



The Effect of Psychosocial Treatment on PTSD and Substance Use Disorder: An Application of Multilevel Meta-Analysis

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Introduction

- Posttraumatic stress disorder (PTSD) and substance use disorder (SUD) co-occur at strikingly high rates—among 19% to 52% of PTSD-diagnosed samples meet criteria for a dual SUD diagnosis (Kessler et al., 1995; Mills et al., 2006; Pietrzak et al., 2011).
- To generate more effective treatments for this population, researchers have developed treatment protocols jointly addressing PTSD and SUD (e.g., Seeking Safety; Najavits, Weiss, Shaw, & Muenz, 1998).
- To our knowledge, four systematic reviews (including two meta-analyses) of psychological interventions for PTSD-SUD have been conducted (Najavits & Hein, 2013; Roberts et al., 2015; Torchalla et al., 2012; van Dam et al., 2012). These reviews have tentatively supported the effectiveness of a number of available interventions in reducing PTSD symptoms, SUD symptoms, or both.
- However, prior reviews are limited in several respects. Existing meta-analyses have utilized either overly strict (i.e., randomized controlled trials [RCTs] only, resulting in 14 unique samples; Roberts et al., 2015), or overly inclusive (i.e., uncontrolled studies, resulting in 17 unique samples; Torchalla et al., 2012) inclusion criteria. Furthermore, prior meta-analyses have not utilized recent advances in meta-analytic statistics that account for dependent effect sizes, which are of significant concern in intervention research. These limitations suggest a need for replication of current meta-analytic data to improve knowledge about the efficacy of existing treatments.
- The current meta-analysis improves upon past meta-analyses in two key respects.
 1. The present study strikes a balance through the inclusion of all controlled studies, including RCTs and quasi-experimental research. This approach, combined with inclusion of more recently published data, should result in more unique samples compared to previous meta-analyses.
 2. The current review will utilize a new, multilevel approach to meta-analytic research that allows for the inclusion of multiple outcomes from a given study and therefore provides a more comprehensive representation of prior findings. Multilevel meta-analysis is also a flexible statistical approach that can be easily adapted to allow for multiple levels, outcomes, moderators, and interaction terms.

Analytic Approach

- Instead of effect sizes, outcomes were raw data. Specifically, raw means, standard deviations, and sample sizes were considered for each available time point. Through procedures detailed by Card (2012), all outcomes were transformed to a scale ranging from 1 to 5 with higher scores representing more problems.
- A multilevel meta-analytic approach (e.g., Hox, 2010) was utilized. Separate models for trauma-related symptoms and substance use outcomes were estimated using restricted maximum likelihood in SAS PROC MIXED.
- Separate 4-level meta-analyses were conducted for PTSD- and SUD-related outcomes:
 - Level 1 represented within-sample, between-participant variability for each effect size (represented by population variance)
 - Level 2 represented within-sample variability over time
 - Level 3 represented within-sample variability between multiple comparisons at a given time
 - Level 4 represented between-sample variability
- The magnitude of heterogeneity was computed for levels 2, 3, and 4 using the I² index (Higgins & Thompson, 2002). I² values range from 0 to 1, with .25, .50, and .75 representing low, medium, and large amounts of heterogeneity, respectively (Huedo-Medina, Sánchez-Meca, Marin-Martínez, & Botella, 2006).
- Treatment condition, time (i.e., weeks since baseline), and the interaction were the predictors of interest. The length of the treatment in weeks (and interactions with other predictors) was included as a control.
- Differences between treatment conditions were sampled at 12, 24, and 48 weeks, holding the length of treatment constant at 12 weeks.

Results

Descriptives

- A total of 30 samples were included in the current analysis.
- Articles were published between 2003 and 2015.
- Samples represented between 11 and 2,026 participants (M = 238.20).
- Mean participant ages across samples ranged from 21.90 to 59.40.
- A wide range of treatments were represented, including exposure-based approaches, Seeking Safety, Cognitive Processing Therapy, Dialectical Behavior Therapy, and Present-Focused Group Therapy.

Trauma-Related Outcomes

- With regard to magnitude of heterogeneity, Level 2 I² > .99, Level 3 I² = .64, and Level 4 I² = .05.
- At baseline, there were no significant differences between treatment and control groups (p = .253).
- The main effect for time was negative (b = -0.02, p < .01), such that trauma-related symptoms generally declined over time.
- At a model-implied post-treatment assessment (i.e., 12 weeks post-baseline for a 12-week treatment), trauma symptoms were significantly less severe in the treatment group compared to the control (p = .023). These differences were maintained at follow-ups (24 weeks p = .004; 48 weeks p = .006).
- Model-implied estimates can be seen in Figure 1 and reveal that, compared to control groups, treatments led to greater improvements over time in trauma-related outcomes.

Substance Use Outcomes

- With regard to magnitude of heterogeneity, Level 2 I² > .99, Level 3 I² = .69, and Level 4 I² = .22.
- The main effect for time was negative (b = -0.02, p < .001), such that substance-related problems generally declined over time.
- Analyses revealed no significant differences between treatment and control groups at 0, 12, 24, or 48 weeks (all p's > .05).
- Model-implied estimates can be seen in Figure 2 and revealed no differences in substance use outcomes between treatment and control conditions over time.

Method

Selection Criteria

- Studies were included if they met all of the following criteria:
 - a) A randomized controlled study or a quasi-experimental study assessing a psychosocial intervention aimed at reducing trauma symptoms, substance use symptoms, or both
 - b) A control condition (waitlist or alternative psychosocial intervention)
 - c) Participants completed pre- and post-measures assessing both PTSD and substance use (e.g., diagnosis, symptom severity, substance use-related problems)
 - d) Participants were adults (i.e., a majority of participants were at least 18 years old)
- Studies were excluded if any of the following criteria were met:
 - a) Study results were not communicated in English
 - b) The intervention was not psychosocial (e.g., drug trials, biofeedback) or not clearly defined
 - c) Treatment or assessment began within one month post-trauma (i.e., did not meet the one-month PTSD duration criteria)
 - d) SUD served as exclusion criteria
 - e) Insufficient information was provided (through published results or email requests) to include in analyses

Search Methods and Coding of Studies

- A systematic literature search of PubMed, PsychINFO, PILOTS, and ERIC databases was performed for studies published through February 2015 using predefined search terms. This search resulted in 1,128 unique hits, 185 of which were deemed to be potentially relevant and reviewed in full.
- A total of 30 unique samples met the selection criteria and were represented in the present meta-analysis.
- Two doctoral students reviewed each study using a standardized coding sheet. Discrepancies were discussed until agreement was reached.

Figure 1. Trauma-Related Symptoms

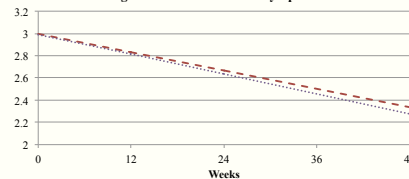
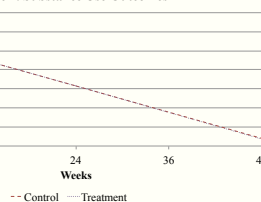


Figure 2. Substance Use Outcomes



Discussion

- The aim of this comprehensive meta-analysis was to examine the overall efficacy of psychosocial treatments for addressing both PTSD and SUD symptoms.
- Findings revealed significant differences in trauma-related outcomes between treatment and control groups, but no significant differences in substance use outcomes.
- These results mirror a recently published meta-analysis (Roberts et al., 2015), which revealed greater reductions in PTSD symptoms at post-treatment and follow-up for treatment compared to control groups.
- Consistent with the current findings, Roberts et al. (2015) did not find treatment-related changes in substance use at post-treatment. Though treatment effects were revealed for substance use at follow-ups, this effect only held for certain kinds of treatments (i.e., trauma-focused CBT alongside SUD treatment). Together with the past findings, the current meta-analytic results suggest that, in general, psychosocial treatments targeted at trauma and SUD are no better than controls at improving SUD-related outcomes; instead, only select interventions may be effective at treating comorbid PTSD and SUD. The similarity between our results, and meta-analytic findings derived from non-multilevel approaches, lend confidence to these conclusions. Future meta-analytic studies should aim to identify common factors in efficacious treatment for PTSD and SUD.
- **Limitations:** Meta-analyses are necessarily limited by the quality of the studies reviewed. Additional high-quality studies including RCTs are recommended in this area. Further, although all included treatment studies assessed both PTSD and SUD, not all treatments targeted individuals with comorbid PTSD-SUD, as there is still limited work in this area.
- **Strengths:** This review is more comprehensive than prior meta-analyses, including 13 more studies than were included by Torchalla et al. (2012), and 17 more studies than were included by Roberts et al. (2015). The multilevel meta-analytic approach also allowed for the representation of multiple outcomes per study.
- **Conclusion:** Findings suggest that treatments addressing PTSD-SUD are more successful in mitigating PTSD symptoms, as opposed to SUD symptoms, indicating a need for further development and evaluation of PTSD-SUD intervention efforts.