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Does a history of violent offending impact treatment response for comorbid PTSD and substance use disorders? A secondary analysis of a randomized controlled trial

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The co-occurrence of posttraumatic stress disorder (PTSD) and substance use disorders (PTSD+SUD) is common and consequential. Together they represent two of the costliest health problems in the U.S. (Bouchery, Harwood, Sacks, Simon, & Brewer, 2011; Wang et al., 2005). PTSD+SUD is associated with more severe clinical profiles, lower rates of treatment engagement and adherence, and higher rates of relapse than PTSD or SUD alone (Blanco et al., 2013; Ouimette, Brown, & Najavits, 1998). One significant, yet understudied, aspect of PTSD+SUD is the interplay between interpersonal trauma, substance misuse, and violent offending. Highly publicized instances of violence committed by Operation Enduring Freedom and Operation Iraqi Freedom returning service members have promoted vital dialogue concerning the propensity for violence among individuals with PTSD+SUD (Currier, Holland, Jones, & Sheu, 2014; Foran, Heyman, Slep, & Snarr, 2012; Ramchand et al., 2011). Research conducted with incarcerated samples, where PTSD and SUD are grossly overrepresented (Fazel, Bains, & Doll, 2006; Prins, 2014), has revealed a powerful coupling of “victimizer” and “victimized” with significant implications for both recidivism and recovery (Kubiak, 2004; Messina, Burdon, Hagopian, & Prendergast, 2004). However, in non-incarcerated populations with PTSD+SUD, very little is empirically known about how a history of violent offending may affect clinical presentation and treatment response. As a population that often stands at the intersection between the criminal justice and mental health systems, understanding how past violent offending interacts with PTSD+SUD symptomatology and intervention may be crucial for delivering sensitive and coordinated care.

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Acts that either involve force or its threat—such as homicide, robbery, assault and sexual offenses—are considered violent offenses (Bureau of Justice, 2018). The relationship of substance abuse to violent offending has been extensively investigated with consistent findings of a heightened propensity for violent crime across substance type (Pedersen & Skardhamar, 2010; Smith, Homish, Leonard, & Cornelius, 2012) and a wide variety of samples ranging from treatment-seeking to incarcerated (see Boles & Miotto, 2003 for review). Alcohol and cocaine abuse have been especially implicated in violent crime with both longitudinal and laboratory studies reporting dose response relationships (Norström & Pape, 2010; Popovici, Homer, Fang, & French, 2012). The acute and prolonged pharmacological effects of substances upon cognition, impulsivity, and disinhibition appear to play central roles in violence perpetration (Chermack & Giancola, 1997; Moore et al., 2008). Additionally, situational and structural factors, such as the primarily illicit contexts of selling, purchasing, and consuming drugs, have been shown to increase the risk of violent offending for individuals with SUD (Hoaken & Stewart, 2003).

Alongside the violence-substance use association, a well-established body of literature has chronicled the link between traumatic stress and perpetration of violence and criminality (Jennings, Higgins, Tewksbury, Gover, & Piquero, 2010; Loeber, Farrington, Stouthamer-Loeber, Moffitt, & Caspi, 1998). The dialectic of PTSD as both product and cause of violence (Begic & Jokic-Begic, 2002) is supported by studies where PTSD has predicted violent criminality (Elklit, Karstoft, Armour, Feddern, & Christoffersen, 2013; Neller, Denney, Pietz, & Thomlinson, 2006). The PTSD symptom cluster of hyperarousal, in particular, has been linked to aggression in veterans (Taft et al., 2007), a nationally-representative sample of non-institutionalized adults (Smith, Smith, Violanti, Bartone, & Homish, 2015), as well as civilians with comorbid PTSD+SUD (Barrett, Mills, & Teesson, 2011; Barrett, Teesson, & Mills, 2014). However, recent work with substance-using veterans identified the intrusion symptom cluster as uniquely predictive of violent criminality (Bennett, Morris, Sexton, Bonar, & Chermack, 2018).

The histories of violent victimization of individuals with PTSD may be significant contributors to violent criminality. Victimization has reliably predicted violent criminality in both civilian (Byrne & Riggs, 1996; Sherman, Sautter, Jackson, Lyons, & Han, 2006) and combat veteran samples (Elbogen, Beckham, Butterfield, Swartz, & Swanson, 2008). This association appears particularly salient when victimization occurs during critical stages of development. Convergent evidence from methodologically diverse studies have confirmed a *cycle of violence* wherein childhood and adolescent victimization increases the risk of criminality, arrest, and violent behavior in adulthood (Mersky & Reynolds, 2007). Children with documented histories of abuse or neglect have been shown to be 4.8 times more likely to be arrested as adolescents, twice as likely as adults, and 3.1 times more likely to commit a violent crime than their non-abused/neglected counterparts (English, Widom, & Brandford, 2002; Mersky, Topitzes, & Reynolds, 2012). Various trajectories from trauma to criminal activity have been charted and include differential gender pathways with aggression, problematic alcohol use, and negative affect as mediators (Dutton & Hart, 1992).

In addition to each disorder's independent associations with violent behavior, the combination of PTSD and SUD may synergistically initiate and propagate the cycle wherein

victim becomes victimizer. In the wake of a traumatic event, the risk of alcohol and drug misuse greatly increases (Gielen, Havermans, Tekelenburg, & Jansen, 2012; Grant et al., 2004). In turn, when a traumatic stress reaction is coupled with substance misuse, the likelihood of an adult committing a violent act multiplies (Elbogen & Johnson, 2009), particularly among men (Loeber et al., 1998). Clark et al. (2014) reported that regular substance users with a history of trauma were more likely to report histories of violent offending than individuals with either substance use problems or trauma histories alone. Bennett et al. (2018) found that within a large sample ($n = 697$) of trauma-exposed veterans in SUD clinics, violent legal charges were associated with greater posttraumatic stress symptom severity. In an Australian sample of 102 men and women seeking outpatient services for comorbid PTSD and SUD, higher levels of aggression and PTSD hyperarousal symptoms were found to predict past-month violent criminality (Barrett et al., 2011).

Despite the association between SUD, PTSD, and criminal violence, there is little consensus on the impact of a history of violent offending upon psychiatric treatment outcomes. This is particularly striking given the ubiquity of violence within SUD treatment settings: in a national sample ($n = 6233$) of individuals entering SUD treatment, 72% of men and 50% of women reported histories of violence perpetration (Burnette et al., 2008). Within the addiction treatment literature, findings on the relationship of past violent offending and treatment response are mixed. In an outpatient setting, a history of violence has been associated with attending more treatment sessions than those without such a history (Easton, Swan, & Sinha, 2000). In turn, a naturalistic study of veterans seeking outpatient SUD care indicated that although those with a history of violence sought and received more treatment, this did not translate into better SUD outcomes; after controlling for the greater severity of dependence in those with a history of violence, rates of abstinence were indistinguishable at one-year followup between those with and without violent histories (Schneider & Timko, 2009). Even less is quantitatively known about the treatment adherence and response of those with PTSD+SUD and a history of violent offending. In the only longitudinal study of violence perpetration in this population to date, Barrett et al. (2014) found violence to be related to severity of PTSD+SUD symptoms and to reduce significantly throughout the course of PTSD+SUD treatment.

To date, no study has examined how individuals with a history of violent offending may respond differently to PTSD+SUD treatment than those without such a history, or moreover, how having such a history may interact with the various approaches currently available for PTSD+SUD. An individual with a history of violent offending may engage differently with singledisorder care (often referred to as *sequential treatment*) where substance use is addressed prior or in lieu of PTSD versus an integrated approach where trauma-related distress and substance problems are considered concurrently. There is evidence to suggest that individuals with SUD, trauma-related concerns, and a history of violent criminality may more successfully adhere to and benefit from integrated than sequential care. Unaddressed trauma-related symptoms have been associated with poorer treatment attendance and more recidivism in veterans receiving treatment for intimate partner violence and substance abuse (Crane, Oberleitner, & Easton, 2013). It is important to note that Crane, Oberleitner, and Easton (2013) did not assess for or analyze by comorbid PTSD diagnosis, thus limiting the study's generalizability to individuals with PTSD+SUD. A recently completed randomized

controlled trial (Ruglass et al., 2017) provides the opportunity to examine whether an integrated treatment for PTSD+SUD, concurrent treatment for PTSD with prolonged exposure (COPE; Back et al., 2014) or a treatment focused solely on SUD, relapse prevention therapy, (RPT; Carroll, 1998) may be better suited for those with a history of violent criminality. Such knowledge is critical for recognizing how past violent offenders engage with and respond to PTSD+SUD treatment, the identification of treatment needs specific to those with such a history, and the consequent tailoring of available interventions.

In this study, we addressed the need for such knowledge with a secondary analysis of a PTSD+SUD randomized controlled trial (Ruglass et al., 2017) whose participants were recruited from a large, urban center notable for its high poverty rates, racial/ethnic minority prevalence, and markedly high exposure to violence. The present study was guided by two objectives: 1) to determine the prevalence of past violent offending and document the relationship of demographic and psychiatric characteristics to the association between past criminal violence and PTSD+SUD and 2) to examine how individuals with a history of violent offending engage and respond to PTSD+SUD treatment. Since prior research of PTSD in disadvantaged urban samples has found disproportionately high rates of criminal justice involvement (Donley et al., 2012), it was hypothesized that this sample of individuals with PTSD+SUD would report high rates of both prior violent and nonviolent arrests. Consonant with prior research (Steffensmeier & Haynie, 2000), we predicted that men would be more likely than women to have endorsed lifetime histories of violent criminality. Given the literature on the enduring effects of childhood traumatic stress and the separately examined associations between PTSD, substance misuse and criminality, we hypothesized that a history of violent offending would be associated with childhood trauma exposure, higher PTSD severity, and higher level of problem substance use. In light of the lack of extant literature on the impact of histories of violent criminality upon the treatment response of individuals with PTSD+SUD, we refrained from a directional hypothesis.

2. Method

This study was a secondary analysis conducted with data collected for a randomized controlled trial of an outpatient, integrated PTSD+SUD intervention. The study was approved by the IRB of The City College of New York. Detailed procedures and results from the parent study are described elsewhere (Ruglass et al., 2017).

2.1 Participants and Procedures

Participant recruitment via flyers, print and online advertisements, and outpatient mental health referrals took place between 2008 and 2014 in New York City. Participants provided written informed consent prior to baseline assessments. Inclusion criteria consisted of meeting: 1. *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM-IV-TR*; American Psychiatric Association, 2000) criteria for current full PTSD or subthreshold PTSD (Grubaugh et al., 2005) defined as endorsement of Criteria A (exposure to a traumatic stressor), B (re-experiencing symptoms), E (symptom duration of at least 1 month), and F (significant distress or impairment of functioning), and either C (symptoms of avoidance and/or numbing) or D (increased arousal symptoms) and 2. *DSM-IV-TR* criteria

for past or current alcohol or other substance dependence and report of problematic substance within the past 3 months. Individuals were excluded if any of the following were evident: 1. history of or current psychotic, schizoaffective or bipolar disorder; 2. current severe depression or suicide risk; 3. participation in PTSD-specific treatment; 4. initiation of anxiolytic, antidepressant, or mood stabilizing medications less than 8 weeks prior to study participation; 5. organic mental syndrome or 6. refusal to be audio/videotaped.

Participants were randomized to COPE, RPT, or an assessment-only control condition using urn randomization to balance groups on PTSD severity, substance dependence, and gender. Assessments were conducted by a research assistant blind to condition assignment at baseline, weekly during the 12-week active intervention period, and at one-, two-, and three-month post-treatment. Participants were compensated at each point of assessment: \$35.00 at baseline, \$15.00 for each weekly assessment during the intervention period, and \$20.00 at each post-treatment assessment. For the aims of the current study, only participants randomized to an intervention condition ($n = 82$) were included in the analysis. The sample was limited in this way for two reasons: (1) the study aims focused on how violent offending impacted SUD-only treatment versus SUD+PTSD treatment, and (2) because those in the assessment-only control condition did not complete one-, two-, or three-month follow-up assessments, a comparison between the three groups would not be equivalent. Two individuals declined to answer questions related to violent arrest history. Hence, when violent offending history was included in the model, the sample size was reduced to 80.

2.2 Interventions

Study interventions were delivered over 12 sessions in an individual, once-weekly, 90-minute format.

COPE is an integrated approach to PTSD+SUD that combines prolonged exposure (PE) for PTSD and relapse prevention for SUD (Back et al., 2014). Initial sessions are dedicated to psychoeducation about the bidirectional relationship between PTSD and SUD. In the present study, the PE techniques of *in vivo* and imaginal exposures were introduced in session 4 and 5. In session 5 imaginal narratives were audio-recorded and then listened to daily between sessions. Participants charted their progress on *in vivo* exercises and the daily listening of imaginal exposures as well as any substance use and/or cravings. In addition to a PE component, each session included a relapse prevention portion (approximately 30 minutes) where coping and planning strategies were discussed.

RPT is a cognitive-behavioral intervention rooted in the acquisition of skills to reduce the likelihood of substance relapse (Carroll, 1998). Psychoeducation, active problem-solving exercises, and role-plays are utilized to promote the effective management of high risk situations. Sessions focus on the development of personalized coping strategies and increased self-efficacy to minimize the risk of relapse. Between sessions, participants kept a daily log of substance use, cravings, and coping skills practiced.

2.3 Measures

Demographics. Questions regarding demographic information (age, sex, race/ethnicity, education, employment pattern, and income) were asked during the baseline interview.

Primary substance use disorder. The Structured Clinical Interview for *DSM-IV* for Axis I Disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 2002) was used to assess lifetime alcohol- and substance-related diagnoses and age of onset. Primary substance diagnosis was based on the number of past or current dependence criteria from the SCID and level of use in the past month.

Days of substance use.—Days of use for the primary substance (as identified above) was measured with the Substance Use Inventory (SUI; Weiss, Hufford, & Najavits, 1995), a self-report measure of past 7-day substance use frequency and quantity. Participants completed the SUI weekly during treatment and at all pre- and post-treatment assessments. Follow-up assessments only assessed primary substance use for the previous week. Scores range from 0 to 7.

Childhood trauma.—Exposure to potentially traumatic events was measured using the Life Events Checklist (LEC; Gray, Litz, Hsu, & Lombardo, 2004). Information regarding type of traumatic event, age at first exposure and number of exposures was collected. A dichotomous variable for childhood trauma exposure (yes/no) was created based on a cutoff age of 13: those who experienced at least one potentially traumatic event at or before the age of 12 were classified as childhood-trauma exposed (Steinberg et al., 2013).

PTSD diagnosis.—Current PTSD diagnosis was assessed at baseline with the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995). Based on the CAPS scores, we determined whether individuals met criteria for subthreshold diagnosis (yes/no). We also recorded the number of criterion A traumas that individuals endorsed. Those endorsing more than one trauma were categorized as having multiple criterion A traumas (yes/no).

PTSD symptom severity.—PTSD symptom severity was measured at each weekly intervention visit and all pre- and post-treatment assessments, using the modified PTSD Symptom Scale Self-Report (MPSS-SR; Falsetti, Resnick, Resick, & Kilpatrick, 1993) which assessed the past 7 days of self-reported PTSD symptom severity. The MPSS-SR yielded a total score comprised of the sum of frequency and intensity ratings of each of the 17 DSM-IV-TR PTSD symptoms. Scores range from 0 to 119. Psychometric studies of the MPSS-SR with similar comorbid PTSD+SUD treatment samples demonstrated its high concurrent validity with the CAPS, and suggest it is a reliable tool for monitoring PTSD symptoms (Ruglass, Papini, Trub, & Hien, 2014).

Criminal justice involvement and violent offending history. The Addiction Severity Index, Lite Version (ASI-Lite; McLellan, et al., 1992) is a semi-structured interview that assesses the severity of problems across seven areas including legal issues. Lifetime information regarding criminal justice involvement was collected with the ASI-Lite. Individuals are asked questions about the number of arrests in several of areas: shoplifting/vandalism, parole/probation violation, drug charges, forgery, weapons offense, burglary/larceny/breaking and entering, robbery, assault, arson, rape, homicide/manslaughter, prostitution, contempt of court, and other. Individuals who endorsed at least one arrest for robbery, assault, rape, and/or homicide/manslaughter, were categorized as having a history of violent offending (yes/no).

2.4 Statistical Analyses

All analyses were completed using Stata Statistical Software: Release 15 (StataCorp, 2017). For the first aim, we computed descriptive statistics to describe the sample and examine potential differences among participants based on a history of violent offending. For all categorical variables, differences were examined using chi-squared tests, with Fisher's exact statistic examined when cell sizes were <10. For continuous variables, a generalized linear model was utilized.

For the second aim, we examined the impact of histories of violent offending on treatment attendance, completion, and response (i.e., days of substance use, PTSD symptom severity). Differences in total sessions attended and treatment completion were analyzed using a generalized linear model. Completion was defined as having received eight or more sessions; this definition has been employed in prior studies which examined the sufficient dosages of PTSD+SUD treatments (Najavits, 2015). To examine the effect of past violent offending on treatment outcomes, we specified several piecewise two-level mixed-effects models. We began by specifying an unconditional growth model for PTSD symptom severity $Y_{ijd} = (b_{0ia} + b_{1ia}(\text{week} - 15)_{ija} + \epsilon_{ija}) + (b_{0ib} + b_{1ib}(\text{week} - 15)_{ijb} + \epsilon_{ijb})$ (UCLA Statistical Consulting Group, n.d.) and for days of substance use $Y_{ijd} = \exp(b_{0ia} + b_{1ia}(\text{week} - 15)_{ija} + \epsilon_{ija}) + (b_{0ib} + b_{1ib}(\text{week} - 15)_{ijb} + \epsilon_{ijb})$ (UCLA Statistical Consulting Group, n.d.). In these models, Y_{ij} represents individual i 's PTSD symptom severity or days of substance use, respectively, at time j for indicator d . The subscript d , denotes whether the value of Y_{ij} is based on one of two indicator variables, either subscript a or b . Time was represented by session-15 so that the intercept in the piecewise model (i.e., when $X = 0$) would represent individual i 's PTSD symptom severity at either posttreatment (subscript b , information to the right of bolded plus sign) or the time infinitely close to posttreatment, but not yet posttreatment (subscript a , information to the left of the bolded plus sign). Therefore, the intercept with the a subscript can be understood as the intercept at the end of the treatment phase, while the intercept with the subscript b can be understood as the intercept at the beginning of the posttreatment phase. A significance test was computed to examine whether the value of the two intercepts was significantly different, indicating the necessity of a piecewise model. The piecewise model also yields two slopes: the slope to the left of the bolded plus sign (subscript a) is the linear rate of change for the treatment period, while the slope to the right of the bolded plus sign (subscript b) is the linear rate of change for the posttreatment period. The main effect and moderating role of past violent offending was then examined. Specifically, we included any history of violent offending as a predictor in the model, along with interactions between any past violent offending and all significant functions of time. We then examined the moderating role of treatment type by including treatment (i.e., RPT vs. COPE) in the model along with all two- and three-way interactions. To present the most parsimonious model, final models only included significant interactions (i.e., $p < .05$). Model fit was examined using Akaike's Information criterion (AIC) and Schwarz's Bayesian information criterion (BIC).

3. Results

3.1. Sample Demographics & Baseline Variables

Baseline demographic and clinical variables are presented separately for those with and without a history of violent offending in Table 1. The majority of the sample (61.3%) reported a lifetime history of arrest, with 27.5% endorsing a history of arrest for violent offenses. Arrests for violent offenses included assault (21.5%), robbery (10.3%), homicide or manslaughter (3.8%), and rape (1.3%). With regards to incarceration history, 38.75% reported being incarcerated for at least two weeks in their life. Three participants in RPT and one in COPE reported current involvement with criminal justice system (on parole or awaiting sentencing). There was only one significant difference among those with and without a history of violent offending at baseline: women were disproportionately represented among those without a violent offending history (39.7% vs. 9.1%, $p = .008$).

Between the two treatment groups no differences were found on demographic variables, baseline levels of PTSD symptom, or substance dependence severity—except for the presence of multiple criterion A traumas (see Appendix A). A higher percentage of individuals with multiple criterion A traumas for those was found in RPT (80.5%), compared to the COPE (53.9%) condition ($p = .017$). We then examined whether there were differences in the outcome variables between RPT and COPE for those with a history of violent arrest. Results indicated that at baseline, for those with a history of violent offending, PTSD severity scores were significantly higher among those assigned to RPT than COPE ($M = 69.31$, $SD = 21.03$ vs $M = 45.78$, $SD = 21.90$, $p = .011$). There were no differences in baseline days of substance use between the two treatments for those with a history of violent offending (RPT: $M = 4.23$, $SD = 2.65$ vs COPE: $M = 2.44$, $SD = 2.30$, $p = .011$, $p = .101$). Among those without a history of violent offending, there were no baseline differences in either PTSD symptom severity (RPT: $M = 50.25$, $SD = 23.60$ vs COPE: $M = 56.80$, $SD = 25.14$, $p = .307$) or days of substance use (RPT: $M = 3.93$, $SD = 2.25$ vs COPE: $M = 4.73$, $SD = 2.57$, $p = .210$) between the two treatments.

3.2 Effect of history of violent offending on treatment retention and outcomes

Attendance and Intervention Completion—No differences were found in the number of intervention sessions attended ($p = .111$) or percentage of treatment completers ($p = .221$) among those with and without a history of violent offending (see Table 1). Similarly, there were no significant differences in the number of sessions attended ($p = .259$) or percentage of treatment completers ($p = .495$) between the two treatments (see Appendix A).

PTSD Symptom Severity.—Parameter estimates and fit statistics for all models are presented in Table 2.

Unconditional growth model. A piecewise linear growth model was fit to the data with a breakpoint set at posttreatment (i.e., week 15) and a random intercept and results indicated that a piecewise model was a good fit to the data. Specifically, results indicated that the intercept at the end of the treatment phase was ($B = 22.24$; 95% CI [16.51, 27.97], $p < .001$), while the intercept at the beginning of the posttreatment phase was ($B = 29.98$; 95% CI

[24.10, 27.97], $p < .001$). The 7.74 point difference between these two intercepts was found to be significant ($p = .002$) indicating a discontinuous change between the treatment and posttreatment phase. Results also continued a significant difference in the rate of change between the two phases ($p < .001$). During the treatment phase, there was a significant linear decline in PTSD symptom severity ($B = -2.28$; 95% CI $[-2.61, -1.95]$, $p < .001$, $d = -1.31$), but there was no significant change during the posttreatment phase ($B = -0.27$; 95% CI $[-0.81, 0.26]$, $p = .321$, $d = -0.03$).

Model including any history of violent offending and its interactions with time.: Any history of violent offending was added to the model as a predictor, as well as the interaction between any history of violent offending and time during the treatment phase. Given that there was no growth to the model during posttreatment phase, we did not include interactions between past violent offending and time during the posttreatment phase. Results indicated that there was not a significant interaction between any history of violent offending and time during the treatment phase ($B = -0.04$; 95% CI $[-0.50, 0.43]$, $p = .884$). Further, there was no evidence of a main effect of past violent offending on PTSD symptom severity at posttreatment ($B = 6.68$; 95% CI $[-4.59, 17.95]$, $p = .245$).

Model including treatment type and all two- and three-way interactions.: Treatment type was added to the model as a predictor, as well as all two- and three-way interactions between treatment, any history of violent offending, and time during the treatment phase. Results indicated that there was a significant three-way interaction between past violent offending, treatment type, and time during the treatment phase ($B = -1.05$ $[-2.01, -0.09]$, $p = .032$). Figure 1 presents the plotted trajectories with shaded regions demarcating asymptomatic (about 17 points and lower) and mild/subthreshold (about 17.5 - 34.99 points) levels of PTSD symptom severity on the MPSS-SR (Ruglass et al., 2014). Inspection of the simple slopes and plotted trajectories revealed that for those in COPE, a history of violent offending was associated with a more rapid rate of change in PTSD symptom severity compared to those without such a history in COPE ($B = -3.17$ vs. $B = -2.37$). However, a history of violent offending was associated with a less rapid rate of change for those in RPT ($B = -1.89$ vs. $B = -2.01$). Overall, we did not find evidence that treatment impacted the rate of change during the treatment phase irrespective of a history of violent offending ($B = -0.35$ $[-0.85, 0.14]$, $p = .163$).

At posttreatment, we found that there was a significant difference in the main effect of past violent offending between the two treatments ($B = -40.04$ $[-62.14, -17.94]$, $p < .001$). To examine differences between treatment type, we plotted the estimates in Figure 2. For those in RPT, a history of violent offending was associated with a significantly higher score on the MPSS-SR (47.10 vs. 26.66), while for those in COPE, past violent offending was associated with a lower score on the MPSS-SR (11.74 vs. 30.11). In addition, by using the 95% confidence intervals around the estimates, we found that the estimate for PTSD symptom severity was significantly higher for those in RPT with a violent arrest history, compared to those in RPT without such a history. The estimate for those in COPE with a history of violent offending was not significantly different from the estimates for those in COPE or

RPT without such a history, but was different than those in RPT with a history of violent offending.

Days of Substance Use.—Parameter estimates and fit statistics for all models are presented in Table 3.

Unconditional growth model. A piecewise linear growth model was fit to the data with a breakpoint set at posttreatment (i.e., week 15) and a random intercept and results indicated that a piecewise model was a good fit to the data. Specifically, results indicated that the intercept at the end of the treatment phase was ($\exp(B) = 0.52$; 95% CI [0.39, 0.70], $p < .001$), while the intercept at the beginning of the posttreatment phase was ($\exp(B) = 1.03$; 95% CI [0.76, 1.39], $p = .849$). The 1.91 point difference between these two intercepts was found to be significant ($p < .001$) indicating a discontinuous change between the treatment and posttreatment phase. Results also continued a significant difference in the rate of change between the two phases ($p < .001$). During the treatment phase, there was a significant linear decline in days of substance use ($\exp(B) = 0.89$; 95% CI [0.87, 0.91], $p < .001$), but there was no significant change during the posttreatment phase ($\exp(B) = 1.00$; 95% CI [0.97, 1.03], $p = .959$).

Model including any history of violent offending and its interactions with time. Past violent offending was added to the model as a predictor, as well as the interaction between any violent offending and time during the treatment phase. Given that there was no growth to the model during posttreatment phase, we did not include interactions between past violent offending and time during the posttreatment phase. Results indicated that there was not a significant interaction between any history of violent offending and time during the treatment phase ($\exp(B) = 0.99$; 95% CI [0.96, 1.02], $p = .422$). However, there was a main effect of past violent offending on days of substance use at posttreatment ($\exp(B) = 0.54$; 95% CI [0.31, 0.92], $p = .024$), indicating that past violent offending was associated with an expected count of days of substance use that was 46% lower than those without such a history.

Model including treatment type and all two- and three-way interactions. Treatment type was added to the model as a predictor, as well as all two- and three-way interactions between treatment, any history of violent offending, and time during the treatment phase. Results indicated that there was not a significant three-way interaction between past violent offending, treatment type, and time during the treatment phase ($\exp(B) = 0.99$ [0.93, 1.04], $p = .652$), which suggests that the way that violent offending may impact weekly days of substance use did not differ between treatments. In addition, there was not a significant interaction between a history of violent offending and the rate of change during the treatment phase ($\exp(B) = 1.00$; 95% CI [0.97, 1.04], $p = .879$). However, the final model did reveal two significant two-way interactions. First, there was an interaction between treatment type and the rate of change ($\exp(B) = 1.03$; 95% CI [1.01, 1.06], $p = .004$). Inspection of the simple slopes indicated that being in RPT was associated with a more rapid decline in days of substance use during the treatment phase. Second, there was a significant interaction between treatment type and a history of violent offending ($\exp(B) = 0.35$; 95% CI

[0.14,0.91], $p = .032$). Inspection of the simple slopes indicated that a history of violent offending was associated with less weekly days of substance use at posttreatment for those in COPE ($\exp(B) = 0.33$; 95% CI [0.16,0.69], $p = .003$), while violent offending was not significantly associated with weekly days of substance use at posttreatment for those in RPT ($p = .827$).

To examine whether the estimates for the four groups based on treatment type and any history of violent offending were significantly different from one another at post-treatment we plotted the estimates along with error bars representing the 95% confidence intervals in Figure 3. As can be seen in Figure 3, for those in COPE, the two estimates were significantly different from one another based on violent offending history. However, both estimates for those in COPE had overlapping confidence intervals with those in RPT, regardless of violent offending status.

4. Discussion

The present study documented the criminal justice sequelae of an understudied yet markedly vulnerable group—an urban, treatment-seeking sample with chronic traumatic stress and co-occurring substance dependence—and thus expands the scope of contemporary research's focus beyond the context of single event trauma exposure or combat-related PTSD and SUD-excluding samples. We explored the relationship of trauma exposure, PTSD and substance abuse severity to the nature of involvement with the criminal justice system in order to identify potentially predictive associations that may help refine efforts to provide social support and psychiatric care. To further address the limited understanding of how a history of committing violence may impact PTSD+SUD treatment, we compared the treatment response trajectories of violent offenders to those who did not report a history of violence across two types of intervention for PTSD+SUD.

At the intersection between lifelong exposure to violence, chronic PTSD, and significant substance misuse, we hypothesized that involvement with the criminal justice system would be high. Indeed, legal difficulties were strikingly commonplace with two-thirds of participants reporting a lifetime history of arrests. This finding closely replicates prior work in communities exposed to high rates of violence and contributes to the emerging literature that associates civilian PTSD, violence, and criminal justice system involvement by extending it to populations with PTSD+SUD. In a large ($n = 4,113$), urban poor sample from Atlanta, Donley et al. (2012) found that 65% of residents with lifetime PTSD diagnoses reported histories of arrest, compared to 51% of residents without PTSD. In this Atlanta sample, violence was found to be associated with trauma exposure and PTSD diagnosis (Gillikin et al., 2016). However, prevalence of arrest histories in the current study was still lower (61.3 vs. 81.4%) than the lifetime rate of criminal justice involvement of the only other study to date which has examined violence in a PTSD+SUD treatment-seeking sample (Barrett et al., 2011). This disparity in prevalence may be the product of the two studies assessing different constructs. Barrett et al. (2011) measured violent crime perpetration while the current study measured violent crime arrests. Also, Barrett et al., (2011), conducted in Australia, consisted of predominantly opioid dependent participants (83%) with severe levels of PTSD (mean total = 90, $SD = 16.6$). In contrast, our U.S. sample was

comprised of significantly different substance use profiles, mostly alcohol- and cocaine-dependent individuals with a broader range of PTSD severity. These distinctions in sample characteristics suggest the potential heterogeneity in the relationship between criminal justice involvement and PTSD+SUD—as well as the impact of geographic differences in criminal justice policies.

In line with our hypotheses, gender was shown to predict violent offending with men being far more likely to report violent arrest histories than women in the sample. Literature has repeatedly demonstrated that males are more prone to engage in criminal behavior than their female counterparts (Steffensmeier & Allan, 1996). This association may be further potentiated within the context of PTSD+SUD due to the propensity towards externalizing behavior in both pathologies (Miller, Kaloupek, Dillon, & Keane, 2004). Particularly for men, it appears that this co-occurrence creates a *double threat* that significantly increases risk of criminal justice involvement. For example, gendered experiences of affect and cognition, specifically negative states such as shame prevalent in both PTSD and SUD, are more likely to be transformed into other-directed aggression (Zlomke & Hahn, 2010). Of note, when not limited to violence resulting in arrest (as is the case in the present study), gender differences in violence perpetration are no longer apparent in a PTSD+SUD treatment setting (Barrett et al., 2011) and not consistently found within SUD-only samples (Walton, Chermack, & Blow, 2002; Burnette et al., 2008; Chermack et al., 2009). Additional work is needed to examine the specific factors that differentially strengthen men's association to PTSD, SUD, and violent charges.

Study findings did not support our hypotheses that PTSD+SUD severity and childhood trauma exposure would be related to a history of violent offending. Apart from gender, no other differences in demographic or clinical variables emerged between those with histories of violent criminality and those without. Various lines of research have converged to demonstrate a robust association between childhood trauma and violent behavior in adulthood (Anda et al., 2006; Haapasalo & Pokela, 1999; Thornberry, Ireland, & Smith, 2001), yet we found only a trend-level association between exposure to potentially traumatic events in childhood (before the age of 13), multiple trauma exposures, and violent criminality. One interpretation of this finding may be the social disadvantage in this sample. Non-traumatic stressors (for example, poverty) whose cumulative burden has been associated with higher risk of criminal involvement and violence (Gorman-Smith & Tolan, 1998; Wilson & Daly, 1997) were notably high in the present sample. Research on simultaneous exposure to both traumatic and non-traumatic stressors suggest a complex interaction (Nurius, Uehara, & Zatzick, 2013) that may explain this sample's high prevalence of criminal involvement and the lack of predictive power of specific clinical variables.

Along similar lines, the current study diverges from earlier work which found a relationship between overall PTSD symptom severity and past-month perpetration of a violent crime in individuals seeking treatment for PTSD+SUD. Barrett et al. (2011) noted that despite comparable histories of trauma exposure and type between the subgroups which reported violence perpetration and those that did not, those who had committed a violent crime in the past month had greater PTSD severity compared to those without a past-month violent

crime. When considered alongside the current study's findings, this potentially suggests that the recency of violence perpetration may be a crucial ingredient in the association between violent criminality and PTSD symptomatology. With regard to the relationship between substance use and violent crime, the current study dovetails with the results of Barrett et al. (2011). In neither PTSD+SUD treatment sample was substance use related to a history of violent crime, either in the past year or lifetime, when examined in multivariate models. Taken together, these findings raise the possibility that when PTSD and SUD co-occur, the symptoms of PTSD may uniquely influence the comorbidity's relationship to a history of violence.

Across the two treatment approaches examined, no differences were found in engagement and attrition between individuals with self-reported histories of violent offending and those without. Although a history of violence perpetration has been related to greater severity of SUD-related problems (Chermack et al., 2009), research has been inconsistent regarding its impact upon treatment engagement and retention. This variation is likely due in part to differences in sample types, methodologies and operational definitions of criminal justice involvement and violence perpetration. Our results are consistent with findings from substance use disorder RCTs in which participation prompted by the criminal justice system was not associated with poorer retention or outcomes of cocaine dependence treatment (Easton, Babuscio, & Carroll, 2007; Kiluk et al., 2015). For those with a history of violent offending, the influence of legal coercion in our study was likely minimal due to the low number of reported current contact with the legal system.

When examining how a history of violent offending impacted PTSD symptomatology during PTSD+SUD treatment, we found evidence of a three-way interaction suggesting that a history of violent offending was associated with how the two treatments impacted change in PTSD symptom severity during the treatment phase. Specifically, for those in the integrated PTSD+SUD treatment, having a history of violent offending was associated with more rapid decline in PTSD symptom severity during each week of the treatment phase (i.e., 0.8 points difference per week on the MPSS-SR). Conversely, for those in the SUD-only treatment, a history of violent offending was associated with less rapid changes in PTSD symptom severity during the treatment phase (i.e., 0.12 points difference per week on the MPSS-SR). To examine the implications of these differences in the rate of change based on treatment type and violent offending history on PTSD treatment outcomes, we plotted the mean PTSD symptom severity scores at post. As seen in Figure 2, we found that by posttreatment, those in the SUD-only treatment (i.e., RPT) with a violent offending history had PTSD symptom severity scores that were significantly higher than those without a history violent offending. Those without a history of violent offending had scores in the mild/subthreshold region, while those with such a history had scores that suggested still meeting the threshold of a PTSD diagnosis. In the integrated treatment (i.e., COPE), those with a violent offending history had scores at post-treatment suggesting that they were asymptomatic, while this those with a history of violent offending had scores in the mild/subthreshold range. However, these scores were not significantly different from one another. Overall, the largest difference in scores at posttreatment was between those with a history of violent offending in COPE and those with a history of violent offending in RPT. Our results suggest that those with a history of violent offending who received integrated treatment improved substantially

in their PTSD symptom severity during the treatment phase, while reductions in PTSD symptom severity were minor for those with perpetration histories who received SUD-only treatment. It is critical to note that group assignment was not randomized by violent arrest history, so that baseline differences in PTSD symptom severity between those with and without a history of violent criminal offending in the two treatments may have contributed to this interaction.

Despite this lack of randomization, our results suggest that for individuals with PTSD+SUD who have themselves perpetrated a violent crime an integrated approach is not only feasible but may be optimal. For the subgroup of individuals with a history of violent offending, it appears that a focus primarily on substance abuse may constitute a missed opportunity to break the cycle of violence by addressing PTSD symptomatology. This point carries significant weight in light of recent work that suggests that RPT may generalize to symptoms beyond SUD and may thus be a suitable alternative to trauma-focused care for the reduction of PTSD symptoms (Simpson, Levahot, & Petrakis, 2017). Results converge with prior work that COPE may be particularly helpful for certain subgroups. Ruglass et al. (2017) found no difference between COPE and RPT for the sample as a whole, but for those with full PTSD compared to subthreshold PTSD, COPE proved significantly more effective than RPT in ameliorating PTSD-related distress. As one of the front-line therapies for trauma-related disorders, prolonged exposure is thought to reduce PTSD symptoms through the dual channels of habituation and emotion processing (Institute of Medicine, 2008). Current results provide preliminary support for COPE as a therapeutic platform for directly addressing PTSD symptoms while managing substance-related issues in individuals with histories of violence perpetration.

With regards to substance use outcomes, our findings echo that of the parent study (Ruglass et al., 2017), which found that participants in the SUD-focused intervention evidenced a more rapid decline in primary problematic substance than those assigned to the integrated PTSD+SUD treatment. Our results suggest that this benefit may extend to individuals with a history of violent criminality. Dosing may play a role in RPT's demonstrated advantage over COPE in affecting substance use change. Participants randomized to RPT received on average twice as much SUD-focused care (in the form of 90 minutes per week) than participants in COPE (whose sessions were divided between PE and a substance-related topic).

Our study examined the relationship between PTSD, SUD, and histories of violent criminality as it is manifested within the high-risk context of an inner-city environment. Its inclusion of urban residents of racial and ethnic minority status subsisting close to the federal poverty line (Office of the Assistant Secretary for Planning and Evaluation, 2018) with a range of substance and PTSD-related problems is a significant study strength, given this topic's relative lack of attention outside of the prison and veteran's administration systems. However, several study limitations are important to note. Due to the retrospective nature of the data obtained, evidence of causal associations between PTSD, substance use, and criminal violence could not be ascertained. We were limited to reserving assumptions of temporal associations to the childhood exposure to traumatic stress and participants' arrest histories since the latter were collected for ages 18 and above. Despite attempts to provide a

nonjudgmental study environment, it is possible that due to a fear of stigma, some participants may have misrepresented their histories of criminal activity. Participants' reports of arrests were not confirmed with official legal records; moreover, a portion, albeit small, of the sample declined to share information regarding their past legal issues. Furthermore, we measured violent offending solely through the self-report of arrest charges. In doing so, the present findings cannot account for the breadth of violent behavior that does not result in arrest. Actual rates of violence perpetration in this sample are therefore likely underestimated. Given the gender distribution of the current sample, in which women comprised approximately one third (34.2%) of the overall sample, generalizability of the findings to women with violence perpetration histories may be limited. Future research is charged with increasing the representation of women in order to explore how PTSD+SUD and violent criminality specifically impact women's treatment responses.

As noted previously, we did not control for history of violent offending in randomization (factors included in the urn randomization were PTSD severity, substance dependence, and gender). Although the percentage of violent offenders did not differ between the two treatment groups, randomization would have offered superior control. As is the case with treatment research with this population (Roberts, Roberts, Jones, & Bisson, 2015), RCT sample sizes are small and impact analytic power. Our study findings should thus be considered exploratory and the need for their replication and extension is crucial. In terms of treatment effects, it is unknown if the observed reductions in PTSD symptom severity or frequency of substance use persisted beyond the study's relatively short post-treatment follow-up for any of the groups. Whether these reductions are maintained long-term, or if either violent offending or treatment type is related to subsequent changes in PTSD symptom severity or substance use, remains a question for future research with assessment periods which extend further than three-months post-treatment. Additionally, a more granular analysis of the nature and chronicity of trauma exposure as well as the context of the violence perpetrated may help clarify the demonstrated differences in how individuals with histories of violence perpetration responded to the two treatments. Lastly, future work is tasked with discerning the extent to which a history of violent arrests may have served as a proxy variable for community-level factors in the present study. Our sample consisted predominantly of African-American and Hispanic individuals residing in low-income, urban neighborhoods. Evidence has shown that poor and minority communities are subject to heightened police surveillance which in turn raises the probability of escalation during police encounters and greater likelihood of being apprehended and taken into custody, despite arrest charges being later disconfirmed (Terril & Reisig, 2003; Moore & Elkavich, 2008; Bjornstorm, 2015).

The high prevalence of arrest histories in the present study underscores that prevention strategies for reducing criminal justice involvement are extremely relevant for the PTSD +SUD population. Our findings suggest that specialized training and support for clinicians around criminal justice issues and propensity for violence are also critical. Screening, assessment, and treatment planning should take into account the likelihood of criminal justice histories. For PTSD+SUD treatment, our results underscore that clinicians treating PTSD+SUD must be adept at handling legal involvement and the potential for violent behavior. Engaging explicitly with individuals with PTSD+SUD about the relationship

between victim and victimizer may help facilitate a therapeutic environment where future violence can be averted.

Findings from the current study warrant future efforts to identify the biopsychosocial mechanisms that form a toxic synergy related to violence. The multiple pathways that may potentiate the relationship between traumatic stress, substance use, and violence include a host of distal and proximal variables that can be best appreciated with prospective research. Furthermore, a history of violent crime offenses is but one facet of a multidimensional construct of violence and future work is needed to systematically examine the various manifestations and consequences of violent behavior within this population. Similarly, a future step might involve detailed analysis of the sequelae of criminal justice system involvement for individuals with PTSD+SUD. Given our study results, we hypothesize that individuals with PTSD+SUD may confront at disproportionately higher rates the litany of negative outcomes associated with criminal justice involvement such as unemployment, diminished physical and mental health, and increased chances of future legal problems. For those caught in this vicious cycle of trauma, substance use, and violence, future research may furnish evidence to promote more effective and humane alternatives to arrest and incarceration.

Our findings argue that the need for effective delivery and access to integrative PTSD+SUD treatments is a matter of public health and safety, especially within socio-economically disadvantaged communities facing historically high rates of violence. Taking a longer view, this study stands in support of multi-pronged public health interventions to prevent, treat, and mitigate the long-term effects of violent victimization. Particularly for men chronically exposed to violence, interventions that selectively address the likelihood of traumatization and its many sequelae are strongly warranted. Together, efforts aimed at ameliorating the structural basis of chronic trauma exposure in low-income communities and the identification of and intervention those most at risk may provide an effective route for reductions in adverse mental health outcomes and violent criminality.

Conclusions

The current study demonstrated a high rate of criminal justice involvement within a sample of treatment-seeking individuals with PTSD+SUD. Those with histories of violent offending did not differ in terms of treatment engagement or attrition from those without such a history. Results suggests that a trauma-focused approach for PTSD+SUD may be especially beneficial for reducing PTSD symptom severity among individuals with histories of violent criminality. These findings carry broad clinical and policy implications such as competencies for treating PTSD+SUD and the necessity of targeted strategies for reducing and preventing violence.

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Appendix A

Descriptive statistics for subsample with criminal justice data (N = 80)

	RPT (51.3%) N or M (% or SD)	COPE (48.8%) N or M (% or SD)	
Female	14 (34.2)	11 (28.2)	$p = .567$
Age	44.20 (9.25)	43.08 (10.00)	$p = .603$
Race/Ethnicity			$p = .566$
White/Caucasian %	6 (14.6)	6 (15.4)	
Black/African American %	26 (63.4)	21 (53.9)	
Hispanic %	9 (22.0)	10 (25.6)	
Other %	0 (0.0)	2 (5.1)	
Education-Years Completed	13.27 (2.40)	13.31 (1.92)	$p = .936$
Household Monthly Income \$	1,317.15 (1,137.49)	1,219.10 (1,145.19)	$p = .701$
Employment-Any %	24 (58.5)	29 (74.4)	$p = .135$
Primary Substance Use Disorder			
Alcohol %	17 (41.5)	19 (48.7)	$p = .920$
Cannabis %	4 (9.8)	3 (7.7)	
Stimulants %	6 (14.6)	6 (15.4)	
Poly %	14 (34.2)	11 (28.2)	
Days of Substance Use at Baseline	4.03 (2.36)	4.21 (2.67)	$p = .750$
PTSD Subthreshold Diagnosis	8 (19.5)	7 (18.0)	$p = 1.00$
Childhood Trauma-%	26 (63.4)	26 (66.7)	$p = .761$
Multiple Criterion A Traumas-%	33 (80.5)	21 (53.9)	$p = .017$
Baseline PTSD Symptom Severity	56.29 (24.27)	54.26 (24.60)	$p = .709$
Any prior arrests %	25 (61.0)	24 (61.5)	$p = .959$
Past violent offenses %	13 (31.7)	9 (23.1)	$p = .457$
Any past incarceration %	17 (41.5)	14 (35.9)	$p = .610$
Number of sessions attended	7.24 (4.49)	6.08 (4.75)	$p = .259$
Treatment Completer-%	21 (51.2)	17 (43.6)	$p = .495$

Note. Childhood trauma was defined as reporting a potentially traumatic event on the LEC-R prior to age 13. Days of substance use scores ranged from 0-7, representing the number of days of use in the past week. Treatment completer was defined as attending 8 or more sessions of RPT or COPE.

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Highlights

- Majority of sample with PTSD and substance dependence reported arrest histories
- Quarter of sample reported violent crime histories with men more likely than women
- Integrated treatment outperformed substance-only treatment in PTSD reduction
- Integrated treatment may be especially beneficial for perpetrators of violence

Figure 1.

Estimated prototypical trajectories of PTSD symptom severity for COPE and RPT, with or without a violent offending history.

Figure 2.

Estimated mean levels of PTSD symptom severity for COPE and RPT at posttreatment for those with and without a history of violent offending. The bottom shaded region suggests asymptomatic levels of PTSD symptom severity (about 17 points and lower) on the MPSS-SR, while the top shaded region suggests mild/subthreshold levels of PTSD symptom severity (about 17.5 to 34.99 points) (Ruglass et al., 2014). The plus sign indicates that for those in RPT, estimates of PTSD symptom severity for those with and without a violent offending history are significantly different from one another at posttreatment. The asterisks indicate for those with a history of violent offending, estimates of PTSD symptom severity at posttreatment are significantly lower for those in COPE compared to those in RPT.

Figure 3.

Estimated mean count of weekly days of substance use for COPE and RPT at posttreatment for those with and without a history of violent offending. The asterisks indicate for those in COPE, a history of violent offending was associated with significantly lower days of use at posttreatment compared to those without a history of violent offending.

Table 1*Descriptive statistics for subsample with criminal justice data (N = 80)*

	No History of Violent Offending n = 58 (72.5%) N or M (% or SD)	History of Violent Offending n = 22 (27.5%) N or M (% or SD)	p-value
Female	23 (39.7)	2 (9.1)	<i>p</i> = .008
Age	42.81 (10.28)	45.86 (7.13)	<i>p</i> = .201
Race/Ethnicity			<i>p</i> = .807
White/Caucasian %	9 (15.52)	3 (13.6)	
Black/African American %	35 (60.3)	12 (54.6)	
Hispanic %	13 (22.4)	6 (27.3)	
Other %	1 (1.7)	1 (4.6)	
Education-Years Completed	13.50 (2.24)	12.73 (1.88)	<i>p</i> = .151
Household Monthly Income \$	1,333.74 (1,193.94)	1,099.59 (967.44)	<i>p</i> = .411
Employment-Any %	41 (70.7)	12 (54.6)	<i>p</i> = .173
Primary Substance Use Disorder			<i>p</i> = .278
Alcohol %	28 (48.3)	8 (36.4)	
Cannabis %	6 (10.3)	1 (4.6)	
Stimulants %	6 (10.3)	6 (27.3)	
Poly %	18 (31.0)	7 (31.8)	
Days of Substance Use at Baseline	4.35 (2.44)	3.5 (2.61)	<i>p</i> = .173
PTSD Subthreshold Diagnosis-%	12 (20.7)	3 (13.6)	<i>p</i> = .542
Childhood Trauma-%	34 (58.6)	18 (81.8)	<i>p</i> = .068
Multiple Criterion A Traumas-%	36 (62.1)	18 (81.8)	<i>p</i> = .114
Baseline PTSD Symptom Severity	53.64 (24.42)	59.68 (23.99)	<i>p</i> = .321
Number of sessions attended	6.17 (4.67)	8.00 (4.34)	<i>p</i> = .111
Treatment Completer-%	25 (43.1)	13 (59.1)	<i>p</i> = .221

Note. Childhood trauma was defined as reporting a potentially traumatic event on the LEC-R prior to age 13. Days of substance use scores ranged from 0-7, representing the number of days of use in the past week. Treatment completer was defined as attending 8 or more sessions of RPT or COPE.

Table 2

Regression coefficients for piecewise models examining trajectories of PTSD symptom predicted by violent offending and treatment

	Unconditional Growth Model	Model with Violent Offending History	Model with Violent Offending History and Treatment
Initial Status:			
Intercept-Session 12	22.24 ***	21.51 ***	19.65 ***
Intercept-Posttreatment	29.98 ***	28.82 ***	26.66 ***
Treatment			
RPT	--	--	Ref.
COPE	--	--	3.45
Violent offending history	--	6.68	21.73 **
Rate of Change:			
Time-Treatment Phase	-2.28 ***	-2.19 ***	-2.01 ***
Time-Posttreatment Phase	-0.27	-0.28	-0.21
Interactions			
Time-Treatment Phase × Treatment	--	--	-0.35
Violent offending history × Treatment	--	--	-40.04 ***
Violent offending history × Time-Treatment Phase	--	-0.04	0.25
Violent offending history × Time-Treatment Phase × Treatment			-1.05 *
AIC	7406.76	7225.33	7211.61
BIC	7435.35	7263.27	7268.53

Note. The intercept represents the expected value of PTSD symptom severity when all other predictors are held constant at 0. In this piece-wise model, there are two intercepts: the first intercept represents the time after session 12, infinitely close to posttreatment, but not posttreatment, while the second intercept represents posttreatment. The slope represents the expected difference in PTSD symptom severity given a one-unit change in time (all other variables held constant). All predictors are interpreted similarly to the slope and represent the expected difference due to a one-unit change in the predictor (all other predictors held constant). Treatment and violent offending history were coded dichotomously with RPT and no violent offending history equal to 0.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3

Regression coefficients for piecewise models examining trajectories of days of use predicted by history of violent offending and treatment

	Unconditional Growth Model	Model with Violent Offending History	Model with Violent Offending History and Treatment
Initial Status:			
Intercept-Session 12	0.52 ***	0.65 **	0.44 ***
Intercept-Posttreatment	1.03	1.22	0.84
Treatment			
RPT	--	--	Ref.
COPE	--	--	2.01 **
Violent offending history	--	0.54 *	0.93
Rate of Change:			
Time-Treatment Phase	0.89 ***	0.90 ***	0.88 ***
Time-Posttreatment Phase	1.00	1.00	1.00
Interactions			
Time-Treatment Phase × Treatment	--	--	1.03 **
Violent offending history × Treatment	--	--	0.35 *
Violent offending history × Time-Treatment Phase	--	0.99	NS
Violent offending history × Time-Treatment Phase × Treatment	--	--	NS
AIC	2821.12	2764.77	2756.37
BIC	2849.64	2802.63	2803.69

Note. The intercept represents the expected value of days of substance use when all other predictors are held constant at 0. In this piece-wise model, there are two intercepts: the first intercept represents the time after session 12, infinitely close to posttreatment, but not posttreatment, while the second intercept represents posttreatment. The slope represents the expected difference in days of substance use given a one-unit change in time (all other variables held constant). All predictors are interpreted similarly to the slope and represent the expected difference due to a one-unit change in the predictor (all other predictors held constant). Treatment and violent offending history were coded dichotomously with RPT and no violent offending history equal to 0.

* $p < .05$.

** $p < .01$.

*** $p < .001$.