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## **Title**

What works for whom and why: A narrative systematic review of interventions for reducing post-traumatic stress disorder and problematic substance use among women with experiences of interpersonal violence.

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## **Author Declarations**

**Conflict of Interest** None declared.

## **Abstract**

**Background and aims:** Women with histories of interpersonal violence experience high levels of post-traumatic stress disorder (PTSD), problematic substance use, and repeat victimisation. Previous systematic reviews considering the effectiveness of integrated trauma-specific treatments to address PTSD and substance use have lacked sub-group analysis by gender or trauma type. Furthermore, mindfulness-based interventions for treating both issues together are under-researched. It is unclear what treatment components and contextual factors impacting implementation work best for women with IPV experiences. This narrative review examines a range of quantitative and qualitative data to explore: for which groups of women do integrated interventions work (subgroups)? How (mechanisms of action), and/or under what contexts (factors external to the intervention)?

**Methodology:** A two-staged search strategy identified eligible studies. This process identified 20 controlled trials reporting on the effectiveness of psychological or mindfulness-based interventions for PTSD and substance use and 39 relevant supplementary information related to the trials. Narrative synthesis using thematic analysis was conducted on manuscripts identified in both stages.

**Findings:** Safe social support and on-going risks of violence were identified as contextual factors which may affect treatment outcomes, requiring attention by researchers and treatment providers. Whilst there was some evidence that reduced PTSD correlates with substance decrease, there may be more than one pathway to substance use reduction among women with PTSD, requiring a focus on emotional regulation. Other 'active mechanisms' included different modalities of coping skills and support to rebuild connection with self and others. Lack of supplementary studies

for trials involving past-focused treatment precluded detailed discussion of these models.

**Conclusions:** Integrated PTSD and substance use treatment which teaches extensive coping skills to promote external safety, symptom stabilization, and emotional regulation, combined with access to safe social support and external advocacy, may be particularly useful for women with more severe PTSD, or for those experiencing on-going victimization for whom past-focused treatments are contraindicated. Long-term support and organisational trauma-informed practice in substance use treatment services should also be promoted.

**Keywords:** Women; trauma; interpersonal violence; post-traumatic stress disorder; substance misuse; intervention/treatment.

## **1. Introduction**

Women are more likely to experience repeated and extensive interpersonal violence (IPV) [defined here as physical, emotional or sexual violence/abuse in adulthood and/or childhood] in comparison to men (Natcen 2013; Walby & Allen 2004). Experiencing IPV is strongly correlated with mental health problems such as post-traumatic stress disorder (PTSD), depression, suicidal behaviours, as well as problematic substance use (hereafter ‘substance use’) (Natcen, 2013; Trevillion, Oram, Feder & Howard 2012; Rees et al., 2011). Moreover, women using substances experience higher rates of IPV compared to women in the general population (El-Bassel, Gilbert & Hill, 2005; Gilchrist, Blázquez, & Torrens, 2012; Gutierrez & Van Puymbroeck, 2006). Substance use by women may also increase victimisation as they may be less likely to risk assess and implement safety planning whilst intoxicated (Iverson et al., 2013).

Increasing attention is now being paid to addressing the intersection of PTSD and substance use among women because of the high prevalence of both issues: between 30-59% of women receiving substance use treatment have PTSD (Najavits, 2002), and among women with substance use disorders (SUDs), PTSD prevalence is estimated to be 2-3 times higher than for men with SUDs (Hien, 2009). PTSD is also an important treatment target for women because the risk of experiencing IPV from a partner is highest among women with PTSD, compared to those with depression and anxiety (Trevillion et al., 2012) and PTSD has been implicated as a risk factor for first-onset depression in women (Breslau, Davis, Peterson & Schultz, 1997). There is also some suggestion that PTSD treatment improves other mental health conditions, including depression (Bisson et al., 2013).

PTSD typically involves symptoms related to *re-experiencing* such as flashbacks or nightmares, *hyper-arousal* such as being jumpy and on constant alert, *avoidance* of trauma memories or places, and *negative thoughts* such as shame/guilt and feeling the world is unsafe. However, many women will go undiagnosed or have sub-threshold symptoms (Hien, 2009). Repeated and prolonged IPV (e.g. domestic violence) may result in Complex PTSD, which includes symptoms additional to those listed above such as increased alterations in emotional regulation, belief systems, disrupted relations with others, and dissociation (Herman, 2001).

For some, different substances may lend themselves well to self-medicating this wide spectrum of PTSD symptoms (Khantzian, 1997). This hypothesis is supported by a body of literature including longitudinal studies (Chilcoat & Breslau, 1998; Swendsen et al., 2010) and observational studies where participants report worsening PTSD symptoms after abstinence (Reynolds et al., 2005; Back et al., 2006). By extension, the *emotional regulation theory* posits that substance use is triggered by many different forms of distress (e.g. conflict) among people with PTSD, not only the PTSD symptoms (Kramer, Polusny, Arbisi, & Krueger, 2014). This may have particular relevance to women experiencing the psychological distress of ongoing IPV.

The interplay of these co-occurring issues brings complexity to the provision of effective substance use treatment for women. For example, failure to address external safety concerns impacts negatively on drug treatment outcomes (El-Bassel et al., 2005). These realities would suggest an integrated treatment response is needed rather than treating each issue in a silo. The integrated trauma-specific interventions currently available typically follow the staged model of PTSD treatment (Cloitre et al., 2011;

Herman, 2001; Rothschild, 2011). Present-focused models focus on first phase safety and stabilisation work to address both PTSD and substance use (e.g. establishing therapeutic relationships and physical safety, psycho-education about the trauma and substance use, coping skills development), sometimes comprising over 30 sessions in trials. Past-focused models, however, combine this first phase with the second phase of memory processing (exploring traumatic memories in detail); and in trials generally comprise 8-12 sessions.

To date, systematic reviews considering the effectiveness of these treatments have included samples of men and women with a wide range of traumas. Some contained a narrow focus on randomized controlled trials involving participants with PTSD and SUD (Roberts et al. 2016), others included quasi-experimental trials with looser participant inclusion criteria regarding PTSD and SUD (Fowler & Faulkner, 2011; Torchalla, Nosen, Rostam, & Allen, 2012; van Dam, Vedel, Ehring, & Emmelkamp, 2012). The most recent systematic review comparing psychological interventions for those dually diagnosed with both PTSD and a SUD to a control group, concluded that the most promising outcomes for both issues were found in treatments that included a past-focused element, but only when accompanied by numerous services focused on safety and stabilisation (Roberts et al., 2016). However, descriptions of these services were lacking, dropout was high, subgroup analysis by gender unavailable due to lack of data, and their suitability for women facing on-going victimisation unclear. Evidence suggests that some women receiving these interventions, for example those with acute emotional dysregulation, may require a lengthier focus on coping and safety skills (Cloitre, Koenen, Cohen, & Han, 2002), as well as emphasis on the mind-body connection (Van der Kolk, 2014). In light of this,

increasing attention has been paid to the role of mindfulness-based practices such as meditation and yoga, with trials demonstrating promising results in addressing PTSD (Emerson, 2014; Goldsmith et al., 2014) and substance use (Li, Howard, Garland, McGovern, & Lazar, 2017). However evidence on their impact on both issues among women is lacking.

Therefore, the task remains to better determine the active ingredients of integrated trauma-specific interventions to address PTSD and substance use among women with IPV histories, and the wider contextual factors impacting implementation, in order to improve and tailor treatment for women. Thus, it is necessary to move beyond an exclusive focus on treatment effect, to examine a broad range of literature including qualitative and secondary data analyses, practitioner, organizational, and service user knowledge to glean insights as to why a treatment may or may not be working for certain groups and in certain settings (Pawson & Tilley, 1997; Petticrew et al., 2015). Therefore, to synthesise and build on the existing evidence base, this review explores which integrated trauma-specific interventions (hereafter “integrated interventions”) work for which groups of women with co-occurring IPV and varying ranges of substance use and PTSD severity (subgroups), how (mechanisms of action within the interventions), and/or under what contexts (factors external to the intervention)?

## **2. Methodology**

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher, Liberati, Tetzlaff, & Altman, 2009) and narrative synthesis guidelines (Popay et al., 2006).



## 2.1 Search Strategies

A two-staged search strategy identified eligible studies. Stage 1 identified controlled trials reporting on the effectiveness of psychological or mindfulness-based interventions for PTSD and substance use. Stage 2 identified relevant supplementary information [e.g. process evaluations, implementation guidance, and secondary data analyses] related to the trials identified in Stage 1.

Multiple searches were conducted for Stage 1 (See *Supplementary Table S.1*) comprising: (a) identification of trials contained in eight previous literature reviews selected in a prior scoping exercise, and (b) separate electronic searches of bibliographic databases for psychological interventions and mindfulness-based interventions for PTSD and substance use since the dates of the last published literature reviews. Medical Education Subject Headings and free text keywords were used to search PsycINFO, Medline, CINAHL, PILOTS and Clinicaltrials.gov from 01.01.14-08.03.16 for: 1) psychological integrated interventions published since the most recent review (Roberts, Roberts, Jones, & Bisson, 2015),<sup>1</sup> and 2) mindfulness-based interventions (inception to 01.04.16), with an update in PsycINFO, Clinicaltrials.gov and PILOTS to 18.04.18). Multi-staged searches were also conducted for Stage 2 involving: (a) an electronic search of PsycINFO, PILOTS, MEDLINE and Embase (from inception to 05.10.16) entering the names of the primary studies or interventions, with an update on 19.04.18 in PsycINFO and PILOTS; (b) websites searches; (c) forwards and backwards citation tracking in the original trials; and (d) contact with authors of eligible trials from Stage 1 where little or

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<sup>1</sup> This is an earlier version of the full Cochrane systematic review published in 2016 after this search strategy was implemented. This earlier version included searches running up until 01 Jan 2014 which is the starting point for search 2 in this review. The full review (Roberts et al. 2016) comprises a later upper limit search date of 11.03.15.

no supplementary papers had been identified by other means.

## **2.2 Selection Criteria**

Trials were eligible for inclusion (Stage 1) if they: (a) reported on effectiveness of interventions to concurrently address PTSD and substance use, (b) were controlled trials, (c) were published in English, (d) included samples involving more than 50% of women aged at least 18 years, and (e) reported outcomes for both PTSD and substance use. Supplementary information was included (Stage 2) if they: (a) were qualitative studies, process evaluations, implementation guidance, or secondary data analyses of the eligible trials from Stage 1; and (b) explored for whom the intervention produced change (subgroups), how (mechanisms of impact, mediators), and under what contexts (factors external to the intervention impacting on treatment outcomes). Dissertations, book chapters and studies limited to non-interpersonal trauma, and papers relating exclusively to implementation (fidelity, treatment retention, staff training, adverse events etc.) were excluded from both stages.

## **2.3 Data Extraction**

Two authors (from KB, GG, KT) independently assessed all abstracts and potentially eligible full-text manuscripts from Stage 1 against eligibility criteria. Disagreements were resolved through referral to a third reviewer (GG or KT). KB then extracted the following data from each trial: (a) basic study details; (b) details of the interventions and control; (c) details of participants; (d) outcomes and attrition; and (e) subgroups, mechanisms of action and/or context. In studies with mixed samples of men and women, data segregated by gender was unavailable and therefore data for the whole sample was selected.

## 2.4 Quality appraisal

Two authors (from KB, GG, KT) independently assessed 8 domains of the trials' methodological quality as weak, moderate or strong using the McMaster University Quality Assessment (EPHPP, 1998): selection bias, study design, blinding, data collection methods and analyses, attrition and intervention integrity. Differences were resolved through discussion with a third assessor (GG or KT). All supplementary information was assessed by KB using the TAPUPAS standards (Pawson, Boaz, Grayson, Long, & Barnes, 2003). This framework invites consideration of questions relating to *Transparency, Accuracy, Purposivity, Utility, Propriety, Accessibility, and source specific standards*. The Critical Appraisal Skills Programme Qualitative Checklist (CASP 2018) was also used where applicable. Trial quality scores and limitations to the supplementary information identified with the TAPUPAS framework informed consideration of the robustness of the final narrative synthesis.

## 2.5 Analysis

A narrative synthesis of the data from searches 1 and 2 was conducted (Popay et al., 2006). As the purpose of this review was not to determine treatment effect, meta-analysis was not performed. Instead, synthesis drew on principles of thematic analysis (Fereday & Muir-Cochrane, 2008) using both deductive and inductive codes. NVivo 11 was used to oversee the management and analysis of data firstly grouping the text into the three deductive a priori categories of *subgroups, mechanisms of action* and *context*; and then reviewing the assigned text and further categorising with more inductive codes. These codes were then re-grouped into overarching themes (e.g. *Wider Organisational* approach embraced the codes of *trauma-informed practice, wrap-around services, and case-management*). Analysis focused on relationships between the data and PTSD and

substance use outcomes in individual trials, and if any of these relationships were reciprocated or refuted across studies. The narrative summary was produced from triangulating data, pertaining to the over-arching identified themes, spanning both the primary trials and their various supplementary outputs. The majority of data used in the findings involves trials comprising women only. Where data refers to mixed samples this was noted in the findings with attempts to triangulate the data with women only studies.

### **3. Results**

#### **3.1 Study selection**

A total of 1718 records were generated from the stage 1 search. Following the screening of titles and abstracts, 107 full text manuscripts were assessed against eligibility criteria. Thirty-two manuscripts from 20 trials were included. Twenty-four manuscripts from 20 trials reported on primary outcomes relating to both PTSD and substance use (“primary studies”). Five separate manuscripts were identified pertaining to one trial, the Women and Co-occurring Disorders and Violence (WCDV) study, which was delivered over nine sites in the USA, with each site implementing a present-focused integrated intervention from a choice of five different models. One manuscript (see Table 1, 24) pertains to the multi-site analysis, and a further 4 manuscripts (see Table 1, items 13, 16, 17, 18) provide analyses of the site-specific interventions.

The stage 2 search yielded 256 unique records resulting from the 20 trials identified in Stage 1; of which 202 were excluded following title and abstract screening. Fifty-four full text manuscripts were screened for eligibility resulting in 31 eligible manuscripts comprising supplementary studies to trials in stage 1, four of which were obtained from the primary trial authors (Mills et al. 2012a, Ford & Russo, 2006; Calhoun,

Messina, Cartier & Torres, 2012; Gilbert, 2005). Combining the results from stages 1 & 2, there were 63 total records considered in the narrative review. Twenty-four comprised primary studies pertaining to 20 trials, with 39 associated supplementary papers (*see Figure 1*).

[Figure 1: PRISMA flowchart of studies identified in the review]

### **3.2 Sample overview**

An overview of the 24 primary studies and treatment outcomes are presented in *Table 1*. Nineteen of the studies used *present-focused treatment models*, differing in their balance of components, but typically focused on providing strategies for improved coping skills for both PTSD and substance use, e.g., skills to manage emotional self-regulation and substance use triggers, safety planning, and/or cognitive restructuring to address shame/guilt. They were mostly delivered in groupwork ranging in length from 8-48 sessions. The WCDV multi-site study involved the delivery of a present-focused trauma-specific group-work programme within services implementing wider trauma informed practice and other interventions. Only one study comprised mindfulness as the active core mechanism, with body-focused strategies to deal with emotional self-regulation. Five of the studies pertained to *past-focused* treatment models typically containing a form of narrative exposure therapy involving the processing of memories from a selected traumatic incident; combined with various Cognitive Behavioural Therapy (CBT) components such as cognitive restructuring and motivational interviewing for both PTSD and substance use symptoms. These models were provided on a 1:1 basis and most included 1-4 sessions of safety and stabilisation components before progressing to the

exposure components for a further 6-7 sessions. *Supplementary Table S.2* provides more detail of the models used in the trials.

The majority of studies were conducted in the USA within substance use or mental health treatment agencies, targeted at women with any form of substance use. The majority compared a psychological intervention to address both PTSD and substance use with a control condition of usual care consisting of standard substance use treatment. The exceptions were the control sites for WCDV study which included substance use or mental health treatment, and the control sites for the Women and Trauma study which used Women's Health Education (WHE) comprising groupwork sessions such as bodily self-care and HIV prevention. Only one study contained mindfulness as the active component (Price, Wells, Donovan, & Rue, 2012). Participants across all trials reported high levels of IPV, although the IPV descriptions varied, and most excluded emotional abuse. One trial included recent domestic violence survivors only (Norman, n.d.) but few studies reported on recent IPV at baseline. Studies varied in terms of the measures used for assessing PTSD (self-report vs. clinician interview), and participant numbers meeting DSM PTSD criteria (range 31-100%) or SUD (range 10-100%) at baseline. The methodological rigour of the trials varied. Seven were classed as strong, 12 as moderate, and five as weak (See Table 1). Typically weaker studies did not report on the controlling of confounding variables, had high study attrition, and/or treatment blinding processes were unclear. All but three trials (Desai, Harpaz-Rotem, Najavits, & Rosenheck, 2008; Gilbert et al., 2006; Perez-Dandieu & Tapia, 2014), had supplementary papers, or information in the primary paper, which contributed towards the research questions.

[Insert Table 1: Overview of primary outcome studies identified in the stage 1 search and their associated supplementary studies]

Of the 39 supplementary papers, 16 were classified as practitioner/ organisational /service user knowledge, and provided detail of content, theories of change, and/or lessons learnt to guide future implementation. Limitations included a lack of methodological transparency where process evaluation or other qualitative feedback were used to draw conclusions. The remaining 23 were either secondary data analyses (n=18), qualitative (n=3), or mixed methods studies (n=2). A large proportion related to either the WCDV trial (n=7) or the Women and Trauma study (n=10). Secondary data analyses by their nature are subject to methodological constraints that limit the strength of conclusions drawn (see Hien et al., 2015). Several analyses associated with the WCDV trial attempted to address some of the methodological constraints of non-randomised controlled designs (Cocozza et al., 2005; Morrissey, Ellis, et al., 2005). The three qualitative studies used focus groups or interviews and had limitations related to sample selection and data analysis transparency. The majority of supplementary studies related to present-focused models only.

#### **4. Findings**

Over-arching themes are presented according to the a priori categories of: (1) *subgroups* (severity of baseline symptoms, ongoing IPV); (2) *contextual factors* impacting on treatment outcomes (ancillary services to address safety, wider organisational approaches, on-going social support); and (3) *mechanisms of action* (alternative coping skills, relational approaches, PTSD as a mediator). Figure 2 provides a visual mapping with details of some of the original codes that formed the themes.

**Figure 2: Themes (and their substantive codes in brackets) identified in the narrative synthesis**

## 4.1 Subgroups

### 4.1.1 Women with more severe baseline symptoms relating to PTSD and substance use

Four trials noted that severity of baseline PTSD scores were positively associated with greater PTSD reductions among participants in the treatment condition (Hien, Campbell, Ruglass, Hu, & Killeen, 2010; McGovern, Lambert-Harris, Alterman, Xie, & Meier, 2011; Morrissey, Jackson, et al., 2005). For example, McGovern et al., (2011) noted a large treatment effect in PTSD reduction among the more severe subgroup (n=37), relative to the entire sample. However, it is unclear how many of these were women. This group also reported preferring integrated treatment over regular addiction counselling. For the subgroup of women who had severe baseline PTSD scores (n=81 treatment, n=82 control), a trend emerged in the WCDV intervention sites providing more integrated interventions. A greater number experienced substantial improvement in PTSD at the 12 month follow-up compared to the control (30% vs. with 21%) (Morrissey et al., 2005). Both these studies showed mixed treatment effectiveness relating to PTSD reduction in the overall samples. A significant treatment effect for PTSD was found amongst the subset of women randomised to the intervention group in the Women and Trauma study, who were using alcohol problematically at baseline (note that 51% of the sample reported abstinence at study entry) (Hien, Campbell, et al., 2010). The Women and Trauma study, involving 353 women with a diagnosis of PTSD and SUD, was rated as strong according to the Quality Assurance (QA). The trial found that based on ‘average effects’ there was no overall treatment effect for PTSD or substance use, measured by clinical interview, when comparing Seeking Safety, a present-focused



integrated intervention, with an active control (Hien, Wells, & Brigham, 2009). The trial of Mindful Awareness in Body-Orientated Therapy (MABT) involving women only did not evidence an overall treatment effect for PTSD nor substance use, however it was superior for reducing dissociation, suggesting its effectiveness for women with certain symptoms found in Complex PTSD (Price et al., 2012).

With regards to substance use reduction, the 6 month follow-up outcomes in the WCDV study illustrated that women with high baseline scores on alcohol use severity experienced a greater treatment effect for drug use severity than others. This was not found for the baseline drug use severity subgroup nor is it clear if this was sustained at the 12 month follow-up (Morrissey, Jackson, et al., 2005). Among the severe PTSD subgroup, the study by McGovern et al., (2011) illustrated a treatment effect in reported days of drug use, but not alcohol use days (for which the control, individual addiction counselling, was found to be superior). One trial involving a past-focused treatment model using exposure therapy found that participants who dropped out of treatment before reaching the exposure sessions also had higher baseline PTSD scores and days drinking, and were then less likely to experience clinically significant change in PTSD (Sannibale et al., 2013). However, secondary data analysis of another trial involving exposure found baseline substance use severity was not associated with PTSD symptom change (Mills et al., 2016). For both these exposure-based trials, it is unclear what percentage of these sub-groups comprised women.

#### 4.1.2 Women experiencing recent interpersonal violence

The WCDV study meta-analysis showed a treatment effect on PTSD at 12 months but not substance use. However, women who sought hospital treatment for any current IPV in the 3 months prior to the study experienced significantly less PTSD reductions (effect size =

-.705,  $p < .01$ ) from the intervention at follow-up (Morrissey, Jackson, et al., 2005). However, no firm conclusions can be drawn about the relationship between recent physical abuse and the ability of interventions to reduce PTSD symptoms because this association was not seen at the 6 month follow-up, and the analyses used to identify this effect tested a large number ( $n=45$ ) of other covariates at the same time. Another WCDV study analysis showed that women reporting recent victimization at baseline (within past 6 months) had significantly lower odds of responding well to integrated treatment on PTSD symptoms<sup>2</sup> at 12 months compared to those who did not ( $OR=0.59$ ,  $p=.03$ ). However, both these analyses do not indicate the role of re-victimization during the study and the association with treatment outcomes. In two WCDV study sites using the Trauma Recovery and Empowerment model (TREM), and reporting on participant IPV at follow-up, the treatment group did not experience greater reductions in overall experiences of current violence. However, both treatment groups reported significant increases in feelings of safety (Fallot, McHugo, Harris, & Xie, 2011; Toussaint, VanDeMark, Bornemann, & Graeber, 2007), which may indicate a reduction in certain types of abuse.

In the Women and Trauma study, women receiving Seeking Safety reporting abstinence from substances at baseline were at significantly reduced odds of experiencing IPV at follow-up, compared to women who were actively using or those who were abstinent in the control group (Cohen, Field, Campbell, & Hien, 2013). The authors suggest that women who were abstinent were better able to implement the safety strategies for IPV learned in Seeking Safety. A different trial of Seeking Safety combined with IPV therapy was tailored for recent female IPV survivors with alcohol use disorder,

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<sup>2</sup> defined as scoring  $< 20$  on the Posttraumatic Diagnostic Scale (Foa et al., 1997)

but did not show any superiority for the intervention over 12-step facilitated therapy (Norman, n.d). What remained unanswered in these studies was the role of ongoing IPV, interacting with or mediating the causal pathway between the intervention and participants' PTSD and substance use reduction. The trial of Concurrent Treatment of PTSD and SUD Using Prolonged Exposure (COPE) (Mills et al., 2016) did explore this correlation. Sixty percent of participants (n=33, number of women unknown) experienced a further trauma over the 9 month follow-up (25.6% physical attack, 17.9% being threatened or held captive, 12.8% sexual assault), however, after controlling for baseline PTSD severity, exposure to new trauma was not significantly associated with change in PTSD symptom severity at follow-up (substance use was not explored).

## **4.2 Contextual factors (factors external to the intervention)**

### **4.2.1 Ancillary services to address safety**

It is unclear in the Women and Trauma Study what practical and external support was provided for women experiencing ongoing trauma due to IPV, although it is likely to have been minimal (D. Hien, personal communication, May 2016), and the researchers conclude that there is a need to better address IPV concurrently with substance use and PTSD (Cohen et al., 2013). The WCDV study stressed the importance of safe working principles such as not allowing an abusive partner to enroll in the same agency (Markoff, Reed, Fallot, Elliott, & Bjelajac, 2005) and linking and coordinating treatment services with crisis support services to address IPV, with some sites offering domestic violence counseling (VanDeMark, Brown, Bornemann, & Williams, 2004). However, analysis of external service use by participants in this trial at the 6 month follow-up (Domino, Morrissey, Chung, & Nadlicki, 2007) suggests that the multiple components comprising the intervention did not reduce women's need for medical treatment, and/or encourage

access to shelters when facing re-victimization. However, some control sites over the course of the study started to run domestic violence groups potentially masking any treatment effect on these variables (Cocozza et al., 2005, Gatz et al., 2007). Further process evaluation emphasised the importance of providing access to safe housing to avoid returning to abusive partners or family members, despite women having learned skills to keep themselves safe. As women were provided with safe accommodation they described feeling freer to use many of the skills taught in the integrated intervention TREM (Fallot & Harris, 2004).

#### 4.2.2 Wider organizational approach and ancillary support services

Implementation guidance relating to several of the present-focused models described in some of the studies stressed the importance of trauma informed practice (TIP) for healing (Cadiz et al., 2004; Calhoun, Messina, Cartier, & Torres, 2010; Covington, 2000; Moses, Reed, & Ambrosio, 2003; Najavits, 2004). Such an approach means instigating practice at an organisational level as well as an individual/clinician level, centred around five core principles: trauma awareness, safety, trustworthiness, choice and collaboration, and building of strength and skills. Focus groups with participants and staff involved in the trial of Gender Responsive Treatment (GRT) in a prison setting highlighted how the lack of TIP by wider prison staff often undermined the progress made in group sessions (Calhoun et al. 2010). While this research suffered from methodological limitations regarding sample selection and data analysis transparency, this finding does chime with the rationale and theory behind TIP. The WCDV study was unique among all the studies in this review, in that the integrated interventions were delivered within a wider trauma-informed service which included service staff trained in TIP and the provision of multiple ancillary services (*see Supplementary Table S.2*). This makes it difficult to conclude what

role, if any, the integrated interventions contributed to the study treatment outcomes. However, an analysis of programme level variables was undertaken to explain site specific outcomes heterogeneity. Only the integrated groupwork interventions (not the type or number of additional services received or mode of delivery) could explain the more favourable outcomes seen in mental health (including PTSD) and substance use across some sites (Cocozza et al., 2005). In contrast, other trial authors recommended an increased focus on case management and support services for retention (Mills et al., 2012a) and aftercare (Zlotnick, Johnson, & Najavits, 2009). The Women and Trauma study also identified that women at less risk of substance use/infrequent use at the 12 month follow-up reported more contact with substance use treatment services following the integrated intervention, highlighting the importance of sustained and long term treatment and aftercare (López-Castro, Hu, Papini, Ruglass & Hien, 2015).

#### 4.2.3 The role of ongoing social support

The Women and Trauma study showed that women in the Seeking Safety intervention who engaged in additional 12-step affiliated peer support post-intervention showed significantly reduced alcohol use at follow-up compared to women in the control group (Morgan-Lopez et al., 2013). Whilst attendance at 12-step programmes was not randomised, limiting casual inference, other studies identified a similar theme. In the prison based study, also involving Seeking Safety, attendance at follow-up intervention sessions with other women post-release also seemed to be associated with better drug use reduction (Zlotnick et al., 2009). In the WCDV study, women in the interventions sites who practiced their recovery alone often relapsed (Harris, Fallot, & Berley, 2005). However, the type and quality of social support and networks were important. In the WCDV study, family members were found to be less supportive in terms of providing

emotional support and promoting recovery from PTSD compared to friends (Savage & Russell, 2005), with women's families sometimes encouraging drug use and viewing their attempts at sobriety with derision and delusion (Harris et al., 2005). In one site, the more relatives in a woman's network, the less support and healing from trauma she experienced. Integrated CBT for PTSD trial analysis (59% women) also showed that increases in family and social problems from baseline to 6 month follow-up were significantly associated with increases in PTSD and alcohol, but not drug use (Saunders et al., 2016).

### **4.3 Mechanisms of action in the interventions**

#### **4.3.1 Development of alternative coping skills for different symptom clusters**

The trial of Integrated CBT for PTSD was particularly useful for reducing re-experiencing (McGovern et al., 2011) in the sample as a whole, and in the Women and Trauma study, Seeking Safety was beneficial for hyper-arousal symptoms amongst those reporting problematic alcohol use at baseline (Hien, Campbell, et al., 2010). The mindfulness intervention (MABT) was superior for dissociation (Price et al. 2012). This suggests the integrated treatments were superior over standard substance use treatment for addressing certain PTSD symptom clusters. One of the WCDV study analyses suggested it was the improvement in coping skills gained over the 12 month follow-up that mediated in part improvements in PTSD and drug use (Gatz et al., 2007), regardless of treatment condition. Although formal mediation analyses were not undertaken, a positive relationship was also found between developing trauma coping skills through TREM and treatment outcomes relating to substance use, PTSD and feelings of safety (Fallot et al., 2011). Women who reported success in sustained abstinence had developed coping skills and strategies (e.g. mindfulness) for managing emotions and triggers

(Harris, et al., 2005). Eighty-four percent of women receiving MABT found the intervention positively influenced a reduction in their substance use, consistently explained through the facilitation of emotional regulation (Price, Wells, Donovan, & Brooks, 2012a).

#### 4.3.2 Attending to the relational

Process evaluations from several trials highlighted the importance of attending to the relational connections participants had with their self and others. Women receiving TREM in the WCDV sites identified self-awareness, connection with other women, and regaining a sense of purpose, meaning and spirituality, as strong recovery facilitators (Harris et al., 2005), which are core mechanisms of change in the programme theory (Fallot & Harris, 2004). The WCDV study researchers described the profound emptiness and bleakness women felt from years of addiction and IPV, coining the term '*repersonalisation of the self*' to describe the series of activities and commitments needed to fill such a void (Harris et al., 2005). All the WCDV sites provided long term integrated group interventions (4-9 months) combined with many other services suggesting the need for holistic and long term support to address issues of self-identity. Clinicians delivering Seeking Safety for the WCDV study believed that the session on self-compassion had the most impact on participants (Cadiz et al., 2004). This was supported by women completing this group-work intervention, who stated that feeling safe and bonding with other women with similar experiences was one of the most important components (Brown et al., 2007), although it is unclear the sample size this feedback is drawn from. Eleven female peer researchers in the WCDV study described how their involvement altered their self-perceptions through having their voices heard and respected (Mockus et al., 2005).

#### 4.4. Other mechanisms of action

##### 4.4.1 PTSD as mediator in the relationship between intervention and substance use reduction

A laboratory study found support for the hypothesis that negative emotion related to trauma is a mechanism of alcohol craving among a mixed sample of men and women (Coffey, Stasiewicz, Hughes, & Brimo, 2006). Similarly, the Women and Trauma study demonstrated that PTSD reductions were most likely to be associated with substance use reduction, with minimal evidence of a reverse relationship (Hien, Jiang, et al., 2010). Furthermore, changes to PTSD (severity and frequency) were found to mediate the relation between Seeking Safety and reductions in alcohol and cocaine use for participants who had a high likelihood of attending most of the sessions (Morgan-Lopez et al., 2014). However, the exploratory nature of these mediation analyses means no clear conclusions can be made about the temporal relation of substance use reduction following PTSD. Furthermore, for those attending a ‘moderate’ dose of treatment, substance use change was not mediated by PTSD reductions. Another analysis showed a treatment effect for substance use reduction, among those who were heavy substance users at baseline, particularly stimulant users, and whose PTSD had reduced significantly over time (Hien, Jiang, et al., 2010; Ruglass, Hien, Hu, & Campbell, 2014). The authors postulate that Seeking Safety was more effective for these groups because those with more severe substance use also had more severe PTSD.

In the first trial of Integrated CBT for PTSD (59% women) substance use reduction accompanied PTSD reduction (McGovern et al., 2011), however, this was not replicated in the larger follow-up trial in (67% women) (McGovern et al., 2015), and also not seen in the one mindfulness based study (MABT) (Price et al., 2012). This suggests



that PTSD is not a mediator in the relationship between intervention and substance use reduction for everyone. However, in these three studies, some of the sites offered Seeking Safety groups as part of standard care and given this is an active treatment for both PTSD and substance use, and we do not know who received this treatment and to what dosage, it is not clear how this impacted on overall participant outcomes or mediation pathways.

## **5. Discussion**

### **5.1 Pathways to PTSD and substance use reduction**

Few trials demonstrated a treatment effect for substance use reduction, but some illustrated reduction for PTSD symptoms. This echoes the conclusions of previous literature reviews (Roberts et al., 2016; Najavits & Hien, 2013), indicating that entrenched substance use may be harder to treat than PTSD in time-limited interventions. Many of the secondary data analyses presented also focus on PTSD reduction only, and taken together, several suggest that women with more severe PTSD baseline scores experienced greater PTSD reductions from integrated treatment. There was some evidence that PTSD reduction leads to substance use reduction, supporting the self-medication theory, and highlighting the importance of targeting PTSD symptoms in their own right as a mechanism of action. However, the results from other studies under review, albeit those with mixed samples of men and women, indicate there may be more than one pathway to substance use reduction. For example, the notion that substances are used to ‘self-medicate’ wider emotional regulation difficulties (Kramer et al., 2014) as well as PTSD certainly appears plausible for women experiencing on-going IPV and multiple mental health problems.

## 5.2 The role of different coping skills

All interventions contained programme content with varied coping strategies: cognitive (e.g. addressing negative self-talk), behavioural (e.g. safety planning), and body-based (e.g. breathing, bodily interoception and self-care), designed to promote new and healthier ways to cope with trauma symptoms and substance cravings or triggers. However, less was said about the *type* of coping skills women found most useful, nor their differential impact on the different symptom clusters or external stressors. For example, the facilitation of mind-body awareness was clearly valued by women and may be particularly useful for dissociation symptoms (Price et al., 2012a). The theoretical underpinnings of mindfulness treatments point to the enhancement of the attentional regulatory capacity for inducing the para-sympathetic response and regulating arousal (Kelly & Garland, 2016), and reducing reactivity to substance-related cues (Li et al., 2017). The targeting of negative trauma-related beliefs through cognitive strategies have been established as key mechanisms in the reduction of PTSD amongst a variety of trauma survivors (Ehlers et al., 2013), and can also be conceived as a key emotional regulation strategy (Aase et al., 2018). Avoidance coping (escape or withdrawal) has been found to exacerbate drug use, PTSD, and depression among women experiencing partner IPV (Flannigan, Jaquier, Overstreet, Swan & Sullivan, 2014), so the promotion of other coping strategies would appear particularly relevant to this treatment group.

## 5.3 Attending to relations with self and others

The qualitative studies in this review also highlighted the importance of rebuilding women's positive relationships with themselves and others, echoing established goals in the treatment for PTSD and models of working with IPV survivors (Anderson, Renner, & Danis, 2012; Herman, 2001; Warshaw, Sullivan, & Rivera, 2013). Therefore, treatment

that facilitates peer bonding among women with similar experiences, as well as components found in many integrated present-focused interventions such as self-compassion, self-identity, and self-care (Fallot & Harris, 2002; Covington, 2000), appear particularly crucial for women with histories of IPV, potentially influencing both trauma-reappraisal and emotional regulation. However, the work to re-establish identity lost to substance use and IPV is likely to require long term support from substance use services extending beyond group-work treatment.

#### **5.4 Targeting emotional regulation**

Increasing attention is being paid to trans-diagnostic treatment targets, that is to say key ‘difficulties’ that may transcend different ‘disorders’ and which may prove influential to target (Sloan et al., 2017). This may be particularly relevant for survivors of trauma for whom PTSD symptoms often exist alongside other co-occurring mental health problems (Breslau et al., 1997; Rees et al., 2011). Emotional regulation has been implicated in the causal pathway between PTSD and substance use (Tull, Bardeen, DiLillo, Messman-Moore, & Gratz, 2015), is one of the most important treatment targets for chronically traumatized people (Van der Kolk, 2014), and has been found to moderate the efficacy of prolonged exposure on PTSD and substance use outcomes (Hien, Lopez-Castro, Papini, Gorman, & Ruglass, 2017)<sup>3</sup>. Moreover, the targeting of emotional regulation may also explain why some PTSD interventions have also resulted in decreased symptomology of other co-morbid mental health problems (Bisson et al., 2013).

#### **5.5 Implications of contextual factors for treatment implementation**

The identification of active treatment ingredients cannot be considered in isolation from the wider contextual factors facing women such as on-going victimisation and family

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problems, a point also supported in the wider literature (Galvani 2007; Mills et al., 2018). However, lack of IPV monitoring post-baseline in most of the studies under review precluded any further conclusions about the correlation with treatment outcomes. An earlier literature review, involving a meta-analysis of 11 integrated present-focused interventions targeting women in substance use treatment with experiences of IPV (including all of the WCDV study sites), concluded that women reporting IPV in the 6 months prior to baseline experienced better substance use reductions compared to women with other forms of trauma (Fowler & Faulkner, 2011). However, the role of these interventions in reducing victimisation during the studies and the corresponding impact on treatment outcomes was unclear. Given the wider literature that implicates IPV in exacerbating PTSD symptoms, other psychological distress and substance use (El-Bassel et al., 2005; Sullivan et al., 2016; Bailey Peters & Gilchrist 2017), future trials should measure ongoing IPV during the intervention and at follow-up.

These safety concerns have implications for the wider service environment in which interventions are delivered to women. Several studies in this review maintained that integrated interventions should only be delivered within the context of wider organisational TIP, a principle also supported by PTSD treatment guidelines internationally (SAMHSA 2014, ACPMH 2013). Service practitioners should also undertake sustained external advocacy and multi-agency support for women experiencing ongoing victimization, including focus on the perpetrator (Itzin, Taket, & Barter-Godfrey, 2010). This may be all the more important for active substance users who may be less able to put in place safety strategies, and who are more likely to live with a substance using partner, vastly increasing the chances of experiencing physical or sexual violence

(Cohen et al., 2013). It may be less about number of ancillary services provided, but identifying the ones that meet the specific needs of service users at the time and as part of aftercare.

Service practitioners should also pay attention to the quality and safety of external support networks of women in treatment, as they can be both a source of burden and/or support. This has implications for how some substance use social and network based treatment interventions (e.g. Copello, Orford, Hodgson & Tober, 2009) are delivered to women with IPV histories. Service user collaboration in the design and delivery of interventions is an important part of TIP and also provides safe and healthy on-going support beyond time-limited treatments, something often lacking for this treatment group beyond 12-step affiliated groups (Najavits & Hien, 2013). It can provide another relational aspect of treatment so valued by women; building positive self-identity, and promoting social action or ‘survivor mission’ (Herman, 2001).

### **5.6 The value of present-focused integrated interventions**

The studies under review contained samples of women with a wide range of PTSD symptoms, not only those meeting a clinical diagnosis, perhaps best reflective of the women found in substance use treatment. People with sub-threshold symptoms still report higher levels of functional impairment, risk of suicidality, hopelessness and substance use, compared to non-PTSD samples (Brançu et al., 2016), and thus warrant inclusion in integrated treatments. Whilst the most recent systematic review of integrated interventions (Roberts et al., 2016) found no evidence for present-focused treatments, the results of this review suggest that coping skills training focused on establishing external safety, emotional regulation and building positive self-identity and relations with others may well be the most appropriate treatment for some women. This is particularly the

case for those with more severe baseline PTSD and substance use symptoms (Cloitre, Petkova, Su, & Weiss, 2016) and those facing other stressors who are not in a suitable place to explore traumatic memories in depth e.g., due to domestic violence, involvement in prostitution, and community violence. The extensive number of sessions forming many present-focused interventions also provides a template for longer term support in treatment services. The development of coping skills over time may help participants tolerate past-focused interventions to support memory processing should they need it (Hermann, Hamblen, Bernardy, & Schnurr, 2014; Roberts et al., 2016). Greater relief is gained from PTSD symptoms through exposure work combined with CBT, compared to CBT alone, for certain subgroups (Ehlers et al., 2013; Mills et al., 2012; Sannibale et al., 2013).

### **5.7 Future directions for research**

The pooling of data from multiple studies into a ‘virtual multi-site clinical trial’ (Hien et al., 2015) would allow for further subgroup, mediator, and moderator analyses of studies already completed and would facilitate disaggregation of data by gender. Future research should include qualitative and process evaluation data to supplement effectiveness studies, particularly in the past-focused interventions. Qualitative and quantitative measurement of potential intermediary outcomes including differing coping skills, physical and emotional safety measures, negative cognitions, positive self-identity and emotional dysregulation, would be useful, along with disaggregation of outcomes by gender and/or trauma type where possible.

### **5.8 Conclusion**

This review acknowledges the complexity of delivering integrated interventions to women experiencing PTSD and substance use. Supplementary data analyses illustrate

how an exclusive focus on average treatment effect risks overlooking the utility of present-focused interventions for certain subgroups, especially their role in targeting emotional dysregulation. A focus on teaching extensive coping skills to promote external safety and symptom stabilization may be particularly useful for women with more severe PTSD and experiencing on-going victimization, for whom exposure based treatments are contraindicated. A wider service response embracing TIP would focus practitioners on a safety first approach. Only one study involved mindfulness as its principle component and the promising results found in relation to dissociation and emotional dysregulation means they warrant further consideration. From a practical perspective, in countries where clinical guidelines still promote sequential approaches to treating PTSD and SUD (Persson et al. 2017), substance use treatment services are well placed to deliver present-focused integrated interventions, with appropriately skilled staff and organizational TIP as part of a stepped care model.

### **5.9 Limitations**

There is a limited discussion on past-focused interventions in this review due to a lack of controlled trials where women comprised the majority of participants. Substantial attention has been given to the findings of supplementary information related to two trials, the Women and Trauma study and the WCDV study. The secondary data analyses in the Women and Trauma study were part of 19 analyses performed on a moderately sized trial, and due to this multiplicity and the lack of adjustments for the many comparisons, caution should be made when interpreting the results. In two outputs examining moderators, the participants were not randomized to the subgroups examined, and the mediator analyses are exploratory in nature only. This review also draws heavily on the process evaluations attached to the WCDV multi-site trial, a study which bears the

inherent weaknesses of a non-randomised design and which showed significant heterogeneity across sites. Hence the study authors suggest caution in estimating the strength of the overall treatment effects (McHugo et al., 2005) which would extend to the associated secondary data analyses. Moreover the three qualitative studies all suffered from different methodological constraints limiting their generalizability to the wider female population with co-occurring PTSD and substance use. In two studies it is unclear how many of the sample were experiencing current or sub-threshold PTSD and/or severity of substance use at baseline. Therefore, conclusions reached based on these samples may be better generalised to women who have experienced significant levels of traumatic events, rather than women with PTSD. Furthermore, the WCDV study involved an integrated trauma-specific intervention and wider integrated and trauma-informed services, and therefore much of the supplementary information does not exclusively focus on the integrated trauma-specific intervention. However, care was taken to select information that pertains to, or has relevance to, the delivery of the integrated interventions. Finally, this review included 8 primary studies and their 5 supplementary studies, whose results pertain to mixed samples of women and men. However, across all themes, data from these studies (which comprised 21% of all studies) are presented in triangulation with women only studies, and taken together provide useful considerations for women's treatment going forward.

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**Table 1: Overview of primary outcome studies identified in the stage 1 search and their associated supplementary studies**

	Study design	Setting, Country, Sample size (T/C)	Dosage	Control	Female %	IPV details	Recent IPV record %	PTSD %	SUD (AUD) %	PTS Outcome T> C	SU Outcome T>C	Follow up length	Q A	Associated supplementary studies
<b>Past Focused Treatments</b>														
<b>1. Prolonged Exposure combined with CBT</b>														
1	Mills et al. 2012; RCT	Unclear, Australia n=55/48	13 x weekly individual 90 minute of COPE + TAU	TAU	62	Sexual assault 77%, Physical assault 96%, CSA 46%	NR	100	100	Y	N	9 mths from baseline	S	[2= Mills et al. 2012a; Mills et al. 2016]
2	Sannibale et al. 2013; RCT	Substance use clinics, Australia n=33/29	12 x weekly individual 90 minute sessions of ICBT for PTSD & AUD + homework	CBT for AUD + supportive counselling	53	Violent crime (inc. rape) 31, CPA/CSA 23%, domestic violence 7%	NR	100	(100)	Y <sup>4</sup>	N	9 mths from baseline	S	
<b>2. Other exposure based interventions</b>														
3	Coffey et al. 2006; RCT	Laboratory, USA n=16/15	1 education session & 6 x individual trauma focused imaginal exposure + TAU	Imagery relaxation + TAU	67	CSA 82%, CPA 50%,	NR	100	(100)	Y	Y <sup>5</sup>	Post treatment	W	
4	Triffleman 2000; RCT	Community substance use treatment, USA n= 9/10	20 x twice weekly individual sessions (Stress Inoculation Therapy and in-vivo exposure) combined with CBT	Twelve Step Facilitation Therapy	70	NR	NR	70*	100 <sup>6</sup>	N	N	1 mth from baseline	W	[1=Triffleman, Caroll & Kellogg 1999]

<sup>4</sup> Only T participants who did not drop out before receiving the exposure sessions (starting in session 5) had a twofold greater likelihood of clinically significant reduction in PTSD severity at follow up.

<sup>5</sup> But this did not meet statistical significance when confined to those reporting alcohol craving to trauma imagery cues.

<sup>6</sup> Current or history of SUD.

	Study design	Setting, Country, Sample size (T/C)	Dosage	Control	Female %	IPV details	Recent IPV record %	PTSD %	SUD (AUD) %	PTS Outcome T> C	SU Outcome T>C	Follow up length	Q A	Associated supplementary studies
<b>3. Eye Movement Desensitisation and Re-processing (EMDR)</b>														
5	Perez-Dandieu & Tapia 2014; RCT	Outpatient drug clinic, France n=6/6	8 x individual EMDR sessions (3 in first month, then one monthly) +TAU	TAU	100	Sexual abuse 58%, physical abuse or threats 33%	NR	100	100	Y	N	6 mths from baseline	M	
<b>Present focused treatments</b>														
<b>4. Integrated Cognitive Behavioural Therapy for PTSD (ICBT)</b>														
6	McGovern et al. 2015; RCT	Substance misuse treatment, USA n= 73/75/73	8-12 x individual sessions ICBT, weekly + TAU	1. Individual Addiction Counselling + TAU 2. TAU	59	NR (average 6.23 traumas)	NR	100	100	N	Y	6 mths from baseline	M	[1=Saunders et al. 2016]
7	McGovern et al. 2011; RCT	Community substance misuse treatment, USA n=32/21	12-14 individual sessions, weekly + TAU	Individual Addiction Counselling + TAU	67	CSA 68% CPA 19% ASA 9% APA 2%	NR	100	100	Y	N	6 mths from baseline	M	
<b>5. Trauma Adaptive Recovery Group Education and Therapy (TARGET)</b>														
8	Frisman et al. 2008; RCT	Outpatient substance misuse treatment, USA n=141/71	8-9 x gender specific group-work sessions weekly +Trauma informed TAU	Trauma informed TAU	63	NR	NR	95 <sup>7</sup>	NR	N	Y <sup>8</sup>	12 mths from baseline	S	[1=Ford & Russo 2006]

<sup>7</sup> PTSD: 61% PTSD, 34% PTSD+ DESNOS, 3% DESNOS only.

<sup>8</sup> Treatment effect seen for self-efficacy measure. Not clear if valid and reliable assessment tools were used for other measures of substance use and not clear if differences are statistically significant.

	Study design	Setting, Country, Sample size (T/C)	Dosage	Control	Female %	IPV details	Recent IPV record %	PTSD %	SUD (AUD) %	PTS Outcome T> C	SU Outcome T>C	Follow up length	Q A	Associated supplementary studies
	<b>6. Seeking Safety (full and partial doses)</b>													[1=Najavits 2004 ]
<sup>9</sup>	Hien et al. 2004; non randomised quasi-experimental	Unclear, USA n=41/34/32	24 sessions: 12 x twice weekly individual sessions of SS	1. Relapse Prevention 2. Standard community care	100	NR	NR	88*	100	1.N 2. Y	1. N 2.Y	9 mths from baseline	S	
<sup>10</sup>	Zlotnick et al. 2009; RCT	Women's prison, USA n=27/22	25 sessions: 3 x weekly for 6-8 weeks + post release, 1 hour 'booster' sessions for 12 weeks +TAU	TAU	100	Sexual abuse 94%, Physical abuse 90%	NR	83*	27-94 (88) <sup>9</sup>	N	N	6 mths from baseline	M	
<sup>11</sup>	Ghee, Bolling & Johnson 2009; RCT	Residential SMT, USA N= 52/52	6 session of SS twice weekly + TAU	TAU	100	NR	NR	NR	NR	N	N	30 days	M	
<sup>12</sup>	Desai et al. 2008; quasi-experimental nonequivalent control group design	Residential substance misuse services, USA n=91/359	Group or individual; 25 weekly sessions + TAU	TAU	100	Rape 68%, Prostitution 35%	NR	NR <sup>10</sup>	100 <sup>11</sup>	Y	N	6 mths from baseline <sup>12</sup>	M	

<sup>9</sup> One month prior to prison entry.

<sup>10</sup> PTSD diagnosis was not an inclusion criteria.

<sup>11</sup> But unclear how this was measured.

<sup>12</sup> 12 month follow up not used here because of high attrition

	Study design	Setting, Country, Sample size (T/C)	Dosage	Control	Female %	IPV details	Recent IPV record %	PTSD %	SUD (AUD) %	PTS Outcome T>C	SU Outcome T>C	Follow up length	Q A	Associated supplementary studies
13	Gatz et al. 2007; quasi-experimental nonequivalent control group design 'WCDV study'	Outpatient /residential substance misuse and mental health services, USA n=136/177	Twice weekly group-work for 31 sessions + intensive trauma informed care ***	Women only residential TAU	100	Any CSA or CPA 71%, moderate to high levels of CSA/CPA 39%.	52**	NR^	100 <sup>13</sup>	Y	N	12 mths from baseline	M	
14	Hien, Wells & Brigham 2009; RCT 'Women and Trauma study'	Community based substance misuse treatment, USA n=176/177	12 sessions - twice weekly groupwork sessions for 6 weeks	Women's Health Education	100	CSA 70%, CPA 59% APA 85% ASA 68%	10 <sup>14</sup>	80*	100	N	N	12 mths from baseline	S	[11=Anderson & Najavits 2014; Cohen et al. 2013; Hien et al.2015, Hien, Campbell et al. 2010; Hien, Jiang et al. 2010a; López-Castro et al. 2015; Morgan-Lopez et al. 2013, 2014; Ruglass et al., 2014, 2014a; Ruglass et al. 2012]
<b>6a Seeking Safety</b> + modules from Kubany's Trauma Therapy for Battered Women (2004) trauma related guilt, assertiveness training, managing contact with former abusers														
15	Norman, n.d; <sup>15</sup> RCT	Outpatient psychiatric services, USA n=19/9	25 sessions (individual and group) <sup>16</sup> : twice weekly for 12 weeks.	12 Step facilitated therapy	100	CSA 72%, CPA 60%, ASA 57%, APA 56%	100 <sup>17</sup>	100	(100)	N	N	3 mths from baseline	W	
<b>7. Trauma Recovery and Empowerment Model (TREM)</b>														
16	Fallot et al. 2011;	Outpatient mental health	33 sessions: 1 x weekly groupwork	TAU	100	CSA 72%, CPA 60%	44**	NR^	10-34% <sup>18</sup>	N	Y	12 mths from	M	[3=Fallot & Harris 2002, 2005; Harris et

<sup>13</sup> Recent or within past five years.

<sup>14</sup> % of sample reporting physical or sexual abuse in previous 30 days.

<sup>15</sup> Data from Norman was unavailable so information and QA assessment undertaken based on Cochrane assessment (Roberts et al. 2016).

<sup>16</sup> Some received individually (15 SS and 6 12-Step) and some group format (16 SS & 3 12-step).

<sup>17</sup> Inclusion criteria was one month out of an abusive relationship.

<sup>18</sup> Depending on substance: 51% reported abstinence from alcohol, 47% abstinence from drugs, 30% abstinence from both alcohol and drugs.

	Study design	Setting, Country, Sample size (T/C)	Dosage	Control	Female %	IPV details	Recent IPV record %	PTSD %	SUD (AUD) %	PTS Outcome T> C	SU Outcome T>C	Follow up length	Q A	Associated supplementary studies
	quasi-experimental nonequivalent control group design 'WCDV study'	service, USA n=153/98	for 33 weeks + intensive trauma informed care ***			ASA 57% APA 56%						baseline		al. 2005]
17	Toussaint et al. 2007; quasi-experimental nonequivalent control group design 'WCDV study'	Women only residential service, USA n=64/106	24 sessions: twice weekly groupwork <sup>19</sup> for 8 weeks, then weekly for 8 weeks + intensive Trauma informed care ***	TAU	100	NR	50**	NR^	100	N	Y <sup>20</sup>	12 mths from baseline	M	
18	Amaro et al. 2007; quasi-experimental nonequivalent control group design 'WCDV study'	Outpatient and residential substance misuse services, USA n=181/161	25 sessions: 1 x groupwork sessions, weekly for 25 weeks + intensive trauma informed care <sup>21</sup>	TAU	100	100% reported history of any IPV	44**	NR^	100	Y	N <sup>22</sup>	12 mths from baseline	M	[1=Amaro et al. 2005]
<b>8. Gender Responsive Treatment (Helping Women Recover + Beyond Trauma)</b>														[1=Covington 2000]
19	Messina et al. 2012;	Women mandated to	28 sessions of groupwork	TAU	100	CSA 55% CPA 37%	66	31	NR	N	N	18-20 mths	M	

<sup>19</sup> Women could complete a workbook session with a counsellor and also repeat that session in the group format, so viable for women to complete all 24 TREM sessions in group and all 24 workbook sessions.

<sup>20</sup> Treatment found to be superior for measure of dissociation.

<sup>21</sup> Intervention participants also received: (1) 3 sessions of women's leadership training [15 hours]; (2) 8 sessions of economic success in recovery [16 hours]; (3) 10 sessions of Pathways to Family Reunification and Recovery [15 hours]; (4) 12 sessions of Nurturing Program for Families [24 hours], plus an unspecified amount of individual case management.

<sup>22</sup> Treatment not superior on ASI measure of substance use but post hoc analysis revealed superiority for abstinence rates.

	Study design	Setting, Country, Sample size (T/C)	Dosage	Control	Female %	IPV details	Recent IPV record %	PTSD %	SUD (AUD) %	PTS Outcome T> C	SU Outcome T>C	Follow up length	Q A	Associated supplementary studies
	RCT	outpatient drug treatment, USA n=85/65	(frequency unknown but within 15-24 months)			APA 66% ASA 53%						from baseline		
20	Swopes et al. 2015; quasi experimental matched comparison design	Women's prison USA n=59/82	48 sessions: three groupwork sessions weekly for 16 weeks) (inc. additional modules on domestic violence, relapse prevention and 12 step	TAU	100	CSA 48%;	NR	48	NR	N	N	4 mths from baseline	M	[1=Calhoun et al. 2010]
<b>9. Relapse Prevention and Relationship Safety – Women's Wellness Programme</b>														
21	Gilbert et al. 2006) RCT	Methadone maintenance treatment, USA n=16/18	11 x group sessions & 1 individual session; twice weekly for 6 wks	1 hr info session on domestic violence	100	100% IPV	100	100 <sup>23</sup>	100	N	N	3 mths from baseline	S	[1=Gilbert 2005]
<b>10. Dual Assessment and Recovery Track (DART)</b>														
22	Sacks et al. 2008; RCT	Outpatient substance misuse service, USA n=126/114	12 x groupwork & individual sessions of trauma informed addiction counselling + psycho-education, advocacy skills	TAU	57	IPV 98%, CSA/CPA 58%	NR	NR <sup>24</sup>	100	N	N	12 mths from baseline	S	
<b>11. Mindful Awareness in Body Orientated Therapy (MABT)</b>														

<sup>23</sup> PTSD was not an inclusion criterion for the study, 100% met criteria for at least 2/3 symptom clusters on the PCL-C.

<sup>24</sup> The mean GAIN Traumatic Stress Index was in the highest severity category, indicating a clinical level of stress related to trauma.

	Study design	Setting, Country, Sample size (T/C)	Dosage	Control	Female %	IPV details	Recent IPV record %	PTSD %	SUD (AUD) %	PTS Outcome T>C	SU Outcome T>C	Follow up length	Q A	Associated supplementary studies
23	Price et al. 2012; RCT	Women only substance misuse service, USA n=31/15	8 x individual weekly sessions + TAU	TAU	100	CSA or CPA 63%, ASA 48%	0 <sup>25</sup>	65	100	N <sup>26</sup>	N	9 mths from baseline	M	[2=Price et al. 2012a; Price & Smith-DiJulio 2016]
<b>12. Integrated trauma-informed treatment for substance use and mental health disorders with trauma-specific interventions [Women and Co-occurring Disorders and Violence (WCDV) Multi-site Study]</b>														
24	Morrissey, Jackson et al. 2005; quasi-experimental nonequivalent control group	Mental health, substance use, IPV services, USA n=1415/1314	9 study sites delivered: Seeking Safety (n=4), TREM (n=3) or ATRIUM^^ (n=1); Triad Women's Group^^ (n=1), varying lengths ***	TAU	100	CSA 62% CPA 61% APA 85% ASA 60%	47-55	NR^	NR^	Y <sup>27</sup>	N	12 mths from baseline	M <sup>28</sup>	[13=Brown et al. 2007; Heckman et al. 2004; Cadiz et al. 2004; Morrissey, Ellis et al. 2005; Cocozza et al. 2005; Domino et al. 2007; VandeMark et al. 2004; Savage & Russell 2005; Moses et al. 2003, 2004; Gilbert et al. 2011, Markoff et al. 2005; Mockus et al.2005]

PTSD = Post-traumatic stress disorder; DESNOS =Disorders of Extreme Stress Not Otherwise Specified; SUD= Substance Use Disorder; AUD=Alcohol Use Disorder; T = Treatment; C=Control; NR = not reported; TAU = Treatment as Usual; F= Female; CSA= Child sexual abuse; CPA=Child physical abuse; ASA= Adult sexual abuse; APA=Adult Physical Abuse; ICBT = Integrated CBT for PTSD and SUD; IAC = Individual Addiction Counselling; COPE = Concurrent Treatment of PTSD and SUD Using Prolonged Exposure. ATRIUM= Addictions and Trauma Recovery Integrated Model; QA=Quality Assurance; S=Strong; M=Moderate; W=Weak.

\* Remaining sample had sub-threshold PTSD. \*\* Within past 6 months, data drawn from Fowler & Faulkner 2011. \*\*\*Interventions sites: trauma informed services, outreach and engagement, screening and assessment, parenting skills training, resource coordination and advocacy, crisis intervention and peer run services. ^Inclusion criteria involved diagnosed mental health disorder in past five years, % with PTSD not reported only average scores for PTSD which indicated an average of moderate to severe for total sample (McHugo et al 2005). ^^ No separate studies published on WCDV sites which implemented these models.

<sup>25</sup> Current domestic violence was a study inclusion.

<sup>26</sup> Although there were significant effects for the measure of dissociation.

<sup>27</sup> Significant heterogeneity found across sites. Greater PTSD effect sizes (but not drug/alcohol) seen in intervention with high contrast in integrated counseling to the control, but not drug/alcohol measures.

<sup>28</sup> Data also drawn from Morrissey, Ellis et al. 2005; Cocozza et al. 2005; McHugo et al. 2005.



## 6. Online supplementary tables

### Supplementary table S.1: Search strategies for scoping exercise, stage 1 and 2 searches.

<b>Scoping exercise to identify published literature reviews on interventions to address post-traumatic stress and co-occurring substance use</b>	
<b>Databases</b>	PsycINFO (From inception up until 19.02.16), MEDLINE (from inception up until 19.02.16), CINAHL (from inception up until 03.03.16), and the Cochrane Database of Systematic Reviews (03.03.16).
<b>Search terms (see full list below)</b>	Mixture of MESH and index terms of the keywords using Boolean operators for various terms relating to 1) PTSD OR “domestic or sexual violence or child abuse” AND 2) Substance misuse AND 3) psychological interventions OR mindfulness OR Yoga AND 4) Literature reviews
<b>Inclusion criteria</b>	<ul style="list-style-type: none"> <li>• Systematic search strategy employed to identify studies</li> <li>• The review assesses treatment interventions addressing 1) co-occurring substance use and PTS or 2) substance use amongst survivors of interpersonal violence</li> <li>• Includes psychological interventions, mindfulness or yoga interventions involving controlled trials</li> <li>• Reports on effectiveness of interventions for both Substance Use Outcomes <b>AND</b> PTS using clinician or validated self report measures</li> <li>• Report on studies whose sample involves adults 18yrs+</li> <li>• Reports on studies whose sample involves &gt;50% women</li> <li>• English language</li> </ul>
<b>Exclusion criteria</b>	<ul style="list-style-type: none"> <li>• Does not present outcome data for both PTS and substance use</li> <li>• Book chapters, books, dissertations</li> <li>• Only includes interventions which are perpetrator programmes</li> <li>• Only includes interventions evaluating pharmacology</li> </ul>

<b>Outcome</b>	The search yielded 2673 records after removal of duplicates. Titles and abstracts were reviewed by two reviewers (KB & GG/KT) with any disagreements brought to a third reviewer (GG/KT). The full texts of 28 reviews were retrieved and 20 reviews were excluded after reading the full text leaving a total of 8 reviews for inclusion into the principle searches.
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<b>Principle search strategies</b>				
	<b>Stage One</b>			<b>Stage 2</b>
	<b>Search 1: psychological interventions to reduce PTS and substance use among women with experiences of interpersonal violence</b>	<b>Search 2: Updated search of a comprehensive systematic review of psychological interventions</b>	<b>Search 3: mindfulness, meditation and yoga interventions to reduce PTS and substance use among women with experiences of interpersonal violence</b>	<b>Search 4: Process evaluations and secondary data analyses associated with studies included in searches 1-3</b>
Data source	<p>Eight literature reviews identified in initial scoping review (see above)</p> <ul style="list-style-type: none"> <li>• <b>Roberts, Roberts, Jones &amp; Bisson, 2015;</b></li> <li>• <b>Bartlett et al., 2015;</b></li> <li>• <b>Najavits &amp; Hien, 2013;</b></li> <li>• <b>van Dam, Vedel, Ehring &amp; Emmelkamp, 2012;</b></li> <li>• <b>Torchalla, Nosen, Rostam &amp; Allen, 2012;</b></li> <li>• <b>Fowler &amp; Faulkner, 2011;</b></li> <li>• <b>Fareed et al., 2013</b></li> <li>• <b>Hesse, 2009</b></li> </ul>	<p>Searches conducted on the following databases from the upper limit search dates of the original review [01.01.14]: PsycINFO (01.01.14-08.03.16), PubMed (01.01.14 - 08.03.16), CINAHL (01.01.14- 08.03.16), PILOTS (Up until 09.03.16) Clinicaltrials.gov (on 30.03.16). With update in PsycINFO, ClinicalTrials.gov &amp; PILOTS until 18.04.18</p>	<p>Databases via Ovid: PsycINFO (inception-01.04.16), PubMed (inception-01.04.16), CINAHL (inception-01.04.16), PILOTS (Up until 01.04.16) Clinicaltrials.gov (on 01.04.16). With update on PsycINFO, PILOTS &amp; Clinicaltrials.gov until 18.04.18</p>	<p>Ovid platform (combining searches in PsycINFO, PILOTS, MEDLINE, Embase) from database inception to 05.10.16. With PILOTS and PsycINFO update on 19.04.18</p> <p>Reference lists of retrieved papers were also checked.</p> <p><b>Websites</b>  US Substance Abuse and Mental Health Services Administration (<a href="http://www.samhsa.org">www.samhsa.org</a>)  National Drug and Alcohol Research Centre University of New South Wales (<a href="http://www.ndarc.med.unsw.edu.au">www.ndarc.med.unsw.edu.au</a>)  Institute for Health and Recovery (<a href="http://www.healthrecovery.org">www.healthrecovery.org</a>)  British Columbia Centre for Excellence in</p>

				<p>Women's Health <a href="http://www.bcewh.bc.ca">www.bcewh.bc.ca</a>  <a href="http://www.treatment-innovations.org">www.treatment-innovations.org</a>  <a href="http://www.stephaniecovington.com">www.stephaniecovington.com</a>  <a href="http://www.advancedtrauma.com/News-and-Publications.html">http://www.advancedtrauma.com/News-and-Publications.html</a></p> <p>Where no supplementary studies were identified by these means authors of eligible primary studies were contacted to ask if there were any additional papers relating to their study.</p>
Search terms (see full list below)	N/A	1) PTSD OR "domestic or sexual violence or child abuse" AND 2) substance misuse AND 3) psychological interventions AND 4) Controlled trials	1) PTSD OR "domestic or sexual violence or childhood abuse" AND 2) Substance Misuse AND 3) meditation OR yoga OR mindfulness AND 4) Controlled trials	Entering the name of the intervention or primary study as a keyword.
Inclusion criteria	<ul style="list-style-type: none"> <li>Any psychological intervention addressing 1) co-occurring substance use and PTSD or 2) substance use amongst survivors of interpersonal violence</li> <li>Involves primary studies or secondary data analysis of a controlled trial (randomised and non randomised)</li> <li>Reports on effectiveness of interventions on both substance use outcomes and PTSD using clinician or validated self report measures</li> </ul>	<ul style="list-style-type: none"> <li>Any psychological intervention addressing 1) co-occurring substance use and PTSD or 2) substance use amongst survivors of interpersonal violence</li> <li>Involves primary studies or secondary data analysis of a controlled trial (randomised and non randomised)</li> <li>Reports on effectiveness of interventions on both substance use outcomes and PTSD as</li> </ul>	<ul style="list-style-type: none"> <li>Any form of meditation, mindfulness or yoga practice* addressing 1) co-occurring substance use and PTSD or 2) substance use amongst survivors of interpersonal violence</li> <li>Involves primary studies or secondary</li> </ul>	<ul style="list-style-type: none"> <li>Quantitative studies (inc. secondary data analysis) relating to a primary study identified in searches 1-3</li> <li>Qualitative studies relating to a primary identified in searches 1-3</li> <li>Explores the following research question: <i>For whom does the delivered intervention produce change (subgroups), how (mechanisms of action) and under what contexts (factors external to the intervention)?</i></li> <li>Peer reviewed and non-peer reviewed</li> </ul>

	<ul style="list-style-type: none"> <li>• Sample involves adults 18yrs+</li> <li>• Sample involves &gt;50% women</li> </ul>	<p>primary or secondary outcomes using clinician or validated self report measures</p> <ul style="list-style-type: none"> <li>• Sample involves adults 18yrs+</li> <li>• Sample involves &gt;50% women</li> </ul>	<p>data analysis of a controlled trial (randomised and non randomised)</p> <ul style="list-style-type: none"> <li>• Reports on effectiveness of Interventions on substance use outcomes and PTS using clinician or validated self report measures</li> <li>• Sample involves adults 18yrs+</li> <li>• Sample involves &gt; 50% of women participants</li> </ul> <p><i>* including mindfulness based CBT when compared to CBT only.</i></p>	<p>publications, grey literature and material produced online, published and unpublished material.</p>
Limits	English language	English language	English language	English language
Exclusion criteria	<ul style="list-style-type: none"> <li>• Trauma of participants limited to non-interpersonal trauma (e.g combat, accident, terrorist attack etc)</li> <li>• Pharmacological interventions</li> <li>• Non-controlled interventions, case studies</li> </ul>	<ul style="list-style-type: none"> <li>• Trauma of participants limited to non-interpersonal trauma (e.g combat, accident, terrorist attack etc)</li> <li>• Pharmacological interventions</li> <li>• Book chapters, books, dissertations</li> <li>• Non-controlled interventions, case studies</li> <li>• Literature reviews</li> </ul>	<ul style="list-style-type: none"> <li>• Trauma of participants limited to non-interpersonal trauma (e.g combat, accident, terrorist attack etc)</li> <li>• Pharmacological interventions</li> <li>• Book chapters, books, dissertations</li> </ul>	<ul style="list-style-type: none"> <li>• Book chapters, dissertations or conference proceedings</li> <li>• Included in searches 1-3</li> </ul>

		<ul style="list-style-type: none"> <li>• Mind-body interventions</li> </ul>	<ul style="list-style-type: none"> <li>• Non-controlled interventions, case studies</li> <li>• Literature reviews</li> </ul>	
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**Full search terms for PsycINFO (via Ovid)**

**Literature review**

1. Literature review/  
Meta Analysis/(Literature or Systematic) and Review\*
2. Evidence adj2 Synthesis
3. Review adj2 evidence
4. or Meta-analysis or).mp

**PTSD**

1. PTSD or post-trauma\* or post trauma\* or posttrauma\* or stress disorder\*
  2. (trauma\* and (psycho\* or stress\* or complex))
  3. (stress\* and (extreme or disorder\*))
  4. DESNOS
  5. Posttraumatic Stress Disorder/
  6. Complex and (PTSD or post-trauma\* or post trauma\* or posttrauma\*)
- 1 or 2 or 3 or 4 or 5 or 6

**Domestic or sexual violence or child abuse**

1. Domestic violence/
2. Battered females/
3. Child Abuse/
4. Emotional abuse/
5. Exposure to violence/
6. Family conflict/

7. Intimate Partner Violence/
  8. Marital conflict/
  9. Partner Abuse/
  10. Physical Abuse/
  11. Sexual Abuse/
  12. Domestic and (violence or abuse)
  13. (Physical or emotional or psychological or financial) and abuse
  14. Intimate partner and (violence or abuse)
  15. Sexual and (Assault or abuse).mp
  16. Rape.mp
  17. Sexual exploitation.mp
  18. Coercive control.mp
  19. Trauma\*.mp
  20. Gender\* adj violence
  21. ((abus\$ OR batter\$ OR violen\$ OR beat\$) adj5 (domestic OR partner\$ OR family OR families OR spouse OR woman OR women OR men OR man OR female\$ OR male\$ OR wife OR wives OR husband\$ OR boyfriend\$ OR girlfriend\$ OR elder\$ OR brother\$ OR sister\$ OR father\$ OR mother\$ OR daughter\$ OR son\$ OR carer\$).mp.)
- 1 or 2 or 3 or 4 or 5 or 6 or 7 pr 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21

### **Problematic Substance Use**

1. exp drug abuse/
2. exp Alcohol Abuse/
3. ("substance use disorder\*" or SUD)
4. (drug or alcohol) and abuse
5. (abuser\* or abusing or addict\* or depend\* or habit\* or misuse or user\*).
6. (adinazolam or aerosol\* or alcohol\* or alprazolam or amphetamin\* or anthramycin or anxiolytic\* or ativan or barbituat\* or bentazepam or benzodiazepin\* or bromazepan or brotizolam or buprenorphin\* or camazepam or cannabi\* or chlordiazepoxid\* or cinolazepam or clobazam or clonazepam or clorazepam or clotiazepam or cloxazolam or cocaine\* or codeine or crack or crystal or cyprazepam or depressant\* or diacetylmorphin\* or diazepam\* or doxefazepam or ecstasy or estazolam or etizolam or fentanyl or flunitrazepam or flurazepam or flutazoram or flutoprazepam or fosazepam or gases or GHB or girisopam or halazepam or hallucinogen\* or haloxazepam or heroin\* or hydromorphone or hydroquinone or hypnotic\* or inhalant\* or ketamin\* or ketazolam or librium or loflazepate or loprazolam or lorazepam

or lormetazepam or LSD or marihuana\* or marijuana\* or MDMA or meclonazepam or medazepam or meperidine or mephedrone or mescaline\* or metaclozepam or methadone or methamphetamine\* or methaqualone or mexazolam or midazepam or midazolam or morphine\* or narcotic\* or nerisepam or nimetazepam or nitrazepam or nitrites or "nitrous oxide" or "n-methyl-3,4-methylenedioxyamphetamine" or nordazepam or opiate\* or opioid\* or opium or oxazepam or oxazolam or oxazepam or oxycodone or oxzepam or painkiller\* or "pain killer\*" or PCP or pethidine\* or phencyclidine\* or pinazepam or prazepam or propazepam or propoxyphene or psilocybin or psychedelics\* or psychoactive\* or psychostimulant\* or quinazolinone or ripazepam or ritalin or sedative\* or serazepam\* or solvent\* or steroid\* or stimulant\* or substance\* or temazepam or tetrazepam or tofisopam or tramadol or triazolam or triflurazepam or valium or vicodin).

7. (drug\* and (recreational or street)).

8. 1 or 2 or 3 or 4 or 5 or 6 or 7

### **Psychological interventions**

1. psychotherapy/ or behavior therapy/ or brief psychotherapy/ or client centered therapy/ or cognitive behavior therapy/ or eye movement desensitization therapy/ or feminist therapy/ or gestalt therapy/ or group psychotherapy/ or humanistic psychotherapy/ or individual psychotherapy/ or integrative psychotherapy/ or interpersonal psychotherapy/ or narrative therapy/ or psychoanalysis/ or psychodynamic psychotherapy/ or psychotherapeutic counseling/ or relationship therapy/ or solution focused therapy/ or supportive psychotherapy/ or transactional analysis/ or cognitive therapy/ or couples therapy/

2. treatment/ or cognitive techniques/ or personal therapy/ or or treatment outcomes/ or intervention/ or group intervention/ or exp counseling/ or counseling psychology/ or family therapy/ or or support groups/ or psychoeducation/

3. treatment or interventions or psychotherap\* or psychosocial\* or "behavior therap\*" or "behaviour therap\*" or "exposure therap\*" or "EMDR" or "narrative therap\*"

### **Mindfulness/Yoga**

1. exp Meditation/ or meditation. ti,ab,id.

2. exp Mindfulness/ or or mindful\*. ti,ab,id

3. (Vipassana or Zen or Sudarshan or Kriya or Anapanasathi or ChunDoSupBup or Qigong). ti.ab,id

4. exp Yoga/

5. (yoga or pranayama or asana or yogic). ti,ab,id

### **Controlled trials**

1. exp clinical trial

2. Randomized controlled trial\$.t i, ab, id.

controlled trial. ti, ab, id

3. randomi#ed or trial or randomly or control. ti, ab, id



Supplementary table S.2 Overview of models included in the review

Model name	Content
<b>Past-focused: Prolonged Exposure &amp; Cognitive Behavioural Therapy</b>	
Concurrent Treatment of PTSD and Substance Use Disorders Using Prolonged Exposure (COPE)	Individual sessions. Motivational enhancement and CBT for substance use (sessions 1-4 and throughout); psychoeducation relating to both disorders and their interaction (sessions 1-4); in-vivo exposure (sessions 5-12); imaginal exposure (sessions 6-12); and cognitive therapy for PTSD (sessions 8-12); treatment review, after-care planning, and termination of therapy (session 13).
Integrated Cognitive Behavioural Therapy for PTSD and AUD	Individual sessions. Sessions 1-2: Preparation for treatment, motivational interviewing, brief account of trauma, monitoring tasks; Sessions 3-4: Assessing high risk situations, coping with cravings, PTSD psychoeducation, introducing exposure elements Sessions 5-6: identifying trauma-related cognitive distortions and alcohol and drinking thoughts, prolonged imaginal exposure (recounting the traumatic memory in the present tense for a minimum of 45 mins), intro to in-vivo exposure; Sessions 7-9: managing negative moods, pleasant events scheduling, cognitive restructuring for PTSD, imaginal exposure, in-vivo exposure practice Sessions 10-12: managing thoughts about alcohol, cognitive restructuring, imaginal exposure, in-vivo exposure practice, personal lapse plan, review consolidation & termination.
<b>Past-focused: Other exposure based interventions</b>	
Trauma focused imaginal exposure	Individual sessions. 1 educational session & 6 PTSD exposure sessions (1hr) (preceded and followed by a laboratory cue exposure). Participants were encouraged to include emotions and cognitions in their verbal description of the event. Participants described their trauma repeatedly and continuously over the course of the six 60-min clinical sessions. Each session was audiotaped, and participants were instructed to listen to the tape daily.
Substance Dependency-Post-Traumatic Stress Disorder Therapy (SDPT)	Individual sessions. Phase I (weeks 1-12) Coping skills treatment for addictions, integrated with psychoeducation about PTSD. Phase 2 (weeks 13-20) PTSD symptom-focused treatment (Stress Inoculation Therapy & Exposure), with continuing attention to substance use.
Eye Movement Desensitisation and Reprocessing (EMDR) Therapy	Individual sessions. Session 1: Assessment of readiness and treatment plan development, identification of traumatic stressful memories for processing; Session 2: Imagery and stress reduction techniques to deal with emotional distress; Session 3-7 EMDR using bilateral stimulation involving taps or tones targeting the visual vivid memory, negative belief about self, related emotions and body sensations and positive beliefs; Session 7-8 closure and examination of progress.

Present-focused interventions	
Integrated Cognitive Behavioural Therapy for PTSD (ICBT)	12-14 Individual sessions. Module 1: Introduction to treatment - outline of therapy, goals and mutual expectations; Module 2: Crisis and Relapse Prevention plan - review early warning signs, coping strategies and social supports; Module 3: Breathing retraining - anxiety reduction skill. Module 4: Education on PTSD; Module 5: PTSD Associated symptoms - fear & anxiety, sadness & depression, guilt & shame, anger, interpersonal consequences of PTSD, interplay with PTSD and substance use; Module 6: Cognitive restructuring part 1- basic framework for identifying stressful situations, beliefs/thoughts and emotional and behavioural consequences; Module 7: Steps to dispute belief, generating alternative emotions or behaviours; Module 8: Closure to therapy, aftercare plan.
Trauma Adaptive Recovery Group Education and Therapy (TARGET)	8-9 groupwork sessions. Phase 1: stabilisation and self-regulation via 'Focusing'; Phase 2: trauma processing via 'Recognising' emotions and cognitive evaluations, goal definitions and options focused on current life experiences, Phase 3: incorporates learning into client's overarching lifestyle, values, goals and plans.
Seeking Safety	25 sessions, groupwork/individual: (1) Cognitive topics x 7 (PTSD, Compassion, Creating Meaning, Discovery, Recovery Thinking, When Substances Control You, Integrating the Split Self) (2) Behavioural topics x 7 (Taking Good Care of Yourself, Self-Nurturing, Grounding, Red and Green Flags, Commitment, Coping with Triggers, Respecting your Time) (3) Interpersonal topics x 7 (Asking for Help, Setting Boundaries, Healthy Relationships, Getting Others to Support Your Recovery, Honesty, Community Resources, Healing from Anger) (4) Combination x3 (Safety, Review, Termination) (5) Case management x 1 (and running throughout the programme delivery) assumes that psychological interventions can only work if individuals have an effective and holistic coordinated care plan.
Trauma Recovery and Empowerment Model (TREM)	33 groupwork sessions comprising psychoeducational, cognitive behavioral, and relational elements that emphasizes survivor empowerment. Divided into four areas: 11 x Empowerment; 9x Trauma Recovery; 8 x Advanced Trauma Recovery Issues; and 3 x Closing Rituals.
Gender Responsive Treatment	28 Groupwork sessions. Phase 1 Helping Women Recover (Covington 2008) (17-sessions) organized into four modules: (1) Self module, including impacts of addiction (2) Relationship module (3) Sexuality module including link between with addiction and body. (4) Spirituality module. Phase 2 Beyond Trauma (Covington, 2003) consists of 11 sessions focused on three areas: teaching women what trauma and abuse are, helping them to understand typical reactions to trauma and abuse, and developing coping skills, impact of abuse on their lives personal safety.

Relapse Prevention and Relationship Safety: Women's Wellness Programme	Session 1: Preparing for treatment, enhancing motivation. Session 2: Relationship safety, assessing risk, safety planning and case management (individual). Session 3: Triggers for relationship conflict and drug use. Session 4: Healing from psychological domestic violence. Session 5: Dealing with physical domestic violence, reconstructing anger. Session 6: Recovering from trauma, identifying PTSD triggers. Session 7-8: Setting sexual boundaries, negotiation skills, identifying triggers for HIV. Session 9: Strategies for reducing HIV risk. Session 10: Rethinking the balance of power. Session 11: Avoiding Relapse to unsafe behaviours. Session 12: Recovery and celebrating successes.
Dual Assessment and Recovery Track (DART)	12 individual and groupwork sessions incorporated into modified Therapeutic Community treatment and comprising 3 elements: 1) trauma informed addiction treatment to address links to substance misuse and trauma, developing coping skills 2) psycho-social seminar to improve client's understanding of mental health 3) teaching of case management skills to help capacity to negotiate with health and social agencies on their own behalf.
Mindful Awareness in Body Orientated Therapy (MABT)	Individual sessions. Sessions 1 & 2 focused on massage with body literacy - the practice of identifying and articulating what is noticed in the body. Sessions 3 & 4 interoception through body awareness exercises. Sessions 5-8 mindful body awareness practice a) interoceptive awareness of a specific area within the body b) sustained mindful present-moment awareness in the body c) intermittent attention to specific aspects of sensory awareness (sensation, image, emotion and form), review and homework practices.
Integrated and trauma-informed treatment with trauma-specific interventions [Women and Co-occurring Disorders and Violence (WCDV) Multi-site Study]	9 sites implementing groupwork programmes either Seeking Safety(n=4), TREM (n=3 (described above) or Addictions and Trauma Recovery Integrated Mode (ATRIUM)1 (n=1); Triad Women's Group (n=1). In addition, all interventions sites delivered other trauma informed group-work programmes, outreach and engagement, screening and assessment, parenting skills training, resource coordination and advocacy, crisis intervention and peer run services, and often included additional groups such as domestic violence, leadership, health and employment.

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