Screening and treatment of posttraumatic stress disorder in patients with substance use disorders

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Psychological treatments for concurrent posttraumatic stress disorder and substance use disorder: a systematic review

Abstract

This article gives an overview of research into psychological treatments for concurrent posttraumatic stress disorder (PTSD) and substance used disorder (SUD), with a special focus on the effectiveness of treatments addressing both disorders compared to treatments addressing one of the disorders alone. In addition, a distinction is made between trauma-focused versus non-trauma-focused therapies for concurrent PTSD and SUD. The databases Embase, Psychinfo, Medline and Web of science were searched for relevant articles. In total, seventeen studies were identified evaluating ten treatments protocols (six trauma-focused and four non-trauma-focused treatment approaches). In general, the studies showed pre-post reductions for PTSD and/ or SUD symptoms. Although most treatments for concurrent PTSD and SUD did not prove to be superior to regular SUD treatments, there are some promising preliminary results suggesting that some patients might benefit from trauma-focused interventions. However, the lack of methodologically sound treatment trials makes it difficult to draw firm conclusions. Methodological limitations are discussed, along with recommendations for future research.
Introduction

The relationship between PTSD and SUD

Posttraumatic stress disorder (PTSD) and substance use disorder (SUD) are both severe and disabling disorders causing great psychological distress. According to the current literature, prevalence estimates for PTSD in SUD samples vary from 11% to 41% (Harrington & Newman, 2007; Ouimette, Goodwin, & Brown, 2006; Van Dam, Ehring, Vedel, & Emmelkamp, 2010). This variation may partly be due to differences in assessment methods (e.g., questionnaire measures versus diagnostic interviews) and differing population characteristics (e.g., men, women, war veterans). Despite this variability of prevalence estimates, it is evident that the occurrence of PTSD among SUD-patients is high. This has important clinical implications as patients with concurrent PTSD and SUD show higher symptom severities and worse treatment outcomes compared to patients with either disorder alone (Back et al., 2000; Brown & Wolfe, 1994; Najavits, Weiss, & Shaw, 1999; Ouimette, Brown, & Najavits, 1998).

A number of hypotheses have been put forward to explain the concurrence of the two disorders. The ‘high risk hypothesis’ proposes a causal relationship, where substance abuse leads to a higher risk for traumatic experiences, increasing the chance for developing PTSD (Hien, Cohen, & Campbell, 2005). The ‘self-medication hypothesis’ suggests a reverse relationship in that concurrent PTSD and SUD is thought to be caused by trauma survivors’ excessive use of substances as self-medication for painful and disturbing PTSD symptoms (Khantzian, 1985; Stewart & Conrod, 2003). Repeated self-medication may then over time lead to an automatic association between PTSD symptoms and substance use, so that exposure to trauma reminders and/or the experience of PTSD symptoms can trigger craving and substance use (see Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). In addition, it has been suggested that physical symptoms due to withdrawal of substances, such as heart beating, sweating and shivering, can evoke traumatic memories and trigger PTSD symptoms because they are similar to the individual’s fear response during the traumatic experience (Stewart & Conrod, 2003). Finally, concurrent PTSD and SUD may alternatively be due to an unknown third variable, such as a biological vulnerability or poor coping skills, increasing the risk for developing both PTSD and SUD independently following trauma exposure (Stewart & Conrod, 2003).
Patients often perceive a functional relationship between PTSD and SUD. Especially the influence of PTSD on SUD appears to be recognized by patients (Back, Brady, Jaanimägi, & Jackson, 2006; Brown, Stout, & Gannon-Rowley, 1998). To date, the best evidence is available for the self-medication hypothesis as PTSD is more often a precursor of SUD than vice versa (Stewart & Conrod, 2003). Also, the improvement of PTSD complaints appears to have a greater effect on substance use problems than vice versa (Back, 2010). Cognitive experimental research investigating the functional relationship of PTSD and SUD is scarce, but the studies that have been done also support the self-medication theory. For example, it has been shown that exposure to personalized trauma-image cues leads to an increase of reported craving (Coffey et al., 2002; Saladin et al., 2003). Although most evidence available to date supports the self-medication hypothesis, it is conceivable that the processes described earlier are not mutually exclusive but actually interacting with each other in the development of concurrent PTSD and SUD. Patients with concurrent PTSD and SUD may then end up in a vicious circle, where PTSD symptoms trigger substance abuse, substance abuse in turn increases the risk for future traumatic experiences, and withdrawal from substances can trigger PTSD symptoms (Stewart & Conrod, 2003).

**Implications for clinical practice**

In sum, both retrospective and experimental research appears to confirm a functional relationship between PTSD and SUD. This may explain the worse treatment outcomes in patients with concurrent PTSD and SUD in current clinical practice. Traditionally, a patient with both diagnoses is referred to a substance abuse treatment center to deal with the substance abuse first. However, the functional relationship between PTSD and SUD suggests that PTSD symptoms will exacerbate when substances are withheld. This puts patients in danger of dropping out during detoxification and SUD treatment, which prevents them from receiving PTSD treatment. Psycho-education about the vicious circle of PTSD and SUD may prepare patients with concurrent PTSD and SUD for oncoming difficulties during detoxification and SUD treatment (Ford, Russo, & Mallon, 2007). In addition, a number of authors have suggested that this patient group may benefit from an integrated treatment approach that includes specific interventions for both
disorders (Bradizza, Stasiewicz, & Paas, 2006; Donovan, Padin-Rivera, & Kowaliw, 2001; Ford et al., 2007; McGovern et al., 2009; Najavits et al., 2007).

Our clinical impression, shared by other researchers, is that SUD therapists commonly hesitate to ask about traumatic experiences because they fear opening Pandora’s Box leading patients to decompensate during treatment (Hien, Cohen, Miele, Litt, & Capstick, 2004). Consequently, research has shown a low detection rate of PTSD within substance abuse treatment centers as patients often do not report traumatic experiences and PTSD symptoms spontaneously (Kimerling, Trafton, & Nguyen, 2006; Reynolds et al., 2005). It appears that systematic screening can lead to a four times higher detection rate of PTSD among patients attending substance abuse treatment centers (Kimerling et al., 2006; Van Dam et al., 2010). It therefore appears important to make therapists more aware of the prevalence of concurrent PTSD and SUD and the functional relationship between both disorders.

Before focusing on the integrated interventions for comorbid SUD and PTSD, we will first briefly summarize the state-of-the-art of evidence-based psychological interventions for SUD and PTSD when treated separately.

**Evidence-based treatments for SUD.** Cognitive behavioral treatments (CBT) are considered evidence-based interventions for SUD. Empirically supported cognitive behavioral approaches include coping skills training, relapse prevention, contingency management, and behavioral couples therapy (Emmelkamp & Vedel, 2006). Coping skills training and relapse prevention focus on recognizing and coping with high-risk situations that precipitate substance use, and on providing patients with new strategies and skills through modeling, behavioral practice and homework assignments (Monti, Kadden, Rohsenow, Cooney, & Abrams, 2002). Contingency management is based on the principle of operant conditioning (Jones, Wong, Tuten, & Stitzer, 2005; Lussier, Heil, Mongeon, Badger, & Higgins, 2006). Behavior that facilitates abstinence is reinforced by giving patients meaningful privileges (e.g., an employment program, rent-free housing, money). If patients do not commit themselves to the desired behavior, these privileges are withheld as a form of punishment. Behavioral couples training focuses not only on developing self control and coping skills of the patient, but also aims to improve the coping skills of the spouse in order to support the patient in gaining treatment goals (Powers, Vedel, &
Emmelkamp, 2008). It additionally focuses on social functioning of the couple in their relationship and in their social network.

Another type of treatment intervention for SUD (not based on CBT) is the twelve-step treatment approach (Alcoholics Anonymous) (Emmelkamp & Vedel, 2006). An important characteristic of the twelve-step philosophy is the aim to stimulate a sense of spirituality in participants in order to give them meaning in life. Other important principles are the idea that substance abuse is a chronic disease, and that therefore the only way to tackle this disease is by striving for total life-time sobriety. In order to accomplish this treatment goal, participants are stimulated to build an alcohol- and drugfree social environment around them. The treatment results of the twelve-step approaches are comparable to other evidence-based treatments for alcohol use disorder (Ferri, Amato, & Davoli, 2006).

**Evidence-based treatments for PTSD.** Treatment approaches for PTSD are often divided into trauma-focused versus non-trauma-focused treatments (e.g., Bisson et al., 2007). Trauma-focused treatments are defined as focusing on the *memory* of the traumatic event and its meaning (see National Collaborating Centre for Mental Health, 2005). Two different types of trauma-focused treatment are exposure-based therapies and eye movement desensitization and reprocessing (EMDR). The main ingredient of exposure-based therapies is imaginal exposure, which is often combined with in vivo exposure (Powers, Halpern, Ferenschak, Gillihan, & Foa, 2010). During imaginal exposure, patients are asked to revisit their traumatic event in their imagination and describe it in great detail. In vivo exposure consists of repeated exposure to trauma-related real-life situations patients have been avoiding since the trauma. In EMDR, the client is instructed to focus on the traumatic memory and simultaneously perform rhythmic eye movements or other bilateral stimulation (Shapiro, 1995).

Results of most meta-analyses suggest equal efficacy for exposure-based therapies and eye movement desensitization and reprocessing (EMDR) (Bisson et al., 2007; Bradley, Greene, Russ, Dutra, & Westen, 2005; Seidler & Wagner, 2006). In current clinical guidelines, both exposure-based therapies and EMDR are therefore recommended as first-line treatments for PTSD (e.g., National Collaborating Centre for Mental Health, 2005). However, other reports have suggested that evidence is still inadequate to determine the efficacy of EMDR (Institute of
In sum, the best evidence currently exists for exposure-based therapies (Institute of Medicine, 2008).

Non-trauma-focused therapies for PTSD focus on the present or past aspects of the patient’s life other than the trauma, and do not require patients to revisit or reprocess the trauma. The aim of this group of treatments is to provide patients with coping skills to manage their trauma symptoms and to improve functioning. Examples of non-trauma-focused therapies are stress management, supportive/ non-directive therapy and relaxation (Foa, Keane, & Friedman, 2008). Only limited and inconsistent evidence has been found for non-trauma-focused CBT, stress management and relaxation in the treatment of PTSD (Bisson et al., 2007). Therefore, current clinical guidelines recommend against routinely offering this kind of treatments to trauma survivors who present with chronic PTSD (e.g., National Collaborating Centre for Mental Health, 2005).

**Purpose of this review**

In sum, the prevalence of concurrent PTSD and SUD is high. Concurrent PTSD and SUD has been associated with higher symptom severities and worse treatment outcomes. A number of authors have suggested a functional relationship between both disorders, which is largely supported by empirical evidence. The current clinical practice of sequentially treating both disorders might contribute to worse treatment outcomes as a sequential approach does not address the mutual relationship between the two disorders. Therefore, several authors have proposed that concurrent treatment for both disorders may be more effective for this patient group.

In recent years, a number of treatment models and protocols for combined treatment of PTSD and SUD have been developed, tested and implemented into clinical practice. However, treatment rationales, types of intervention used, and treatment intensities are strikingly different between the different programs. The purpose of this review is (1) to give an overview of psychological treatments that have been developed and evaluated for treating concurrent PTSD and SUD, and (2) to summarize the existing evidence for the hypothesis that treatments simultaneously targeting PTSD and SUD are more effective than treatments focusing on one of the disorders alone.
We are aware of two earlier qualitative reviews focusing on treatment for comorbid PTSD and SUD (McCarthy & Petrakis, 2010; Souza & Spates, 2008). However, an update of these reviews appears timely as a number of studies have been published since. In addition, our article extends these earlier ones by using more stringent criteria for the inclusion of studies and by making a distinction between trauma-focused and non-trauma-focused PTSD treatments, which is in line with the PTSD literature (e.g., Bisson et al., 2007). In addition, we only include studies using research samples with a formal diagnosis for PTSD and SUD.

Method

In order to identify relevant articles, the databases Embase, Psychinfo, Medline and Web of science were searched combining the keywords PTSD, substance use disorder and treatment as well as their synonyms1. The databases were searched for articles published by January 2011. 

Articles were included in the current review if (1) they were published in a peer-reviewed journal, (2) they were published in English, (3) they described studies investigating the effectiveness of psychological treatments specifically developed for treating concurrent PTSD and SUD, (4) the studied sample had a formal diagnosis for (full-blown or partial) PTSD and SUD, and (5) the dependent variables included PTSD symptoms and SUD symptoms. Studies not reporting the percentage of participants meeting a formal diagnosis for (partial or full-blown PTSD) or for SUD were excluded. The selection process of relevant articles is illustrated in Figure 1.

The database search led to 1952 hits. Abstracts of all studies that were identified as relevant and were retrieved for more detailed information in the first selection ($N = 163$) were

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1 Databases (Embase, Psychinfo, Medline and Web of science) were searched with the following key words: (PTSD or posttraumatic or post-traumatic) AND (treatment or intervention* or randomized controlled trial or RCT or therap*) AND (addiction or SUD or substance-related disorders or substance abuse or substance dependence or alcohol abuse or alcohol dependence or drug abuse or cocaine abuse or cocaine dependence or opioids abuse or opioids dependence or cannabis abuse or cannabis dependence or sedative abuse or sedative dependence or hypnotic abuse or hypnotic dependence or anxiolytic abuse or anxiolytic dependence or polydrug abuse or polydrug dependence).
References retrieved for more detailed information (N = 163)

References excluded that did not address specifically developed treatments for concurrent PTSD and SUD (N = 1,789)

Potentially relevant references identified and screened for retrieval (N = 1,952)

References excluded that did not address treatment effectiveness or relevant dependent variables (N = 132)

Potentially appropriate references retrieved for more detailed information (N = 31)

References excluded that did not address psychological, but pharmacological treatments for PTSD and SUD (N = 3)

References excluded that were not published in journals or in languages other than English (N = 5)

References excluded that did not include a formal diagnosis for PTSD or SUD (N = 6)

References with usable information (N = 17)

Figure 1. Flow-chart for the selection of relevant articles
independently evaluated by two of the authors. If an abstract appeared to represent a relevant article, the full report was read by each reviewer independently to determine if the study met the inclusion criteria. In the second round, 132 of the 163 references were excluded from this review because they either did not report treatment outcome data at all or did not include dependent variables of relevance for the current study. In the third round, 14 of the 31 potentially appropriate studies identified in the second round were excluded; one study was excluded because results were only published in the Norwegian language (Amundsen & Kårstad, 2006). Description of the study in the English abstract suggests that the article described an uncontrolled study of 20 clients receiving EMDR. Four studies were excluded because they had exclusively been published as dissertations (Bragdon, 2007; Caldeira, 2004; Lester et al., 2007; Stiffler, 2006). In addition, three studies evaluating pharmacological treatments for patients with a concurrent PTSD and SUD were excluded from this review (Brady et al., 2005; Brady, Sonne, & Roberts, 1995; Petrakis et al., 2006). Finally, six studies were excluded because either no formal diagnosis for SUD (Steindl, Young, Creamer, & Crompton, 2003) or no formal diagnosis for (full-blown or partial) PTSD was established in these studies (Amaro et al., 2007; Covington, Burke, Keaton, & Norcott, 2008; Gatz et al., 2007; Messina, Grella, Cartier, & Torres, 2010; Toussaint, VanDeMark, Bornemann, & Graeber, 2007). The following treatment approaches were investigated in these studies: Trauma Recovery and Empowerment (TREM) (Harris, 1998), Helping Women Recover (HWR) and Beyond Trauma (BT) (Covington et al., 2008), Seeking Safety therapy (SS) (Najavits, 2003), and CBT for alcohol misuse added on trauma-focused CBT for PTSD (Steindl et al., 2003). Table 1 gives an overview of all studies investigating psychological treatments for PTSD and SUD that were excluded from the current review. The 17 studies included in the review are presented in Table 2 and 3.

Treatments for concurrent PTSD and SUD

In the PTSD treatment literature, an important distinction is commonly made between trauma-focused and non-trauma-focused treatments. In the current review, the presentation of the studies is therefore structured according to this distinction. In addition, combined treatments have been developed in different ways. Some therapies encompass one specifically designed stand-alone treatment protocol, in which PTSD and SUD interventions are combined. This kind of
Table 1. Excluded Studies Investigating Psychological Treatments for PTSD and SUD.

<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment(s)</th>
<th>Number of sessions/ type of treatment</th>
<th>Design</th>
<th>N</th>
<th>Sample</th>
<th>Reason for exclusion</th>
<th>Measure(s) PTSD</th>
<th>Measure(s) SUD</th>
<th>Measure(s) Timing</th>
<th>PTSD within group effects</th>
<th>SUD within group effects</th>
<th>SUD between group effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amaro et al. (2007)</td>
<td>A) TREM &amp; TAU versus B) TAU</td>
<td>25/ group</td>
<td>Quasi Experimental</td>
<td>342 women</td>
<td>No formal diagnosis PTSD</td>
<td>PSS, ASI</td>
<td>Pre 6 month 12 month (post baseline)</td>
<td>A+ B n/r</td>
<td>A+ B</td>
<td>A+ B+/ A&gt; B²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covington et al. (2008)</td>
<td>A) HWR and BT</td>
<td>28/ group</td>
<td>Uncontrolled</td>
<td>79 women</td>
<td>No formal diagnosis PTSD</td>
<td>TSC-40, ASI-F</td>
<td>Pre-post / during treatment</td>
<td>A+</td>
<td>n/a</td>
<td>A + n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gatz et al. (2007)</td>
<td>A) SS &amp; TAU versus B) TAU</td>
<td>31/ group</td>
<td>Quasi Experimental</td>
<td>313 women</td>
<td>No formal diagnosis PTSD</td>
<td>PSS, ASI</td>
<td>Pre-post 3 month 6 month 9 month 12 month</td>
<td>A+ B+</td>
<td>A+ B</td>
<td>A+ B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Messina et al. (2010)</td>
<td>A) HWR and BT versus B) TAU</td>
<td>28/ group</td>
<td>RCT</td>
<td>115 women/ incarcerated</td>
<td>No formal diagnosis PTSD</td>
<td>PDS, ASI-Lite</td>
<td>Pre 6 month 12 month</td>
<td>n/r</td>
<td>n/r</td>
<td>A + A&gt; B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steindl et al. (2003)</td>
<td>A) Combination of 2 CBT treatments for PTSD and SUD</td>
<td>4 days per week for 6 weeks &amp; 1-2 days per week for 6 weeks' group</td>
<td>Uncontrolled</td>
<td>608 men/ veterans</td>
<td>No formal diagnosis SUD</td>
<td>PCL, AUDIT</td>
<td>Pre 3 month 9 month</td>
<td>A+</td>
<td>n/a</td>
<td>A + n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toussaint et al. (2007)</td>
<td>A) TREM &amp; TAU versus B) TAU</td>
<td>24/ group</td>
<td>Quasi Experimental</td>
<td>170 women</td>
<td>No formal diagnosis PTSD</td>
<td>PSS, ASI</td>
<td>Pre 6 month 12 month</td>
<td>n/r</td>
<td>A= B</td>
<td>n/r A= B</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. PTSD = Posttraumatic stress disorder. SUD = Substance use disorder. TAU = Treatment as usual. TREM = Trauma Recovery Empowerment. HWR and BT = Helping Women Recover and Beyond Trauma. SS = Seeking Safety therapy. RCT = Randomized controlled trial. CBT = Cognitive behavioral treatment. + = significant improvement of symptoms. - = significant worsening of symptoms. +/- = no significant change in symptoms. n/a = not applicable. n/r = not reported.

² No differences for alcohol or drugs severity. However the intervention group reported significantly higher drug abstinence rates than the comparison group. This effect was not found for alcohol abstinence rates.
<table>
<thead>
<tr>
<th>Treatment(s)</th>
<th>Trauma-focused/Non-trauma-focused</th>
<th>Exposure</th>
<th>Integrated/add-on</th>
<th>SUD treatment</th>
<th>Number of studies (N = 17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concurrent Treatment of PTSD and Cocaine Dependence (CTPCD) (later modified into COPE)</td>
<td>Trauma-focused</td>
<td>Imaginal</td>
<td>Integrated</td>
<td>CBT</td>
<td>N = 1 (Back et al., 2001)</td>
</tr>
<tr>
<td>Imaginal Exposure (IE)</td>
<td>Trauma-focused</td>
<td>Imaginal</td>
<td>Add-on</td>
<td>Coping skills-based therapy</td>
<td>N = 1 (Coffey et al., 2006)</td>
</tr>
<tr>
<td>Multiple Channel Exposure Training (MCET)</td>
<td>Trauma-focused</td>
<td>Imaginal</td>
<td>Add-on</td>
<td>12-step CBT</td>
<td>N = 1 (Davis et al. 2005) (case study)</td>
</tr>
<tr>
<td>Image Habituation Training (IHT)</td>
<td>Trauma-focused</td>
<td>Imaginal</td>
<td>-</td>
<td>n/r</td>
<td>N = 1 (Vaughan &amp; Tarrier 1992) (case study)</td>
</tr>
<tr>
<td>Exposure Therapy</td>
<td>Trauma-focused</td>
<td>Imaginal</td>
<td>-</td>
<td>-</td>
<td>N = 1 (Tuerk et al. 2009) (case study)</td>
</tr>
<tr>
<td>Seeking Safety therapy (SS)</td>
<td>Non-trauma-focused</td>
<td>-</td>
<td>Integrated</td>
<td>CBT</td>
<td>N = 8 (Cohen &amp; Hien, 2006; Cook et al., 2006; Hien et al., 2004; Hien et al., 2009; Killeen et al., 2008; Najavits et al., 2006; Najavits et al., 1998; Norman et al., 2010; Zlotnick et al., 2009; Zlotnick et al., 2003)</td>
</tr>
<tr>
<td>CBT for PTSD in addiction treatment programs (CBT-P in add)</td>
<td>Non-trauma-focused</td>
<td>-</td>
<td>Add-on</td>
<td>CBT</td>
<td>N = 1 (McGovern et al., 2009)</td>
</tr>
<tr>
<td>Substance Dependency-Post-traumatic stress disorder Therapy (SDPT)</td>
<td>Non-trauma-focused</td>
<td>In vivo</td>
<td>Integrated</td>
<td>CBT</td>
<td>N = 1 (Triffleman, 2000)</td>
</tr>
<tr>
<td>Transcend</td>
<td>Non-trauma-focused</td>
<td>Social sharing</td>
<td>Integrated</td>
<td>Eclectic</td>
<td>N = 1 (Donovan et al., 2001)</td>
</tr>
</tbody>
</table>

Note. n/r = not reported. PTSD = Posttraumatic stress disorder. SUD = Substance use disorder. CBT = Cognitive behavioral treatment.
Table 3. Studies Evaluating Non-trauma-focused Treatments.

<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment(s)</th>
<th>Number of sessions/type of treatment</th>
<th>Design</th>
<th>N</th>
<th>Sample</th>
<th>PTSD%</th>
<th>Measure(s) PTSD</th>
<th>Measure(s) SUD</th>
<th>Measure(s) Timing</th>
<th>PTSD within group effects</th>
<th>PTSD between group effects</th>
<th>SUD within group effects</th>
<th>SUD between group effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohen et al. (2006)</td>
<td>A) SS &amp; CC vs. B) RP &amp; CC vs. C) CC</td>
<td>24/individual</td>
<td>RCT</td>
<td>107</td>
<td>women</td>
<td>88%</td>
<td>CAPS, IES, CGI</td>
<td>SU1, CGI</td>
<td>Pre-post 6/9month</td>
<td>A&gt; B</td>
<td>B&gt; C</td>
<td>A&gt; C</td>
<td>C&gt; (A+B) &gt; C</td>
</tr>
<tr>
<td>Hien et al. (2004)</td>
<td>A) SS &amp; CC versus B) RP &amp; CC versus C) CC</td>
<td>24/individual</td>
<td>RCT</td>
<td>33</td>
<td>girls</td>
<td>100%</td>
<td>WAS, PEI, BSU</td>
<td>RFU</td>
<td>Pre-post 3month</td>
<td>A&gt; B</td>
<td>A&gt; C</td>
<td>B&gt; C</td>
<td>C&gt; (A+B) &gt; C</td>
</tr>
<tr>
<td>Cook et al. (2006)</td>
<td>A) SS</td>
<td>25/group</td>
<td>Uncontrolled</td>
<td>25</td>
<td>men and women/ veterans</td>
<td>100%</td>
<td>PCL-M</td>
<td>days of abstinence</td>
<td>Pre-post</td>
<td>A +/-</td>
<td>A +/-</td>
<td>A +/-</td>
<td>n/a</td>
</tr>
<tr>
<td>Donovan et al. (2001)</td>
<td>A) Transcend</td>
<td>12-weeks, 10 hours/week/group</td>
<td>Uncontrolled</td>
<td>46</td>
<td>men/veterans</td>
<td>100%</td>
<td>CAPS</td>
<td>ASI</td>
<td>Pre-post 6/12month</td>
<td>A + n/a</td>
<td>A + n/a</td>
<td>A +</td>
<td>n/a</td>
</tr>
<tr>
<td>Hien et al. (2009)</td>
<td>A) SS &amp; TAU vs. B) WHE &amp; TAU</td>
<td>12/group</td>
<td>RCT</td>
<td>353</td>
<td>women</td>
<td>80%</td>
<td>CAPS, PSSr</td>
<td>days of abstinence</td>
<td>Pre-post 6/9/12month</td>
<td>A + B</td>
<td>A =&gt; B</td>
<td>A =&gt; B</td>
<td>B =&gt; C</td>
</tr>
<tr>
<td>Kilken et al. (2008)</td>
<td>A) SS &amp; TAU vs. B) WHE &amp; TAU</td>
<td>12/group</td>
<td>RCT</td>
<td>353</td>
<td>women</td>
<td>80%</td>
<td>CAPS, PSSr</td>
<td>days of abstinence</td>
<td>Pre-post 6/9/12month</td>
<td>A + B</td>
<td>A =&gt; B</td>
<td>A =&gt; B</td>
<td>B =&gt; C</td>
</tr>
<tr>
<td>McGovem et al. (2009)</td>
<td>A) CBT-P in add</td>
<td>8-12/individual</td>
<td>Uncontrolled</td>
<td>15</td>
<td>men</td>
<td>100%</td>
<td>CAPS, ASI</td>
<td>TSC-40, MPSSR</td>
<td>Pre-post 3month</td>
<td>A + n/a</td>
<td>A + n/a</td>
<td>A +</td>
<td>n/a</td>
</tr>
<tr>
<td>Najavits et al. (1998)</td>
<td>A) SS</td>
<td>24/group</td>
<td>Uncontrolled</td>
<td>27</td>
<td>women</td>
<td>100%</td>
<td>WAS, PEI, BSU</td>
<td>RFU</td>
<td>Pre-post 3month</td>
<td>A + B</td>
<td>A &gt; B</td>
<td>A +</td>
<td>n/a</td>
</tr>
<tr>
<td>Najavits et al. (2006)</td>
<td>A) SS &amp; CC vs. B) CC</td>
<td>25/individual</td>
<td>RCT</td>
<td>33</td>
<td>girls</td>
<td>100%</td>
<td>WAS, PEI, BSU</td>
<td>RFU</td>
<td>Pre-post 3month</td>
<td>A + B</td>
<td>A &gt; B</td>
<td>A +</td>
<td>B &gt; n/a</td>
</tr>
</tbody>
</table>

Note. PTSD = Posttraumatic stress disorder. SUD = Substance use disorder. SS = Seeking Safety therapy. CC = standard Community Care. RP = Relapse Prevention. TAU = Treatment as usual. WHE = Women’s Health Education. CBT = Cognitive behavioral treatment. CBT-P in add = CBT for PTSD in addiction treatment programs. SDPT = Substance Dependency Posttraumatic stress disorder Therapy. RCT = Randomized controlled trial. +/- = significant improvement of symptoms. n/a = not applicable. n/r = not reported.

3 The percentage of full-blown PTSD in the research sample. The percentage of subthreshold PTSD can be derived from the complement (100%).
4 Clinician diagnosed.
5 Continued abstinence from substances pre- to post.
6 Discharge ASI data were not collected.
7 No significant decreases in number of days drinking or using drugs, but a significant decrease in reported SUD-severity.
8 Referring to improvement in trauma-related symptoms, symptomatic for childhood trauma, such as “fear of men”.

73
<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment(s)</th>
<th>Number of sessions/ type of treatment</th>
<th>Design</th>
<th>N</th>
<th>Sample</th>
<th>PTSD/ %</th>
<th>Measure(s) PTSD</th>
<th>Measure(s) SUD</th>
<th>Measure(s) Timing</th>
<th>PTSD within group effects</th>
<th>PTSD between group effects</th>
<th>SUD within group effects</th>
<th>SUD between group effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norman et al. (2010)</td>
<td>A) SS</td>
<td>10/ group</td>
<td>Uncontrolled</td>
<td>14</td>
<td>men/ veterans</td>
<td>100%</td>
<td>PCL-M</td>
<td>Aud/AST</td>
<td>Pre-post 3month &amp; 6month</td>
<td>A13</td>
<td>n/a</td>
<td>A14</td>
<td>n/a</td>
</tr>
<tr>
<td>Triffleman (2000)</td>
<td>A) SDPT versus B) 12step</td>
<td>40/ individual</td>
<td>RCT (pilot)</td>
<td>19</td>
<td>men and women</td>
<td>44% men/ 70% women</td>
<td>CAPS</td>
<td>ASI</td>
<td>Pre/ during treatment 1month</td>
<td>(A + B)15</td>
<td>A= B</td>
<td>(A + B)16</td>
<td>A= B</td>
</tr>
<tr>
<td>Zlotnick et al. (2003)</td>
<td>A) SS &amp; TAU</td>
<td>24/ group</td>
<td>Uncontrolled</td>
<td>17</td>
<td>women/ incarcerated</td>
<td>100%</td>
<td>CAPS</td>
<td>ASI/SCID</td>
<td>Pre-post 3month</td>
<td>A +</td>
<td>n/a</td>
<td>A +</td>
<td>n/a</td>
</tr>
<tr>
<td>Zlotnick et al. (2009)</td>
<td>A) SS &amp; TAU versus B) TAU</td>
<td>18-24/ group &amp; 12/ individual</td>
<td>RCT</td>
<td>49</td>
<td>women/ incarcerated</td>
<td>84%</td>
<td>CAPS/I</td>
<td>TSC-40/ THQ</td>
<td>ASI/TLFB</td>
<td>Pre-post 3month &amp; 6month</td>
<td>A +</td>
<td>A= B</td>
<td>A +</td>
</tr>
</tbody>
</table>

Note. PTSD = Posttraumatic stress disorder. SUD = Substance use disorder. SS = Seeking Safety therapy. CC = standard Community Care. RP = Relapse Prevention. TAU = Treatment as usual. WHE = Women’s Health Education. CBT = Cognitive behavioral treatment. CBT-P in add = CBT for PTSD in addiction treatment programs. SDPT = Substance Dependency Posttraumatic stress disorder therapy. RCT = Randomized controlled trial. ± = significant improvement of symptoms. - = significant worsening of symptoms. +/− = no significant change in symptoms. n/a = not applicable. n/r = not reported.

9 The percentage of full-blown PTSD in the research sample. The percentage of subthreshold PTSD can be derived from the complement (100%).
10 PTSD- and SUD-diagnoses were based on the intake with a mental health provider.
11 12 Changes were examined on an individual basis.
13 14 Within group effects were only reported for the sample as a whole, and not specified for treatment A or B.
treatment protocols will be referred to as *integrated* treatments. In the other protocols, the original treatment for SUD is maintained, while a separate therapy targeting PTSD is added to the SUD treatment. These treatment protocols will be referred to as *add-on* treatments. Most of the SUD interventions used in the combined treatment programs can be considered as evidence-based interventions for SUD.

**Non-Trauma-Focused Therapies**

In the following, four non-trauma-focused treatment programs will be described in more detail and their treatment effectiveness will be discussed (see Tables 2 and 3). These programs are Seeking Safety therapy (SS) (Najavits, 2003), CBT for PTSD in SUD treatment (McGovern et al., 2009), Substance Dependency-Posttraumatic stress disorder Therapy (SDPT) (Triffleman, Carroll, & Kellogg, 1999) and Transcend (Donovan et al., 2001). First, the eight studies investigating the effectiveness of SS will be presented, followed by one study investigating the effectiveness of CBT for PTSD in SUD treatment, one study evaluating the effectiveness of SDPT, and one study investigating the effectiveness of Transcend (see Table 3).

**Seeking Safety therapy.** Seeking Safety therapy (SS) is the treatment approach for patients with PTSD and SUD that has most extensively been studied to date. It incorporates a combination of non-trauma-focused CBT for PTSD and CBT for SUD. SS aims to educate patients about both disorders and assist them in developing self-control skills to prevent drug use and to manage overwhelming affect. Another important element of the treatment is cognitive restructuring, addressing disabling thoughts associated with both disorders (e.g. “blaming the victim” and “user thinking”). SS also pays attention to interpersonal and communication skills, promoting participants to build a supportive network. An important assumption in SS is that safety has the highest priority when recovering from both disorders. Safety is defined as “abstinence from all substances, reduction in self-destructive behavior, establishment of a network of supportive people, and self-protection from dangers associated with the disorders (e.g., HIV-risk, and domestic violence)” (Najavits, Weiss, Shaw, & Muenz, 1998, p. 439). Of the eight studies investigating the effectiveness of SS, four were uncontrolled studies and four were randomized controlled trials (RCTs). Although SS was originally designed as an integrated stand-alone treatment, SS has also been evaluated as an add-on to SUD treatment.
The four uncontrolled studies comprise diverse population samples (women, incarcerated women, men and male veterans; \( N \) between 14 and 27) (Cook, Walser, Kane, Ruzek, & Woody, 2006; Najavits et al., 1998; Norman, Wilkins, Tapert, Lang, & Najavits, 2010; Zlotnick, Najavits, Rohsenow, & Johnson, 2003). In addition, the number of SS therapy sessions offered varied from 10 to 30 sessions (see Table 3). In three of the studies, SS was investigated as a stand-alone treatment (Cook et al., 2006; Najavits et al., 1998; Norman et al., 2010). In one study, SS was investigated as an add-on to a residential therapeutic program for women in prison based on the 12-step program for addictions (Zlotnick et al., 2003). In one of the studies, PTSD and SUD were not diagnosed with a clinical structured interview but clinical diagnoses were established by a mental health provider at intake (Norman et al., 2010).

In all four uncontrolled studies, PTSD and SUD symptom severities were found to significantly improve from pre- to post treatment. The three studies incorporating 3-month follow-up measurements showed that these improvements were maintained at follow-up (Najavits et al., 1998; Norman et al., 2010; Zlotnick et al., 2003). Completer percentages ranged from 63% to 72% in three of the four uncontrolled studies. However, it is noteworthy that these three studies all used different definitions of completers (Cook et al., 2006: attending 56% of the sessions until the end of therapy; Najavits et al., 1998: attending at least 25% of the sessions; Norman et al., 2010: completing follow-up measures). In the study among incarcerated women, all patients completed treatment, which can be explained by the specific setting (Zlotnick et al., 2003). Although the results appear promising, no firm conclusions can be drawn based on uncontrolled studies alone. It is therefore important to consider the results of more methodologically rigorous studies investigating the effectiveness of SS.

So far, four RCTs have been conducted investigating the effectiveness of SS (Hien et al., 2004; Hien et al., 2009; Najavits, Gallop, & Weiss, 2006; Zlotnick, Johnson, & Najavits, 2009). Hien et al. (2004) assigned 75 female PTSD-SUD patients to either 24 sessions of SS or CBT for SUD. Both therapies were combined with TAU (community care). SS plus TAU, and CBT for SUD plus TAU were compared to TAU alone. TAU alone was offered to a nonrandomized control group (\( N = 32 \)). Participants receiving SS plus TAU or CBT for SUD plus TAU both showed significant and equal reductions in quantity and frequency of substance use from pre- to post-treatment, as well as reductions in PTSD symptom severity from pre- to post-treatment. For
both groups improvements in substance use and PTSD severity sustained at 6-month and 9-month follow-ups. On the other hand, the TAU group showed no significant changes regarding substance use, and PTSD symptoms even got worse during the study interval. Overall retention rates were 75%, whereby retention was defined as participants having attended at least 25% of all therapy sessions. No between group differences for retention were found. When the data of SS plus TAU and CBT for SUD plus TAU were pooled, these treatments showed significantly stronger reductions in PTSD symptoms and substance use compared to TAU (Cohen & Hien, 2006).

Although SS resulted in significant improvements of PTSD and SUD compared to the non-active comparison group, this RCT did not prove superiority of SS above a regular treatment program dealing with SUD only. In addition, the high retention rates of both active treatments should be interpreted with caution because patients were labeled as completers after attending a relatively small number of treatment sessions.

In a small RCT with 49 incarcerated individuals with PTSD and SUD, SS was added to treatment as usual (TAU) as a voluntary group treatment (Zlotnick et al., 2009). The SS intervention consisted of 18 to 24 group sessions and 12 individual booster sessions. TAU was a required residential treatment program for addiction for the duration of 3 to 6 months, based on the 12-step model. Results for PTSD and SUD were compared between the SS plus TAU condition and TAU alone. A comparison between retention for SS plus TAU (78%) and TAU (100%) cannot be made because TAU was obligatory. Also, the percentage of sessions necessary to be defined as a completer for SS was not explicitly described. Assessments took place at intake, 12 weeks after intake (4 to 6 weeks after the end of the group SS, which was close to women’s release from prison), and 3 and 6 months after release from prison. Both groups showed a significant reduction in frequency and severity of PTSD symptoms from pre-treatment, to 12 weeks after intake, and to 3 and 6 months after release from prison. Also, both groups showed equal improvements in drug and alcohol use severity as well as in days of abstinence. Hence, the results of this study again do not favor SS above regular SUD treatment.

In an RCT by Hien et al. (2009) (N = 353), SS was compared to an active comparison group called “Women’s Health Education” (WHE). Both active interventions comprised 12 group-sessions and were combined with community-based substance abuse treatment programs
(TAU). The seven participating treatment sites offered different kinds of TAU, differing in length, frequency and SUD treatment orientation. Equal improvements for SS and WHE were found in clinician-rated and self-reported PTSD symptom severity, whereas no improvements were found for substance use in both treatments (measured by self-reported days of abstinence and days of substance use). Overall 56% of the participants completed at least 6 treatment sessions (50%), whereby both groups did not differ in treatment attendance. No differences between groups were found for adverse events. Adverse events referred to the extent to which treatment evoked negative consequences (increased PTSD symptoms, increased depression symptoms, and increased or more severe alcohol or substance use) (Killeen et al., 2008).

In an RCT carried out among 33 PTSD-SUD adolescent girls (Najavits et al., 2006), the SS protocol was modified by including the option to discuss details of the trauma. SS comprised 25 individual treatment sessions, and was combined with TAU. SS plus TAU was compared to TAU alone. The TAU condition was similar to standard community care and not uniform. In other words, the control group was not offered a manualized comparative treatment, but patients were allowed to attend any concurrent treatments they naturally sought. Positive outcomes were found favoring the SS condition compared to standard community care in substance use and associated problems, some trauma-related symptoms, and cognitions related to SUD and PTSD. The average attendance of sessions was 12. A definition of completer or completer percentages could not be obtained from the article.

The results of the latter study appear promising. However, one should bear into mind that SS plus TAU included more individual therapy sessions than the community care TAU condition, which may have led to the superior treatment results. It should also be noted that the research sample was relatively small, and that the assessment instruments in this study are not commonly used in comparable studies (see Table 3).

In sum, both the uncontrolled studies and the repeated measure comparisons in the quasi experimental study and the RCTs showed that SS can lead to significant improvements in SUD and PTSD symptom severity. However, there is no evidence to date that patients with a formal

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15 This treatment module can be seen as a form of trauma-focused intervention. However, the dose of this intervention appeared to be minimal ($M = 1.33$ sessions; $SD = 2.09$). Therefore, this study is discussed in the non-trauma-focused section.
diagnosis of (partial) PTSD and SUD are more effectively treated with SS than with active control treatments focusing on SUD only. There is preliminary evidence, however, that SS may be superior to standard community care (Najavits et al., 2006).

When evaluating the SS studies, a number of limitations are noteworthy. First, half of the studies carried out were uncontrolled studies. These studies lack the methodological rigor to draw firm conclusions. Second, not all studies used the same outcome measures and treatment settings differed largely, which makes it difficult to compare results across studies. Third, the studies used different definitions for treatment completers, some of which appeared overly lenient. Finally, in one RCT different kind of TAU programs were used in addition to the experimental and the control treatment. The TAU programs varied in treatment approach, length, and intensity (Hien et al., 2009; Killeen et al., 2008), which makes it difficult to compare treatment results even within the same study.

**CBT for PTSD in SUD treatment.** McGovern et al. (2009) adapted an existing PTSD protocol for individuals with comorbid severe mental illnesses in order to implement it in the context of existing addiction treatment services. The PTSD treatment comprised 8 to 12 individual sessions including psycho-education, breathing re-training, and cognitive restructuring. The SUD treatment was an intensive outpatient program focusing on psycho-education about SUD, and learning coping skills to manage relapse. An uncontrolled study was performed to investigate the effectiveness of CBT for PTSD in SUD treatment \((N = 15)\). The retention rate was 65% (defined as completion of at least 75% of the treatment sessions). Completer analyses over 11 cases from baseline to post-treatment and to 3 month follow-up showed significant reductions in PTSD diagnoses and symptom severities. There were no significant decreases in the number of days drinking or using drugs over time, but there was a significant decrease in SUD severity.

Although results suggest an improvement for PTSD and SUD symptoms, no firm conclusions can be drawn based on this study because of methodological limitations, especially the uncontrolled nature of the study, the small sample size, and the use of a completer analysis only.

**Substance Dependency-Posttraumatic stress disorder Therapy.** Substance Dependency-Posttraumatic stress Disorder Therapy (SDPT) was developed as an integrated individual treatment for PTSD and SUD (Triffleman, 2000). It utilizes relapse prevention and
coping skills training for substance abuse, psycho-education, and stress inoculation. PTSD symptoms are targeted through an adaptation of cognitive strategies and coping skills for dealing with trauma-related cues in daily life gradually including in vivo exposure. Although it also incorporates in vivo exposure for PTSD, the treatment does not specifically focus on the traumatic event and its memory and is therefore classified as a non-trauma-focused therapy.

SDPT was studied in a pilot RCT (Triffleman, 2000). Nineteen patients were randomly assigned to SDPT or an active comparison group based on the twelve-step program. Both groups showed equal reductions of PTSD severity, the number of PTSD symptoms, SUD severity and the number of days using substances from baseline to 1 month post-treatment. Results for treatment retention were ambiguous, showing a higher median for the SDPT group, but no group differences for the mean number of weeks in treatment (Triffleman, 2000). A completer definition or completer percentages could not be obtained from the article.

Based on these results, there is no evidence for a superiority of SDPT in treating concurrent PTSD and SUD above regular SUD treatment. A methodological weakness of this study is the small sample size. Hence, the study lacked appropriate power to detect differences between groups (Triffleman, 2000).

Transcend. Transcend is an integrated therapy specifically designed for war-veterans suffering from PTSD and SUD (Donovan et al., 2001). It involves a 12-week partial hospitalization group-treatment, which is started after the completion of a substance abuse program. Treatment goals focus on decreasing PTSD symptoms and promoting an addiction-free lifestyle, reducing impulsive behavior and shame as well as increasing self-acceptance and self-effectiveness. The SUD treatment is eclectic and incorporates constructivist, dynamic, CBT and 12-step orientated interventions. Although Transcend includes sharing traumatic experiences with the group, this is not the main ingredient of the program, and it cannot be classified as imaginal exposure (see Foa, Hembree, & Rothbaum, 2007).

Transcend was investigated in an uncontrolled study involving 46 male veterans (Donovan et al., 2001). Results showed a significant reduction in PTSD symptoms as well as alcohol consumption, drinking alcohol to intoxication and polysubstance drug abuse (variables assessed from pre-treatment to 12-month follow-up) (Donovan et al., 2001). Ninety percent of the subjects completed the full treatment program. These outcomes suggest that Transcend can be
effective in treating concurrent PTSD and SUD in male veterans with high levels of treatment retention. However, the uncontrolled research design and the relatively small number of veterans limit the generalizability of the results.

**Conclusions for non-trauma-focused treatments.** The aim of this section was to give an overview of studies investigating the effectiveness of non-trauma-focused treatments for treating concurrent PTSD and SUD, and to evaluate whether treatments simultaneously targeting PTSD and SUD are more effective than treatments focusing on one of the disorders alone. The non-trauma-focused treatments investigated were SS, CBT for PTSD in SUD treatment, Transcend, and SDPT.

SS has been investigated most extensively. The studies included in this review comprised four uncontrolled studies, and four RCTs investigating SS. Both CBT for PTSD in SUD treatment, and Transcend were investigated in uncontrolled studies only, and SDPT was evaluated in a small pilot RCT.

Results of the six uncontrolled studies suggest that non-trauma-focused therapy can be effective in treating concurrent PTSD and SUD symptoms. However, uncontrolled study designs are limited in their generalizability in a number of ways. For instance, it remains unclear whether results can be explained by the specific treatment strategies used or by non-specific elements of treatment (e.g., therapist attention) or regression to the mean. Furthermore, uncontrolled studies provide no information regarding the relative effectiveness of SS, CBT for PTSD in SUD treatment, or Transcend compared to existing treatments. The small pilot RCT evaluating SDPT did not provide evidence for a superiority of SDPT above regular SUD treatment. However, it remains unclear whether these results are due to treatment characteristics or a lack of sufficient power. Therefore, the four RCTs investigating the effectiveness of SS should be given most weight in the evaluation of treatment results for non-trauma-focused treatments. The RCTs confirmed the positive results regarding significant pre-post effects reported in the uncontrolled studies, but did not show a superiority of SS above treatments for SUD only.

In conclusion, no convincing evidence was found supporting the added value of specific non-trauma-focused therapies in the treatment of concurrent PTSD and SUD. A possible explanation for this finding is the fact that non-trauma-focused therapies are not state-of-the-art treatments for PTSD (Bisson et al., 2007; National Collaborating Centre for Mental Health,
As described earlier, trauma-focused treatments such as imaginal exposure or EMDR are recommended as first-line treatments for PTSD (National Collaborating Centre for Mental Health, 2005). We will therefore now turn to studies evaluating the effectiveness of trauma-focused treatments for concurrent PTSD and SUD.

**Trauma-Focused Therapies**

Three studies could be identified investigating the effectiveness of trauma-focused therapies for concurrent PTSD and SUD (see Tables 2 and 4). First, two integrated treatments will be described (Concurrent Treatment of PTSD and Cocaine Dependence: Back, Dansky, Carroll, Foa, & Brady, 2001; SS plus Exposure Therapy revised: Najavits, Schmitz, Gotthardt, & Weiss, 2005). After that, one study will be discussed where a PTSD treatment involving imaginal exposure is given parallel to CBT for SUD (Coffey, Stasiewicz, Hughes, & Brimo, 2006). At the end of the section, three case studies will be discussed briefly.

**Seeking Safety plus Exposure Therapy-Revised.** Seeking Safety plus Exposure Therapy-Revised is a modified version of the Seeking Safety protocol, integrating imaginal exposure (see Foa et al., 2008) as an optional component of SS treatment. Exposure Therapy was adapted in several ways to the specific needs of PTSD-SUD patients, e.g., patients were allowed to process multiple traumas in one session as long as the level of affect remained high. Patients were encouraged to process trauma memories as well as painful SUD memories. In addition, the protocol included relapse prevention and crisis prevention strategies. The treatment consisted of 30 individual sessions in a period of 5 months.

A small uncontrolled pilot study among five male participants was carried out to explore the effectiveness of treatment (Najavits et al., 2005). As patients could decide for themselves how many exposure sessions they received, the relative amount of each treatment component (SS or Exposure) could differ between subjects. The average number of sessions with exposure was eight. Treatment results were measured pre- and post-treatment and weekly urine analysis were carried out. Outcomes showed significant improvement for addiction severity and PTSD symptoms. Importantly, all participants completed the total number of treatment sessions.
Although these results appear promising, one should take into account the small sample size, the lack of a control group and the lack of follow-up data after treatment when interpreting the findings.

**Concurrent Treatment of PTSD and Cocaine Dependence.** The Concurrent Treatment of PTSD and Cocaine Dependence (CTPCD) is an individual integrated treatment program for PTSD and SUD (16 sessions; Back et al., 2001). The program has recently been modified and renamed ‘concurrent treatment of PTSD and substance use disorders with prolonged exposure’ (COPE) (see Back, 2010). The treatment intertwines an adapted prolonged exposure protocol (Foa et al., 1999), involving imaginal and in vivo exposure therapy, with CBT for SUD. Treatment effectiveness was studied in an uncontrolled study amongst 39 PTSD-SUD patients (Brady, Dansky, Back, Foa, & Carroll, 2001). Patients received 6 to 9 sessions of imaginal exposure, depending on individual levels of avoidance and distress. Starting with Session 6, patients were required to additionally complete in vivo exposure assignments. Imaginal exposure began at Session 7 for all patients. Patients who completed 10 or more sessions were defined as completers (attending at least 3 sessions of imaginal exposure). The percentage of treatment completers was 38.5%. For pre- to post-treatment outcome analyses, only data for the 15 treatment completers were used. Results indicated a significant decrease in self-reported and clinician-rated PTSD symptoms until 6-months follow-up. Also, the severity in drug and alcohol use, as well as work-related problems decreased from baseline to 6-month follow-up (ASI subscale scores). In addition, patients reported experiencing drug-related problems on fewer days at post-treatment in comparison to pre-treatment.

The findings reveal a significant improvement of PTSD and SUD symptoms from baseline to follow-up. These results suggest that patients with concurrent PTSD and SUD can be successfully treated with exposure therapy. Nevertheless, one must be cautious drawing firm conclusions considering the lack of a control group, the relatively small sample size, the use of completer analyses, and the high percentage of dropout (61.5%). Several randomized controlled trials evaluating the treatment in a more rigorous way are currently underway and will provide more conclusive evidence (see Back, 2010).
<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment(s)</th>
<th>Number of sessions/ type of treatment</th>
<th>Exposure</th>
<th>Design</th>
<th>N</th>
<th>Sample</th>
<th>PTSD%</th>
<th>Measure(s) PTSD</th>
<th>Measure(s) SUD</th>
<th>Measure(s) Timing</th>
<th>PTSD within group effects</th>
<th>PTSD between group effects</th>
<th>SUD within group effects</th>
<th>SUD between group effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brady et al. (2001)</td>
<td>A) CTPCD</td>
<td>16/ individual</td>
<td>IE</td>
<td>IV</td>
<td>Uncontrolled</td>
<td>39 men and women</td>
<td>100%</td>
<td>CAPS, IES, MISS</td>
<td>ASI</td>
<td>Pre-post / during treatment 6month</td>
<td>A + n/a</td>
<td>A + n/a</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Coffey et al. (2006)</td>
<td>A) IE &amp; CBT for SUD versus B) Relaxation &amp; CBT for SUD</td>
<td>6/ individual</td>
<td>IE</td>
<td>RCT</td>
<td>Uncontrolled</td>
<td>43 men and women</td>
<td>100%</td>
<td>IES</td>
<td>ADS craving, VAS</td>
<td>Pre-post / during treatment</td>
<td>A + B +/- A&gt; B</td>
<td>A + B +/- A&gt; B</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Davis et al. (2005)</td>
<td>A) MCET</td>
<td>17/ individual</td>
<td>IE</td>
<td>IV</td>
<td>Case study</td>
<td>1 woman</td>
<td>100%</td>
<td>IES, TSI, M-PTSD-SC</td>
<td>Abstinence</td>
<td>Pre-post / during treatment 3month</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Najavits et al. (2005)</td>
<td>A) SS plus Exposure Therapy-Revised</td>
<td>30 IE Uncontrolled</td>
<td>5 men</td>
<td>100%</td>
<td>SCID, THQ, TSC-40, WAS</td>
<td>SCID, ASI, BASU, Urine</td>
<td>Pre-post / during treatment</td>
<td>A+ n/a</td>
<td>A+ n/a</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Tuerk et al. (2009)</td>
<td>A) Exposure therapy for PTSD</td>
<td>11/ individual</td>
<td>IE</td>
<td>IV</td>
<td>Case study</td>
<td>1 male/ veteran</td>
<td>100%</td>
<td>SCID, PCL</td>
<td>AUDIT</td>
<td>Pre-post / during treatment 6month</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vaughan &amp; Tarrier (1992)</td>
<td>IHT</td>
<td>1/ individual</td>
<td>IE</td>
<td>Case study</td>
<td>3 men</td>
<td>100%</td>
<td>IES</td>
<td>Abstinence/ amount of alcohol</td>
<td>Pre-post / during treatment 6month</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Note. PTSD = Posttraumatic stress disorder. SUD = Substance use disorder. CTPCD = concurrent treatment of PTSD and cocaine dependence. IE = Imaginal exposure. IV = In vivo exposure. CBT = Cognitive behavioral treatment. MCET = Multiple Channel Exposure Therapy. IHT = Image Habituation Training. + = significant improvement of symptoms. - = significant worsening of symptoms. +/- = no significant change in symptoms. n/a = not applicable. n/r = not reported.

16 The percentage of full-blown PTSD in the research sample. The percentage of partial PTSD can be derived from the complement (100%).
Add-on treatment with imaginal exposure. One study has been performed investigating the effectiveness of adding an evidence-based treatment for PTSD to an evidence-based treatment for single SUD. In this study imaginal exposure for PTSD was added on cognitive behavioral treatment for SUD (Coffey et al., 2006).

The main aim of the study by Coffey et al. (2006) was to test the hypothesis that negative emotion is a mechanism of alcohol craving. However, the study also included an RCT, investigating the effectiveness of imaginal exposure as an add-on to regular substance abuse treatment. In the current review, only results on the efficacy of the treatment will be presented and discussed. Participants were randomly assigned to 6 individual sessions of imaginal exposure (experimental treatment) or 6 individual sessions of relaxation training (active control treatment). Both interventions were added on to a regular substance use treatment. The SUD treatment encompassed outpatient group and individual coping skills-based therapy for SUD. Group treatment was scheduled three times per week, whereas individual treatment was provided once every 1 or 2 weeks. The sample consisted of 43 patients with co-morbid PTSD and SUD. Measurements were performed at baseline, at every session of PTSD intervention, and after completion of the 6 sessions of PTSD intervention. Imaginal exposure resulted in a significant decrease in rated SUD craving and in self-reported PTSD symptoms for study completers, whereas relaxation therapy did not. Study completers were defined as individuals attending all laboratory (experimental group) or all clinical sessions (control group). Completer rates were 50% for imaginal exposure, and 63% for relaxation.

Although the sample size of this study was relatively small, results showed that imaginal exposure could be a promising intervention when added on to an SUD program in the treatment of concurrent PTSD and SUD. Importantly, imaginal exposure also performed better than relaxation training as an active control treatment. However, because of the lack of follow-up data no evidence is available on long-term effects for both treatments. A further limitation concerns the fact that analyses were based on completer data only.

Case studies. In addition to the studies described so far, three case studies on trauma-focused treatments for PTSD and SUD could be identified that are briefly described. Tuerk, Brady, & Grubaugh (2009) describe the case of a male veteran diagnosed with alcohol dependence, PTSD and traumatic brain injury. The patient received Exposure therapy for PTSD (Foa et al., 2007), comprising imaginal and in vivo exposure, via videoconferencing. Significant
improvements were reported for PTSD and SUD symptoms up to 6-month follow-up. Davis, Davies, Wright, Falsetti, & Roitzsch (2005) investigated the effectiveness of \textit{Multiple Channel Exposure Therapy (MCET)} including imaginal exposure, added on regular SUD treatment (12-step and CBT) and treatment for borderline personality disorder (Dialectical Behavior Therapy). The female patient attended 17 individual sessions, and reported significant improvement for PTSD and SUD complaints up to 3-month follow-up. Vaughan and Tarrier (1992) investigated the effectiveness of \textit{Image Habituation Training (IHT)} for PTSD (imaginal exposure) followed by daily homework for 2 weeks. They studied 10 different PTSD patients of whom 3 reported comorbid substance abuse (alcohol). PTSD complaints improved greatly for one abstinent patient. IHT was less effective for the two patients that continued drinking.

\textbf{Conclusion for trauma-focused treatments.} In this section, an overview was given of studies investigating the effectiveness of trauma-focused treatments for concurrent PTSD and SUD. The treatments were SS with Exposure Therapy-Revised, CTPCD, and imaginal exposure as an add-on to CBT for SUD. Exposure Therapy, MCET and IHT were explored in 3 case studies.

So far, only three studies with small sample sizes ($N \leq 43$ participants) have investigated the effectiveness of trauma-focused therapies for patients with a double diagnosis of PTSD and SUD. All three studies suffer from a number of methodological limitations, complicating the interpretation of their results. First, two of the three studies were uncontrolled studies, which limits the generalizability of the results. Furthermore, for one of the studies the research sample was very small ($N = 5$) (Najavits et al., 2005). In addition, the only RCT testing a trauma-focused treatment protocol was conducted in an experimental and not a routine clinical setting (Coffey et al., 2006). This study did not provide any data concerning the stability of treatment effects, and analyses were only performed for completers. Other complicating factors for the interpretation and comparison of the three studies were differences in treatment settings, and differences in the definition of treatment completers. Finally, two of the three studies concerning trauma-focused treatment showed high dropout rates (Brady et al., 2001; Coffey et al., 2006). Although there is no empirical evidence indicating that trauma-focused treatment leads to an increase in substance use, relapse, or attrition for this patient group (Back, 2010), high dropout rates might reflect safety issues, and these should be considered carefully. On the other hand, all studies showed improvements for PTSD symptoms as well as SUD symptoms following trauma-focused
treatment for concurrent PTSD and SUD. The only RCT performed for trauma-focused treatment for concurrent PTSD and SUD reported superior effectiveness of trauma-focused treatment (imaginal exposure) added on SUD treatment above an active control treatment (relaxation) added on SUD treatment.

So far, there is not enough proof available supporting the use of trauma-focused treatment for those with a comorbid diagnosis for PTSD and SUD. Nonetheless, the preliminary results presented earlier hold promise that patients may profit substantially from trauma-focused treatment, if they are able to tolerate exposure-based interventions and complete their treatment. This is in line with data from research into PTSD without SUD (Bisson et al., 2007).

Conclusions

The purpose of this review was to give an overview of psychological treatments for concurrent PTSD and SUD. In addition, it was aimed to evaluate whether these treatments are superior to treatments focusing on one of the disorders alone. Hereby a distinction was made between trauma-focused versus non-trauma-focused treatments.

In total, seventeen studies were identified evaluating ten treatment protocols (Table 2). Four treatments were non-trauma-focused (SS; CBT for PTSD added on SUD treatment; SDPT; Transcend), and six treatments were trauma-focused (SS plus Exposure Therapy-Revised; CTPCD; imaginal exposure added on SUD treatment; Exposure Therapy, MCET; IHT). This review discussed six RCTs, eight uncontrolled studies, and three case studies. Ten studies showed significant reductions in PTSD and SUD symptoms for the experimental treatments. Two studies found significant symptom-improvements for PTSD, but not for SUD (Cook et al., 2006; Hien et al., 2009). One study reported symptom improvements for the sample as a whole, and did not specify results for the experimental treatment alone (Triffleman, 2000), and one study only investigated symptom changes on an individual level (Norman et al., 2010). Three studies did not perform follow-up measurements (Coffey et al., 2006; Cook et al., 2006; Najavits et al., 2005). However, the studies comprising follow-up measurements generally showed that effects remained stable at follow-up.

The five RCTs investigating the relative effectiveness of non-trauma-focused therapies compared to single SUD treatment included SS, and SDPT (Hien et al., 2004; Hien et al., 2009; Najavits et al., 2006; Triffleman et al., 1999; Zlotnick et al., 2009). None of these studies
provided evidence that these non-trauma-focused therapies are more effective in treating concurrent PTSD and SUD than interventions focusing on one of the disorders alone. Only one RCT evaluated the relative effectiveness of trauma-focused therapy (Coffey et al., 2006). Although results are preliminary, the completer analysis from this trial shows a significantly higher effect for the trauma-focused intervention than a control condition providing relaxation training. Based on these preliminary findings as well as results from the literature on treatments for PTSD without SUD (Bisson et al., 2007), it appears promising to investigate the efficacy of trauma-focused treatment for comorbid PTSD and SUD using more rigorous methodology.

The current review is limited by its purely qualitative nature. We were therefore not able to compare the different treatment approaches in a quantitative way. In the future, meta-analytic procedures should be used to this end. However, a larger number of studies using sound methodology are needed before a meta-analysis in this area appears warranted. In the following, we will discuss a number of methodological limitations of and inconsistencies between the existing studies before turning to recommendations for future research. First, the studies presented a large variety in research samples and settings (veterans, women, prisoners), which makes it difficult to directly compare treatment results. Second, there was a large variability regarding the way, in which the key dependent variables were operationalized. For example, not all studies used the same type of outcome measures for PTSD and SUD. In addition, there was a huge variation in the definition of treatment completers, varying from 25% to 100% attendance. Therefore, a comparison of dropout across studies does not appear to be very meaningful. Furthermore, the type and timing of follow-up measurements differed considerably, which again complicates a comparison across studies. Third, the interpretation of the results is seriously complicated by the relatively small amount of RCTs conducted so far (N = 6). In addition, these RCTs differ regarding the control groups included. For example, different kinds of SUD-TAU programs were used as comparison groups. Finally, the pilot RCT investigating SPDT comprised such a small research sample that it lacked the necessary power (Triffleman, 2000), and therefore it cannot be considered as a rigorous study.

Based on the review of the literature, the following recommendations can be made for future research. First, research directly comparing trauma-focused versus non-trauma-focused interventions is needed in order to be able to draw conclusions regarding their relative effectiveness for patients with concurrent PTSD and SUD. Preliminary evidence regarding the
effectiveness of imaginal exposure plus SUD treatment, such as implemented in the COPE treatment approach, appears promising. Though, more rigorous research evaluating the efficacy of these treatments in necessary. Importantly, given the high dropout rates reported in studies conducted so far, future research need to pay close attention to safety issues and retention of patients in treatment. Reassuringly, several RCTs investigating trauma-focused treatment for comorbid PTSD and SUD appear to be currently underway (Back, 2010). Additionally, it appears interesting to investigate the effectiveness of other types of trauma-focused interventions as part of combined treatments for concurrent PTSD and SUD. An apparent gap is the lack of studies investigating the effectiveness of EMDR in this area. In addition, cognitive processing therapy (CPT) (Resick & Schnicke, 1992), a widely used evidence-based treatment for PTSD has to our knowledge not been evaluated for patients with comorbid PTSD and SUD, yet. CPT focuses on deconstructing dysfunctional conflicting assumptions and beliefs about the world and the self. Trauma-related exposure is provided by letting patients write in detail about the most traumatic incident(s), followed by reading it to themselves and to the therapist. Writing assignments are also used in Structured Writing Therapy (SWT) for PTSD, which has been found to result in sharply reduced levels of intrusion and avoidance, depression, anxiety and somatization (Lange et al., 2003). Importantly, CPT and SWT appear equally effective to CBT involving standard imaginal exposure to the trauma (Resick, Nishith, Weaver, Astin, & Feuer, 2002; Van Emmerik, Schoorl, Emmelkamp, & Kamphuis, 2006).

In future research more attention should be paid to the methodology of studies in this area. First of all, there is a strong need for rigorous study designs, where patients are randomly allocated to treatment conditions. Secondly, the use of long-term follow-up measurements is very important to investigate the sustainability of treatment results over a longer period of time. Moreover, we recommend the development of general guidelines for studies investigating the effectiveness of concurrent treatment for PTSD and SUD. By this means, an identical timing of follow-up measurements, and measurements of constructs can be established across different studies. Also, inclusion criteria, and outcome measures can be equally defined, as well as clear and identical definitions for dropout, and retention. The establishment of general guidelines would serve to compare the results of different studies in a meta-analysis, and would enable us to take this area of research to a next level.
References


