Preference was given to clinician-rated rather than self-rated when available.

²Completer data received from the author but ITT data reported in the study.

ITT=Intent-to-treat analysis; LOCF=Last observation carried forward



Differences in the treatment effects of trauma-focussed psychological interventions for PTSD between males and females

A series of meta-analyses were undertaken to examine whether gender modified the effect of trauma-focussed psychological interventions versus any comparison condition, as well as separately for each of the comparison conditions (waitlist or no treatment, usual care, attention control, pharmacotherapy, and non-trauma-focussed interventions) based on clinician and self-rated PTSD symptoms and self-rated depression symptoms at post-intervention, short-term and long-term follow-up.

1. Trauma-focussed interventions versus any comparison

As shown in Table 3, for females and males combined, there were medium to large statistically significant reductions in clinician- and self-rated PTSD symptoms and self-rated depression symptoms for trauma-focussed interventions versus any comparison condition at all available time-points, with the exception of a smaller effect for depression symptoms at long-term follow-up. Heterogeneity was substantial for most of these analyses.

There was evidence that gender modified the intervention effect with a larger and statistically significant effect for females compared with males on clinician-rated PTSD symptoms at post-intervention. The forest plot of clinician-rated PTSD symptoms at post-intervention is shown in Figure 2. The greater effect for females was also evident at short-term but not long-term follow-up.

For self-rated PTSD symptoms, there was some evidence for a larger intervention effect for females at post-intervention, and for males at long-term follow-up, although both results did not reach statistical significance. There was no evidence that gender modified the intervention effect at short-term follow-up.

For self-rated depression symptoms, there was some evidence for a larger intervention effect for males at post-intervention although this analysis was based on data from relatively few males (n=69). There were no data for males at short-term follow-up, and minimal data for males (n=9) at long-term follow-up.

**Table 3. Trauma-focussed psychological interventions versus any comparison**

Outcome	Number of studies	Number of participants	Standard Mean Difference (95% CI)	Heterogeneity	Gender effect
Clinician-rated PTSD symptoms					
Post-intervention					
Males and females combined	38	2559	-0.87 (-1.06, -0.68)*	chi-square=198.38, df=48, p<0.00001; I ² =76%	chi-square=5.14, df=1, p=0.02
Female only	29	1791	-1.02 (-1.27, -0.76)*	chi-square=140.55, df=28, p<0.00001; I ² =80%	
Male only	20	768	-0.60 (-0.86,-0.33)*	chi-square=39.10, df=19, p<0.004; I ² =51%	
Short-term follow-up					
Males and females combined	16	1370	-0.42 (-0.61, -0.22)*	chi-square=45.59, df=22, p=0.002; I ² =52%	chi-square=4.61, df=1, p=0.03
Female only	13	845	-0.54 (-0.81,-0.26)*	chi-square=32.39, df=12, p=0.001; I ² =63%	
Male only	10	525	-0.18 (-0.35, -0.00)*	chi-square=8.45, df=9, p=0.49; I ² =0%	
Long-term follow-up					
Males and females combined	10	799	-0.59 (-0.85,-0.34)*	chi-square=26.50, df=13, p=0.01; I ² =51%	chi-square=1.53, df=1, p=0.22
Female only	8	704	-0.49 (-0.75,-0.23)*	chi-square=14.20, df=7, p=0.05; I ² =51%	
Male only	6	95	-0.91 (-1.52, -0.30)*	chi-square=8.59, df=5, p=0.13; I ² =42%	



Self-rated PTSD symptoms					
Post-intervention					
Males and females combined	32	2340	-0.82 (-1.00, -0.63)*	chi-square=159.10, df=44 p<0.00001; I ² =72%	chi-square=2.74, df=1, p=0.10
Female only	26	1578	-0.93 (-1.17, -0.69)*	chi-square=104.40, df=25, p<0.00001; I ² =76%	
Male only	19	762	-0.62 (-0.90, -0.34)*	chi-square=40.02, df=18, p=0.002; I ² =55%	
Short-term follow-up					
Males and females combined	11	1280	-0.46 (-0.67, -0.25)*	chi-square=35.41, df=15, p=0.002; I ² =58%	chi-square=0.08 df=1, p=0.77
Female only	9	789	-0.43 (-0.73, -0.13)*	chi-square=24.06, df=8, p=0.0002; I ² =67%	
Male only	7	491	-0.49 (-0.83, -0.16)*	chi-square=10.09, df=6, p=0.12; I ² =41%	
Long-term follow-up					
Males and females combined	9	793	-0.65 (-0.92, -0.38)*	chi-square=30.94, df=14, p=0.006; I ² =55%	chi-square=3.64, df=1, p=0.06
Female only	9	674	-0.50 (-0.81, -0.20)*	chi-square=20.63, df=8, p=0.008; I ² =61%	
Male only	6	119	-1.02 (-1.46, -0.59)*	chi-square=3.00, df=5, p=0.70; I ² =0%	



Self-rated depression symptoms					
Post-intervention					
Males and females combined	23	1538	-0.89 (-1.17, -0.62)*	chi-square=116.07 df=22, p<0.00001; I ² =81%	chi-square=4.16, df=1, p=0.04
Female only	20	1469	-0.83 (-1.12, -0.54)*	chi-square=108.26, df=19, p<0.00001; I ² =82%	
Male only	3	69	-1.48 (-2.02, -0.93)*	chi-square=0.09, df=2, p=0.96; I ² =0%	
Short-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	6	674	-0.47 (-0.83, -0.11)*	chi-square=18.89, df=5, p=0.002; I ² =74%	
Male only	0	0	n/a	n/a	
Long-term follow-up					
Males and females combined	5	588	-0.36 (-0.69, -0.03)*	chi-square=10.07, df=4, p=0.04; I ² =60%	chi-square=2.36 df=1, p=0.12
Female only	4	579	-0.31 (-0.62, -0.01)*	chi-square=7.48, df=3, p=0.06; I ² =60%	
Male only	1	9	-1.63 (-3.29, 0.02)	n/a	

*p<0.05

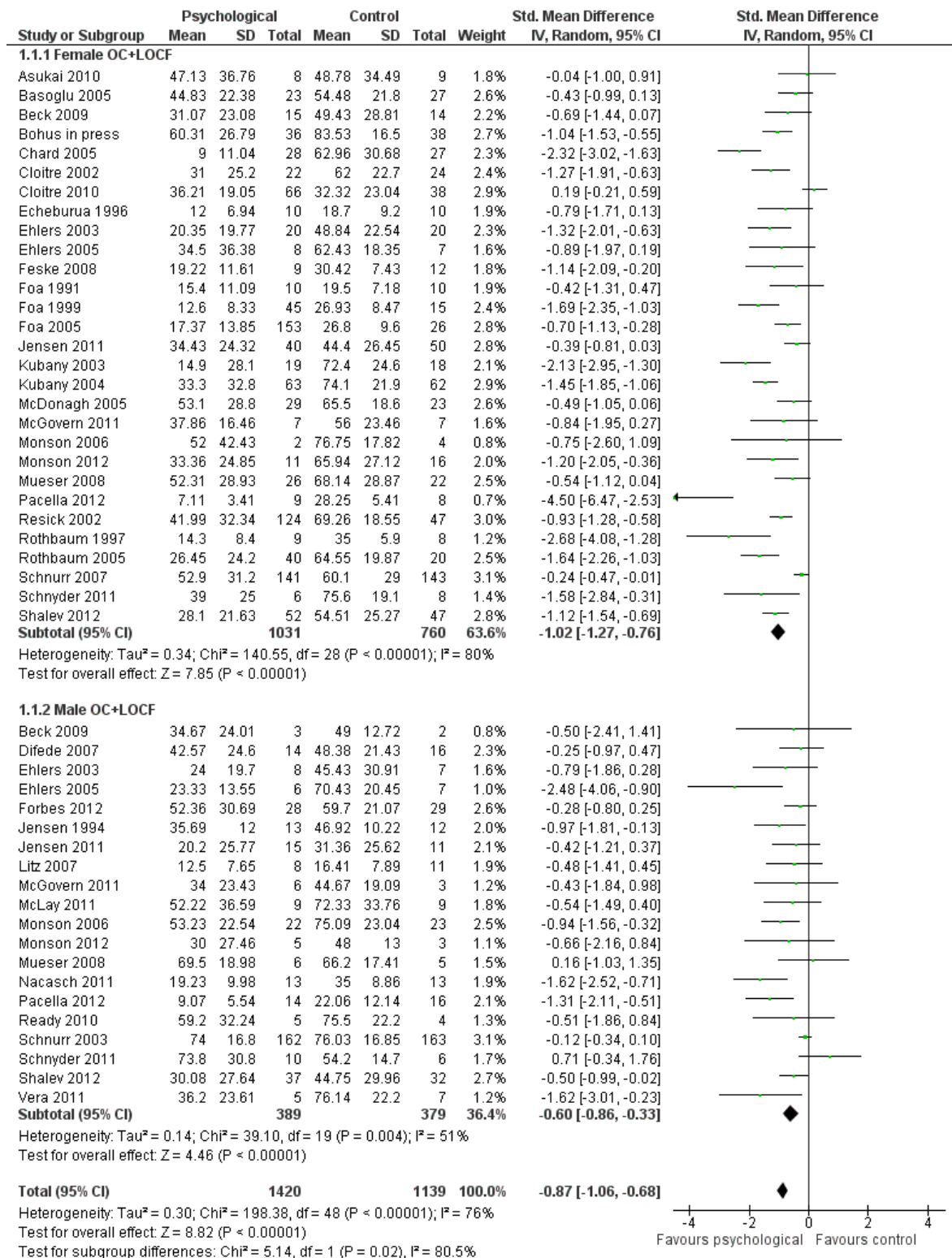


Figure 2. Forest plot of clinician-rated PTSD symptoms post-intervention for trauma-focussed interventions versus any comparison condition



2. Trauma-focussed interventions versus wait list or no intervention

As shown in Table 4, for males and females combined, there were medium to large statistically significant reductions in clinician- and self-rated PTSD symptoms and self-rated depression symptoms for trauma-focussed interventions versus wait list or no intervention at all available time-points. Heterogeneity was moderate to substantial for most of these analyses.

There was evidence that gender modified the intervention effect with a larger intervention effect for females compared with males on clinician-rated PTSD symptoms at post-intervention, although this failed to reach statistical significance (see Appendix 2). There was no evidence for a gender-related intervention effect at short-term or long-term follow-up.

For self-rated PTSD symptoms, there was some evidence for a larger intervention effect for females at post-intervention that did not reach statistical significance. There was no evidence for a gender-related effect at short-term or long-term follow-up.

For self-rated depression symptoms, there was no evidence that gender modified the intervention effect at post-treatment. There were no data for males at short-term and long-term follow-up.



Table 4. Trauma-focussed psychological interventions versus wait list or no intervention

Outcome	Number of studies	Number of participants	Standard Mean Difference (95% CI)	Heterogeneity	Gender effect
Clinician-rated PTSD symptoms					
Post-intervention					
Males and females combined	21	1345	-1.13 (-1.37, -0.90)*	chi-square=84.16, df=28, p<0.00001; I ² =67%	chi-square=3.33, df=1, p=0.07
Female only	20	1119	-1.26 (-1.53, -0.98)*	chi-square=62.06, df=19, p<0.00001; I ² =69%	
Male only	9	226	-0.78 (-1.21, -0.35)*	chi-square=15.60, df=8, p=0.05; I ² =49%	
Short-term follow-up					
Males and females combined	4	317	-0.79 (-1.20, -0.39)*	chi-square=11.47, df=6, p=0.07; I ² =48%	chi-square=0.60, df=1, p=0.44
Female only	4	226	-0.96 (-1.54, -0.38)*	chi-square=5.81, df=3, p=0.12; I ² =48%	
Male only	3	91	-0.61 (-1.27, 0.04)	chi-square=4.18, df=2, p=0.12; I ² =52%	
Long-term follow-up					
Males and females combined	3	279	-0.67 (-0.93, -0.41)*	chi-square=3.31, df=4, p=0.51; I ² =0%	chi-square=0.22, df=1, p=0.64
Female only	3	236	-0.67 (-1.03, -0.30)*	chi-square=2.74, df=2, p=0.25; I ² =27%	
Male only	2	43	-0.50 (-1.11, 0.12)	chi-square=0.18, df=1, p=0.67; I ² =0%	



Outcome	Number of studies	Number of participants	Standard Mean Difference (95% CI)	Heterogeneity	Gender effect
Self-rated PTSD symptoms					
Post-intervention					
Males and females combined	20	1204	-1.07 (-1.28, -0.86)*	chi-square=64.58 df=30, p<0.0002; I ² =54%	chi-square=4.07, df=1, p=0.04
Female only	18	907	-1.22 (-1.45, -0.99)*	chi-square=34.36, df=17, p<0.008; I ² =51%	
Male only	13	297	-0.76 (-1.14, -0.38)*	chi-square=22.76, df=12, p=0.03; I ² =47%	
Short-term follow-up					
Males and females combined	4	329	-0.69 (-1.01, -0.37)*	chi-square=7.98, df=6, p=0.24; I ² =25%	chi-square=0.60, df=1, p=0.44
Female only	4	249	-0.53 (-1.11, -0.06)*	chi-square=7.84, df=3, p=0.05; I ² =62%	
Male only	3	80	-0.83 (-1.33, -0.33)*	chi-square=0.02, df=2, p=0.99; I ² =0%	
Long-term follow-up					
Males and females combined	5	350	-0.81 (-1.04, -0.57)*	chi-square=3.72, df=8, p=0.88; I ² =0%	chi-square=0.05, df=1, p=0.83
Female only	5	262	-0.79 (-1.06, -0.53)*	chi-square=3.60, df=4, p=0.56; I ² =0%	
Male only	4	88	-0.86 (-1.37, -0.35)*	chi-square=0.67, df=3, p=0.88; I ² =0%	



Outcome	Number of studies	Number of participants	Standard Mean Difference (95% CI)	Heterogeneity	Gender effect
Self-rated depression symptoms					
Post-intervention					
Males and females combined	13	906	-1.15 (-1.50, -0.80)*	chi-square=54.31 df=12, p<0.00001; I ² =78%	chi-square=0.44, df=1, p=0.51
Female only	12	868	-1.13 (-1.50, -0.76)*	chi-square=53.20, df=11, p<0.00001; I ² =79%	
Male only	1	38	-1.41 (-2.12, -0.69)*	n/a	
Short-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	1	171	-0.71 (-1.05, -0.36)*	n/a	
Male only	0	0	n/a	n/a	
Long-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	1	171	-0.67 (-1.01, -0.33)*	n/a	
Male only	0	0	n/a	n/a	

*p<0.05



3. Trauma-focussed interventions versus usual care

As shown in Table 5, for males and females combined, there were medium to large statistically significant reductions in clinician- and self-rated PTSD symptoms and self-rated depression symptoms for trauma-focussed interventions versus usual care at all available time-points. Heterogeneity was small for analyses based on self-rated PTSD symptoms, and moderate to substantial for the analyses based on clinician-rated PTSD symptoms and self-rated depression symptoms.

There was evidence that gender modified the intervention effect with a larger intervention effect for females compared with males on clinician-rated PTSD symptoms at short-term follow-up, although this just failed to reach statistical significance ($p=0.05$). There was no evidence that gender modified the intervention effect at post-intervention or long-term follow-up (see Appendix 3).

For self-rated PTSD symptoms, there was no evidence that gender modified the intervention effect at post-intervention, short-term or long-term follow-up.

For self-rated depression symptoms, there was no evidence that gender modified the intervention effect at post-intervention. There were no data available for males at short-term follow-up and for both females and males at long-term follow-up.

**Table 5. Trauma-focussed psychological interventions versus usual care**

Outcome	Number of studies	Number of participants	Standard Mean Difference (95% CI)	Heterogeneity	Gender effect
Clinician-rated PTSD symptoms					
Post-intervention					
Males and females combined	10	430	-0.60 (-0.86, -0.33)*	chi-square=17.80, df=11, p=0.09; I ² =38%	chi-square=0.05, df=1, p=0.82
Female only	5	250	-0.64 (-0.99, -0.28)*	chi-square=6.67, df=4, p=0.15; I ² =40%	
Male only	7	180	-0.57 (-1.01, -0.14)*	chi-square=10.77, df=6, p=0.10; I ² =44%	
Short-term follow-up					
Males and females combined	4	217	-0.56 (-0.94, -0.17)*	chi-square=6.92, df=4, p=0.14; I ² =42%	chi-square=3.89, df=1, p=0.05
Female only	3	149	-0.77 (-1.16, -0.38)*	chi-square=2.56, df=2, p=0.28; I ² =22%	
Male only	2	68	-0.15 (-0.63, 0.33)	chi-square=0.07, df=1, p=0.79; I ² =0%	
Long-term follow-up					
Males and females combined	2	77	-1.04 (-2.11, -0.04)*	chi-square=7.07, df=2, p=0.03; I ² =72%	chi-square=0.29, df=1, p=0.59
Female only	1	44	-0.68 (-1.30, -0.05)*	chi-square=4.94, df=1, p=0.03; I ² =80%	
Male only	2	33	-1.24 (-3.17, 0.69)	chi-square=4.94, df=1, p=0.03; I ² =80%	



Self-rated PTSD symptoms					
Post-intervention					
Males and females combined	7	345	-0.54 (-0.76, -0.33)*	chi-square=5.58, df=8, p=0.69; I ² =0%	chi-square=0.02, df=1, p=0.88
Female only	4	205	-0.52 (-0.85, -0.19)*	chi-square=3.73, df=3, p=0.29; I ² =20%	
Male only	5	140	-0.56 (-0.90, -0.21)*	chi-square=1.85, df=4, p=0.76; I ² =0%	
Short-term follow-up					
Males and females combined	3	157	-0.74 (-1.07, -0.42)*	chi-square=2.57, df=3, p=0.46; I ² =0%	chi-square=0.08, df=1, p=0.78
Female only	2	92	-0.73 (-1.45, -0.01)*	chi-square=2.04, df=1, p=0.15; I ² =51%	
Male only	2	65	-0.61 (-1.11, -0.11)*	chi-square=0.03, df=1, p=0.86; I ² =0%	
Long-term follow-up					
Males and females combined	2	55	-1.09 (-1.69, -0.50)*	chi-square=2.39, df=3, p=0.49; I ² =0%	chi-square=1.53, df=1, p=0.22
Female only	2	24	-0.72 (-1.56, -0.12)*	chi-square=0.02, df=1, p=0.89; I ² =0%	
Male only	2	31	-1.47 (-2.31, -0.63)*	chi-square=0.85, df=1, p=0.36; I ² =0%	



Self-rated depression symptoms					
Post-intervention					
Males and females combined	4	134	-0.94 (-1.55, -0.34)*	chi-square=6.65, df=3, p=0.08; I ² =55%	chi-square=1.58, df=1, p=0.21
Female only	3	112	-0.77 (-1.50, -0.04)*	chi-square=5.37, df=2, p=0.07; I ² =63%	
Male only	1	22	-1.55 (-2.53, -0.57)*	n/a	
Short-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	2	95	-1.04 (-1.48, -0.61)*	chi-square=0.01, df=1, p=0.90; I ² =0%	
Male only	n/a	n/a	n/a	n/a	
Long-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	n/a	n/a	n/a	n/a	
Male only				n/a	

*p<0.05



4. Trauma-focussed interventions versus attention control

As shown in Table 6, for males and females combined, there were small to medium statistically significant reductions in clinician-rated and self-rated PTSD symptoms for trauma-focussed interventions versus attention control at post-intervention and short-term follow-up. The small effect favouring trauma-focussed interventions based on clinician-rated PTSD symptoms at long-term follow-up just failed to reach statistical significance. There were no data available for males based on self-rated PTSD symptoms at long-term follow-up. The small to medium effects favouring trauma-focussed interventions based on self-rated depression symptoms at post-intervention and long-term follow-up were not significant. There were no data available for males based on self-rated depression symptoms at short-term follow-up. Heterogeneity was small for analyses based on clinician-rated PTSD symptoms as well as self-rated PTSD symptoms at short-term follow-up. Heterogeneity was moderate for self-rated PTSD symptoms at post-intervention as well as self-rated depression symptoms at post-intervention and long-term follow-up.

For clinician-rated PTSD symptoms, there was no evidence that gender modified the intervention effect at post-intervention, short-term or long-term follow-up.

For self-rated PTSD symptoms, there was some evidence for a greater intervention effect for females at post-intervention, although this failed to reach statistical significance ($p=0.08$) and was based on one study by Schnurr and colleagues [33]. There was no evidence for a gender-related effect at short-term follow-up.

For self-rated depression symptoms, there were too few data for males ($n=9$) at both post-intervention and long-term follow-up (and no data at short-term follow-up), to adequately assess for whether gender modified the intervention effect.



Table 6. Trauma-focussed psychological interventions versus attention control

Outcome	Number of studies	Number of participants	Standard Mean Difference (95% CI)	Heterogeneity	Gender effect
Clinician-rated PTSD symptoms					
Post-intervention					
Males and females combined	5	688	-0.16 (-0.31, -0.01)*	chi-square=3.08, df=4, p=0.54; I ² =0%	chi-square=0.08, df=1, p=0.78
Female only	2	335	-0.08 (-0.51, 0.35)	chi-square=2.23, df=1, p=0.14; I ² =55%	
Male only	3	353	-0.15 (-0.36, 0.06)	chi-square=0.83, df=2, p=0.66; I ² =0%	
Short-term follow-up					
Males and females combined	5	703	-0.15 (-0.30, -0.01)*	chi-square=2.62, df=5, p=0.76; I ² =0%	chi-square=0.47, df=1, p=0.49
Female only	3	354	-0.21 (-0.42, 0.00)*	chi-square=1.61, df=2, p=0.45; I ² =0%	
Male only	3	349	-0.10 (-0.31, 0.11)	chi-square=0.54, df=2, p=0.76; I ² =0%	
Long-term follow-up					
Males and females combined	3	327	-0.18 (-0.39, 0.04)	chi-square=1.63, df=2, p=0.44; I ² =0%	chi-square=0.93, df=1, p=0.33
Female only	2	318	-0.16 (-0.38, 0.06)	chi-square=0.70, df=1, p=0.40; I ² =0%	
Male only	1	9	-0.87 (-2.29, 0.55)	n/a	



Self-rated PTSD symptoms					
Post-intervention					
Males and females combined	4	687	-0.31 (-0.56, -0.06)*	chi-square=5.87, df=3, p=0.12; I ² =49%	chi-square=3.06, df=1, p=0.08
Female only	3	362	-0.43 (-0.68, -0.17)*	chi-square=2.31, df=2, p=0.32; I ² =13%	
Male only	1	325	-0.12 (-0.34, 0.09)	n/a	
Short-term follow-up					
Males and females combined	3	690	-0.19 (-0.34, -0.04)*	chi-square=0.98, df=3, p=0.81; I ² =0%	chi-square=0.77, df=1, p=0.38
Female only	2	344	-0.25 (-0.47, 0.04)	chi-square=0.00, df=1, p=0.99; I ² =0%	
Male only	2	346	-0.12 (-0.33, 0.09)	chi-square=0.21, df=1, p=0.65; I ² =0%	
Long-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	1	284	-0.19 (-0.42, 0.04)	n/a	
Male only	n/a	n/a	n/a	n/a	



Self-rated depression symptoms					
Post-intervention					
Males and females combined	5	425	-0.25 (-0.65, 0.15)	chi-square=9.47, df=4, p=0.05; I ² =58%	chi-square=2.79, df=1, p=0.09
Female only	4	416	-0.18 (-0.55, 0.19)	chi-square=6.67, df=3, p=0.08; I ² =55%	
Male only	1	9	-1.62 (-3.27, 0.03)	n/a	
Short-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	2	318	-0.22 (-0.45, 0.00)*	chi-square=0.31, df=3, p=0.58; I ² =0%	
Male only	n/a	n/a	n/a	n/a	
Long-term follow-up					
Males and females combined	3	327	-0.40 (-0.99, 0.19)	chi-square=4.54, df=2, p=0.10; I ² =56%	chi-square=2.78, df=1, p=0.10
Female only	2	318	-0.19 (-0.56, 0.17)	chi-square=1.45, df=1, p=0.23; I ² =31%	
Male only	1	9	-1.63 (-3.29, 0.02)	n/a	

*p<0.05



5. Trauma-focussed interventions versus pharmacotherapy

As shown in Table 7, for males and females combined, there were medium to large statistically significant reductions in clinician and self-rated PTSD symptoms for trauma-focussed interventions compared with pharmacotherapy at post-intervention and short-term follow-up. Heterogeneity was small for all these analyses. There were no data available based on clinician-rated and self-rated PTSD symptoms at long-term follow-up or self-rated depression symptoms at any time-point.

For clinician and self-rated PTSD symptoms, there was no evidence that gender modified the intervention effect at post-intervention or short-term follow-up.



Table 7. Trauma-focussed psychological interventions versus pharmacotherapy

Outcome	Number of studies	Number of participants	Standard Mean Difference (95 % CI)	Heterogeneity	Gender effect
Clinician-rated PTSD symptoms					
Post-intervention					
Males and females combined	1	110	-0.78 (-1.26, -0.29)*	chi-square=0.28, df=1, p=0.60; I ² =0%	chi-square=0.28, df=1, p=0.60
Female only	1	64	-0.89 (-1.54, -0.24)*	n/a	
Male only	1	46	-0.63 (-1.37, 0.11)	n/a	
Short-term follow-up					
Males and females combined	1	105	-1.03 (-1.55, -0.51)*	chi-square=0.27, df=1, p=0.60; I ² =0%	chi-square=0.27, df=1, p=0.60
Female only	1	59	-1.15 (-1.84, -0.46)*	n/a	
Male only	1	46	-0.87 (-1.66, -0.09)*	n/a	
Long-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	n/a	n/a	n/a	n/a	
Male only	n/a	n/a	n/a	n/a	



Outcome	Number of studies	Number of participants	Standard Mean Difference (95 % CI)	Heterogeneity	Gender effect
Self-rated PTSD symptoms					
Post-intervention					
Males and females combined	1	107	-0.95 (-1.44, -0.45)*	chi-square=0.15, df=1, p=0.70; I ² =0%	chi-square=0.15, df=1, p=0.70
Female only	1	63	-0.86 (-1.51, -0.21)*	n/a	
Male only	1	44	-1.06 (-1.83, -0.29)*	n/a	
Short-term follow-up					
Males and females combined	1	104	-0.98 (-1.49, -0.46)*	chi-square=0.98, df=1, p=0.33; I ² =0%	chi-square=0.97, df=1, p=0.33
Female only	1	59	-0.76 (-1.43, -0.09)*	n/a	
Male only	1	45	-1.29 (-2.10, -0.48)*	n/a	
Long-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	n/a	n/a	n/a	n/a	
Male only	n/a	n/a	n/a	n/a	



Self-rated depression symptoms					
Post-intervention					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	n/a	n/a	n/a	n/a	
Male only	n/a	n/a	n/a	n/a	
Short-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	n/a	n/a	n/a	n/a	
Male only	n/a	n/a	n/a	n/a	
Long-term follow-up					
Males and females combined	n/a	n/a	n/a	n/a	n/a
Female only	n/a	n/a	n/a	n/a	
Male only	n/a	n/a	n/a	n/a	

*p<0.05



6. Trauma-focussed interventions versus non-trauma-focussed interventions

As shown in Table 8, for males and females combined, there were small to medium reductions in clinician-rated PTSD symptoms for trauma-focussed interventions compared with non-trauma-focussed interventions at all time-points, although the only statistically significant finding was at long-term follow-up. There was a small non-significant effect favouring trauma-focussed interventions based on self-rated PTSD symptoms at post-intervention and long-term follow-up, with no clear effect for either type of intervention at short-term follow-up. For self-rated depression symptoms, there was no clear effect for either type of intervention at post-intervention, and a small non-significant effect at short-term follow-up and a medium statistically significant effect at long-term follow-up that favoured trauma-focussed interventions. Heterogeneity ranged from small to substantial for these analyses.

For clinician and self-rated PTSD symptoms, there was no evidence for a gender-related intervention effect at any time-point, although there were relatively few data available for males at most time-points.

For self-rated depression symptoms, there were too few data available for males at all time-points to adequately assess for a gender-related intervention effect.



Table 8. Trauma-focussed psychological interventions versus non-trauma-focussed interventions

Outcome	Number of studies	Number of participants	Standard Mean Difference (95% CI)	Heterogeneity	Gender effect
Clinician-rated PTSD symptoms					
Post-intervention					
Males and females combined	6	299	-0.36 (-0.75, 0.04)	chi-square=15.14, df=7, p=0.03; I ² =54%	chi-square=0.70, df=1, p=0.40
Female only	6	275	-0.31 (-0.75, 0.14)	chi-square=13.36, df=5, p=0.02; I ² =63%	
Male only	2	24	-0.72 (-1.58, 0.14)	chi-square=0.26, df=1, p=0.61; I ² =0%	
Short-term follow-up					
Males and females combined	7	304	-0.15 (-0.39, 0.08)	chi-square=4.69, df=9, p=0.86; I ² =0%	chi-square=0.22, df=1, p=0.64
Female only	7	266	-0.18 (-0.43, 0.08)	chi-square=4.16, df=6, p=0.66; I ² =0%	
Male only	3	38	-0.00 (-0.68, 0.67)	chi-square=0.31, df=2, p=0.86; I ² =0%	
Long-term follow-up					
Males and females combined	7	318	-0.49 (-0.80, -0.17)*	chi-square=13.58, df=9, p=0.14; I ² =34%	chi-square=2.21, df=1, p=0.14
Female only	6	260	-0.36 (-0.76, 0.03)	chi-square=10.34, df=5, p=0.07; I ² =52%	
Male only	4	58	-0.89 (-1.46, -0.32)*	chi-square=0.28, df=3, p=0.96; I ² =0%	



Outcome	Number of studies	Number of participants	Standard Mean Difference (95% CI)	Heterogeneity	Gender effect
Self-rated PTSD symptoms					
Post-intervention					
Males and females combined	5	233	-0.26 (-0.85, 0.33)	chi-square=23.09, df=6, p=0.0008; I ² =74%	chi-square=0.95, df=1, p=0.33
Female only	4	185	-0.05 (-0.94, 0.84)	chi-square=19.75, df=3, p=0.0002; I ² =85%	
Male only	3	48	-0.58 (-1.17, 0.00)	chi-square=0.50, df=2, p=0.78; I ² =0%	
Short-term follow-up					
Males and females combined	4	308	-0.01 (-0.24, 0.22)	chi-square=4.50, df=5, p=0.48; I ² =0%	chi-square=0.14, df=1, p=0.71
Female only	3	205	0.02 (-0.26, 0.30)	chi-square=1.06, df=2, p=0.59; I ² =0%	
Male only	3	103	-0.11 (-0.73, 1.50)	chi-square=3.34, df=2, p=0.19; I ² =40%	
Long-term follow-up					
Males and females combined	5	297	-0.33 (-0.78, 0.11)	chi-square=19.93, df=7, p=0.006; I ² =65%	chi-square=0.21, df=1, p=0.65
Female only	3	215	-0.26 (-0.87, 0.35)	chi-square=12.06, df=3, p=0.0007; I ² =75%	
Male only	4	82	-0.49 (-1.31, 0.32)	chi-square=7.70, df=3, p=0.05; I ² =61%	



Outcome	Number of studies	Number of participants	Standard Mean Difference (95% CI)	Heterogeneity	Gender effect
Self-rated depression symptoms					
Post-intervention					
Males and females combined	6	270	-0.07 (-0.39, 0.25)	chi-square=7.10, df=5, p=0.21; I ² =30%	chi-square=3.13, df=1, p=0.08
Female only	5	248	-0.02 (-0.28, 0.25)	chi-square=3.97, df=4, p=0.41; I ² =0%	
Male only	1	22	-0.85 (-1.73, 0.03)	n/a	
Short-term follow-up					
Males and females combined	5	224	-0.24 (-0.54, 0.06)	chi-square=4.34, df=4, p=0.36; I ² =8%	chi-square=1.82, df=1, p=0.18
Female only	4	206	-0.17 (-0.46, 0.12)	chi-square=2.52, df=3, p=0.47; I ² =0%	
Male only	1	18	-0.87 (-1.85, 0.11)	n/a	
Long-term follow-up					
Males and females combined	4	189	-0.44 (-0.84, -0.04)*	chi-square=4.16, df=3, p=0.24; I ² =28%	chi-square=3.49, df=1, p=0.06
Female only	3	177	-0.33 (-0.64, -0.03)*	chi-square=0.67, df=2, p=0.71; I ² =0%	
Male only	1	12	-1.78 (-3.26, -0.30)*	n/a	

*p<0.05



Sensitivity analyses

The planned analyses to investigate the robustness of the results to risk of bias showed that the intervention effects were modified by risk of bias regarding random sequence generation (chi-square =7.36, df=1, p=0.007) and randomisation allocation concealment (chi-square =6.54, df=1, p=0.01), with a smaller intervention effect for studies with low ratings of bias. There was also some evidence for a smaller intervention effect for studies with no missing or ITT data compared with completer data, although this finding was not significant (chi-square =3.01, df = 1, p=0.08). The intervention effects were not modified by risk of bias regarding blinding of outcome assessors (chi-square =0.27, df=1, p=0.60) or the percentage of participants with 15% or less versus more than 15% missing data available (chi-square =0.45, df=1, p=0.50)

Seven (out of 38) studies were excluded from an analysis restricted to those that evaluated a trauma-focussed intervention more likely to be provided by practitioners in routine practice, that is individual-based, face-to-face and multiple-session interventions [14, 17, 31, 33, 35, 46, 49]. In this analysis, for two studies that tested two trauma-focussed interventions, we used the “unmerged” data for the intervention without a non-trauma component; that is, we used the data for prolonged exposure and not prolonged exposure plus stress inoculation in the study by Foa and colleagues [24], and we used the data for affect and interpersonal regulation treatment plus prolonged exposure and not supportive counselling plus prolonged exposure in the study by Cloitre and colleagues [28]. When the seven studies were excluded, the intervention effect remained the same, and gender still modified the intervention effect (chi-square=4.33, df =1, p=0.04; heterogeneity for females and males combined: $I^2 = 78\%$).

A direct effects meta-analysis included only those studies that provided data on both females and males within the same study [23, 49, 52, 53, 55, 58-60, 64, 66]. The findings showed that gender modified the intervention effect, with a greater effect for females compared to males (mean difference 10.00; 95% CI 1.21 to 18.79). Heterogeneity appeared to be relatively unimportant (chi-square = 12.18, df=9, p=0.20; $I^2 = 26\%$). A second analysis was restricted to those studies that recruited participants who had experienced the same type of trauma, which resulted in the inclusion of two studies of participants who had experienced a motor vehicle accident [49, 52]. The findings showed that gender modified the intervention effect but was no longer



significant (mean difference 5.89; 95% CI -17.42 to 29.21) and heterogeneity was unlikely to be important ($I^2 = 0\%$). It was not possible to undertake a direct effects meta-analysis of military-related trauma because only one study by Monson and colleagues [58] provided mixed gender data, and in this study there were relatively few data available for females and participants were exposed to various index trauma including combat or physical or sexual assault.



Discussion

Main findings

The findings of this meta-analysis showed that trauma-focussed interventions were effective in reducing PTSD symptoms for both males and females, with mostly medium to large effect sizes for the comparisons with any comparison condition, as well as wait list and usual care, based on the primary outcome measure of clinician-rated PTSD symptoms as well as self-rated PTSD symptoms. Not unexpectedly, the type of comparison condition had an impact on the size of intervention effects, with greater intervention effects found for the less intensive comparison conditions of wait list and usual care compared with the more intensive conditions of attention control and non-trauma-focussed interventions. The large intervention effects for trauma-focussed interventions compared with pharmacotherapy interventions were derived from only one study [23].

Importantly, there was some evidence that gender modified the effect of interventions, with females experiencing greater reductions in PTSD symptoms compared with males. Of note, statistically significant results were found for comparisons between trauma-focussed interventions and any comparison condition based on the primary outcome of clinician-rated PTSD symptoms at both post-intervention and short-term follow-up. There was some limited evidence that males had greater reductions in PTSD symptoms compared with females at long-term follow-up, although this finding was not statistically significant and the relatively few males contributing data to the analysis means that this finding should be treated with caution.

The finding that females had greater reductions in PTSD symptoms compared with males was confirmed in a direct effects meta-analysis of studies that provided data on both females and males. Further, in an attempt to disentangle the potentially confounding effect of trauma type, the direct effects meta-analysis was repeated using data from only those studies of participants with the same trauma type. Based on two studies of survivors of motor vehicle accidents, the findings showed that females had greater reductions in PTSD symptoms compared with males, although this finding was not significant. Due to limited available data it was not possible to undertake a direct effects meta-analysis of participants exposed to military-related trauma.



The findings also showed that trauma-focussed interventions were effective in reducing depression symptoms for both males and females. Overall, there were relatively few, if any, data available for analyses to examine potential gender differences in reduction of depression symptoms. There was some evidence that males had greater reductions in depression symptoms at post-intervention, although the lack of available data for males suggests that considerable caution should be exercised in interpreting this result.

There was considerable clinical diversity within the trauma-focussed interventions, which included cognitive and/or behavioural therapies, EMDR, narrative therapy, and other types of interventions, and as a group these interventions varied considerably in terms of their duration and planned number of sessions. An attempt was made to investigate this heterogeneity (that is, the statistical variation between studies caused by clinical, methodological or unknown differences of studies) by performing a sensitivity analysis restricted to those studies that evaluated individual-based, face-to-face and multiple-session trauma-focussed interventions. This analysis confirmed that females showed greater reductions in PTSD symptoms compared with males, although heterogeneity remained substantial. It is possible that sample characteristics, the type and severity of trauma, the severity of PTSD and comorbid conditions, or a combination of these and/or other clinical and methodological factors contributed to heterogeneity.

Limitations and strengths of the study

Some caution should be taken when interpreting the current findings owing to the significant statistical heterogeneity in many of the analyses undertaken. The planned use of random effects models that take this heterogeneity into account was appropriate. To some extent, the separation of different comparison conditions into groups reduced statistical heterogeneity, although heterogeneity remained moderate to substantial in many of the analyses.

A limitation of the current study is that approximately one third of the studies deemed eligible for inclusion were not able to be included because of a lack of available or usable gender-specific data. Most of the studies that were not included were mixed gender studies that could have contributed data to both indirect and direct effects meta-analyses, and the inclusion of these additional studies could potentially have changed the current findings. It should also be noted that only studies published in English were



eligible for inclusion, and when we requested gender-specific data from authors we did not ask for depression outcome data which contributed to a lack of this type of data.

The current results should also be viewed in light of the reported quality of the included studies. There was often inadequate reporting of aspects of the conduct of studies known to introduce risk of bias and potentially inflate intervention effects. For example, the risk of bias was assessed to be unclear for random sequence generation in almost half of the included studies, and unclear for randomisation allocation concealment in three-quarters of the studies. Sensitivity analyses undertaken showed that studies with lower ratings of bias regarding some, but not all, aspects of the conduct of studies tended to have smaller intervention effects, although it is unclear to what extent, if any, the reported quality of studies would have a differential impact on the outcomes of females and males.

A strength of the current study is that, to our knowledge, this is the first study to undertake a systematic review and meta-analysis to examine gender differences in outcomes following psychological interventions for PTSD. Authors of previous reviews that have examined this same issue have used either a descriptive and qualitative approach [6], or have calculated effect sizes of interventions from relevant controlled studies but without using a meta-analytic method to synthesise gender-specific intervention effects [7]. The current review was conducted using explicit and systematic methods that adhered closely to the Cochrane guidelines to minimise bias in the review process. In addition, while there may be some bias toward inclusion of published studies, we attempted to find unpublished studies by hand-searching conference proceedings of the International Society for Traumatic Stress Studies, as well as searching the Cochrane Central Register of Controlled Studies which is a database of trials that includes the results of grey literature searching undertaken across the different Cochrane Collaboration review groups internationally.

Practice and research implications

- The current findings support the available research evidence and practice guidelines that trauma-focussed interventions are effective for both women and men with PTSD and should be offered as a first-line intervention [69].
- The finding that women are likely to experience greater reductions in PTSD symptoms compared with men may be related to one or more of a number of



factors, including potential gender differences in expression of emotions; the use of coping strategies; the type and severity of trauma exposure; civilian versus military status; the chronicity and severity of PTSD and comorbid mental health conditions; and compensation-seeking status [7].

- Further well-designed controlled trials of trauma-focussed interventions are required that report on outcomes for women and men separately following treatment for PTSD. In addition, controlled trials are needed that recruit women and men who have been exposed to the same type of trauma and receive the same trauma-focussed intervention, with collection of additional data to more fully examine factors hypothesised to influence gender differences in treatment outcomes. Data from these types of studies could also contribute to an update of this review, in particular the direct effects meta-analyses of studies of women and men with the same trauma type.



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Appendix 1

Example search strategy

Medline search conducted in Web of Knowledge:

Step	Search Terms	No of records
S1	"Posttraumatic stress disorder" OR "post-traumatic stress" OR	13,586

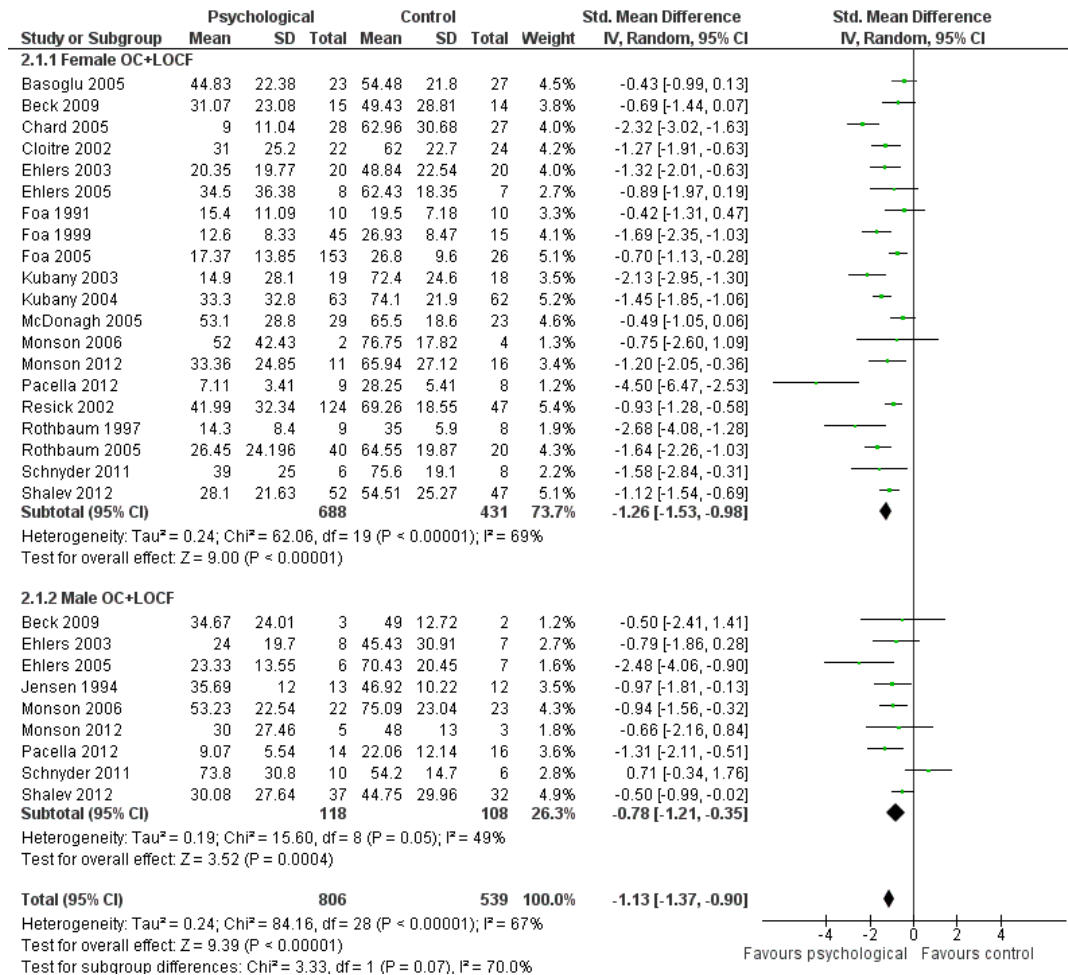


	“Traumatic stress” (Topic)	
S2	Stress Disorders Post-Traumatic (MH)	17,808
S3	S1 OR S2	21,410
S4	“Randomi*ed clinical trial” (MH) OR “randomi*ed controlled trial” (MH) OR “Clinical trial” (MH) OR “random” (Topic) OR “random allocation” (Topic) OR “control trial” (Topic) OR “Randomized Controlled Trial” (Document Types)	515,865
S5	Clinical trials as Topic OR Clinical Trial (MH)	252,929
S6	S4 OR S5	733,951
S7	S3 AND S6	1,311
S8	Humans (MH)	12,220,300
S9	Animals (MH)	15,905,623
S10	S9 NOT S8	3,685,323
S11	S7 NOT S10	1,289
S12	Adult OR Adolescent (MH)	5,468,216
S13	Child OR Infant (MH)	1,864,953
S14	S12 AND S11	1,003
S15	S14 NOT S13	845
S16	S15 AND English (Language)	831



Appendix 2

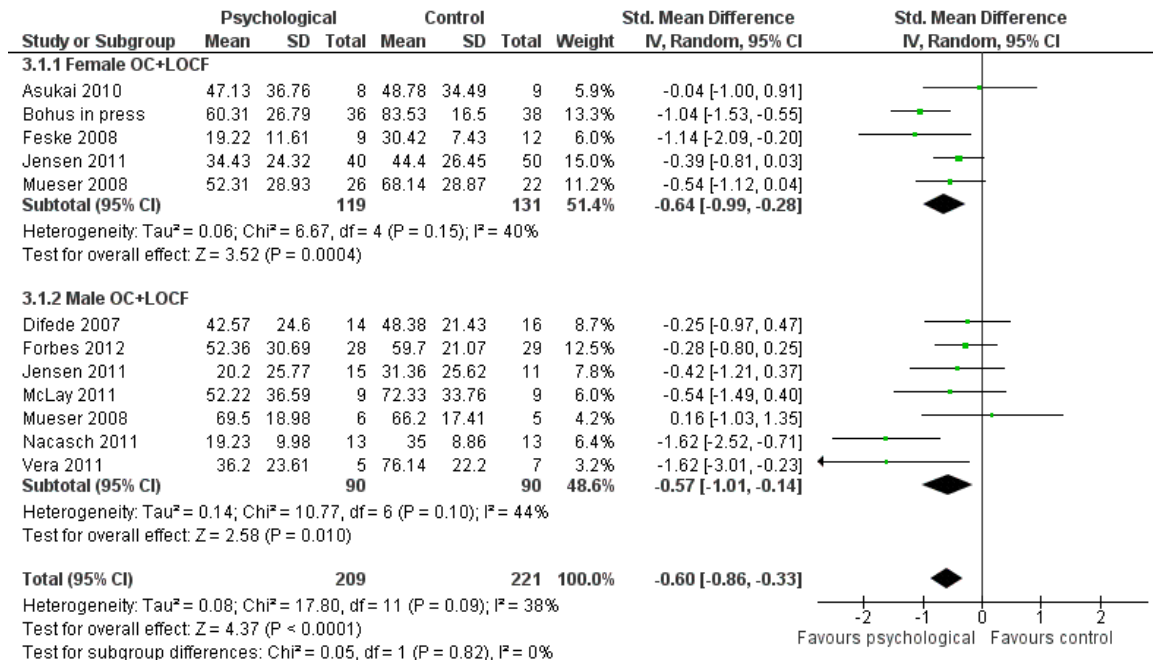
Forest plot of clinician-rated PTSD symptoms post-intervention for trauma-focussed interventions versus wait-list comparison





Appendix 3

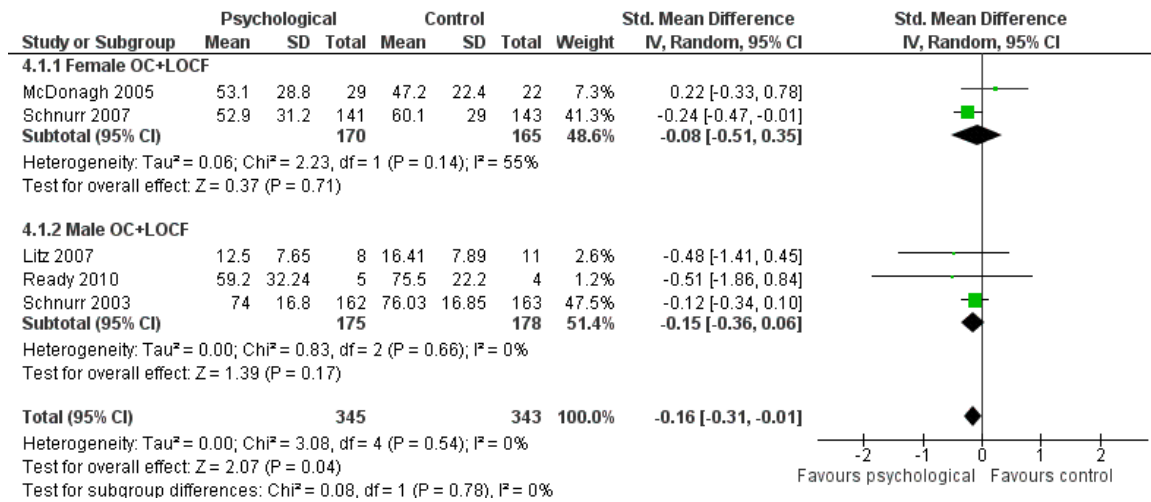
Forest plot of clinician-rated PTSD symptoms post-intervention for trauma-focussed interventions versus usual care





Appendix 4

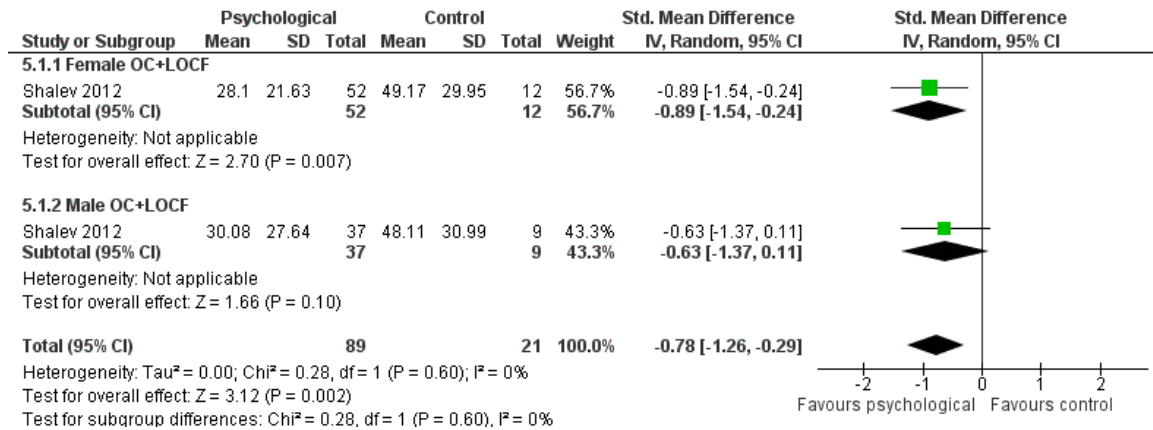
Forest plot of clinician-rated PTSD symptoms post-intervention for trauma-focused interventions versus attention placebo





Appendix 5

Forest plot of clinician-rated PTSD symptoms post-intervention for trauma-focussed interventions versus pharmacotherapy





Appendix 6

Forest plot of clinician-rated PTSD symptoms post-intervention for trauma-focussed interventions versus non-trauma-focussed interventions

