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Making Sense of Missing Sessions: Attendance Patterns in Posttraumatic Stress Disorder and Substance Use Disorder Treatments

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MAKING SENSE OF MISSING SESSIONS:
ATTENDANCE PATTERNS IN POSTTRAUMATIC STRESS DISORDER AND
SUBSTANCE USE DISORDER TREATMENTS

by

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This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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THE CITY UNIVERSITY OF NEW YORK
ABSTRACT

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Attendance Patterns in Posttraumatic Stress Disorder and Substance Use Disorder Treatments

by
Margaret Rauen

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The current study examined the diverse ways individuals with co-occurring Posttraumatic Stress Disorder and Substance Use Disorders (PTSD-SUD) attend treatment. The study was a secondary analysis of a randomized controlled trial for PTSD-SUD (Ruglass et al., 2017), in which participants meeting criteria for both PTSD and SUD (N=82) were randomized to either Concurrent Treatment of PTSD and SUD using Prolonged Exposure (COPE: n=39) or Relapse Prevention Therapy (RPT: n=43). Latent class growth analysis (Muthén & Muthén, 2000) revealed three distinct classes of attendance as the model of best fit. Diagnostic, but not demographic, variables were significantly associated with treatment attendance patterns. Namely, the number of trauma exposures and the presence of co-occurring Major Depressive Disorder (MDD) were associated with attendance patterns. Titrators (n=26) were more likely to have multiple traumas compared to those subjects who were droppers (n=26), the participants who attended the fewest overall sessions. Titrators (n=26) were more likely to have current MDD than completers (n=30). In the initial treatment phase (baseline – session 4), self-report of PTSD symptom severity decreased more quickly for titrators (n=26) than for completers (n=30). There were no significant differences within the initial treatment phase in terms of substance use among completers and titrators; frequency or type of substance use was not
predictive of attendance class in this sample of those with PTSD-SUD. Finally, the distribution of attendance class patterns did not vary across treatment types, COPE or RPT. Understanding the heterogeneity of those with PTSD-SUD including the relationship between variables that describe this diversity and attendance irregularities may improve treatment engagement and effectiveness on an individual and programmatic level, as well as facilitate appropriate resource allocation. Future efforts to clarify the relationship between baseline patient characteristics, treatment attendance patterns, rates of improvement and psychotherapy outcomes may offer support for treatment delivery models of increased flexibility and individualization.

*Keywords*: posttraumatic stress disorder, substance use disorder, dropout, attrition, psychotherapy, prolonged exposure
Acknowledgments

I have been told that no one has four or three, let alone two dissertation chairs. As one more interested in fairness than formalities, I am happy to share the dissertation chair role with all of my committee members who have borne this title throughout the evolution of the project due to various personal, professional and programmatic changes. Besides allowing for my stubbornness, it encapsulates the fullness of my gratitude. And so, I would like to extend this title further to include the one member of my committee who did not ever fill this specific role, but has been important throughout the process. To my first dissertation chair, Denise, I am forever grateful for your skill, sensitivity, support, and stamina throughout my time in graduate school as well as during the dissertation process specifically. Lesia, I am grateful for your graciousness at assuming the dissertation chair role subsequently and through your consistency in sharing your knowledge and high expectations. Teresa, thank you for challenging me to clarify my understanding and communication of statistical methods. Your attention to the big picture and the small details was remarkably helpful. Diana, thank you for your generosity in joining my committee despite my disordered completion of dissertation tasks; your readiness to be my official chair following the program reorganization; and your delight in the process. Finally to Deidre, my last official dissertation chair—thank you for your magnanimity and collaboration prior to and then during your sabbatical. Your flexibility in taking on this role is sincerely appreciated.

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CHAPTER 1: INTRODUCTION

Study Rationale

Retrospective studies indicate that for a large majority of cases of co-occurring PTSD-SUD, PTSD develops prior to SUD. Data from prospective studies has demonstrated that PTSD does contribute to increased risk for the development of SUD (Stewart & Conrod, 2003). Many individuals with PTSD report consuming substances in efforts to gain short-term relief from the distress of trauma-related symptoms. The use of substances to avoid the painfulness of trauma sequelae lends support to the self-medication hypothesis of addiction (Jacobsen, Southwick, & Kosten, 2001; McCauley, Killeen, Gros, Brady, & Back, 2012), a cyclical process reinforced by withdrawal symptoms (Brady, McCauley, and Back, 2014) and the development of cravings in response to trauma cues (Coffey et al., 2002). Literature from the trauma and addiction fields detail treatment engagement and compliance as primary concerns interfering with recovery. Carroll (1997) asserts that among those meeting criteria for alcohol and substance use disorders, “rates of treatment dropout range from 25 to 90 percent” (p.6). Souza, Spates, & Rankin (2012) note that, “as levels of avoidance increase, the likelihood of an individual seeking, complying with, and completing treatment for PTSD decrease significantly” (p.103) meaning that those most in need of intervention are also those less likely to receive it (Pineles, Mostoufi, Ready, Street & Griffin, 2011). For those with dual diagnoses, as substances leave the body, trauma symptoms return, oftentimes with greater intensity. Many treatment settings for those meeting criteria for PTSD, SUD, or the dual-diagnosis enforce strict requirements for patient attendance given wait lists and overburdened mental health resources for those with limited financial means. While concordant with some theoretical and clinical approaches, this policy when universally applied to a population with PTSD-SUD may not only lack a sufficient scientific basis, but may be iatrogenic in practice. At times, missed sessions may be markers of unformulated experience,
dissociation, enactment, or (un)conscious awareness of the felt-need to modulate the emotional impact of disclosure and treatment participation. Flexible and compassionate responses to missed-sessions in the context of ongoing clinical engagement may be of greater benefit than termination (Bernard, 1994). For those with PTSD-SUD, the longer the duration of PTSD care (with attendance at 2 or more sessions per month), the greater the likelihood of substance use remission (Ouimette, Moos, and Brown, 2003), a finding that suggests that while treatment attendance matters, “good enough” dosing may be sufficient for the achievement of clinically significant improvement. Emerging evidence from both the trauma-specific treatment literature (Powers, Halpern, Ferenschak, Gillihan, & Foa, 2010) and the co-occurring trauma-addiction treatment literature (Hien et al., 2012) reveals that for some patients attending more treatment sessions within a given time frame does not always result in improved outcomes. Indeed, a subset of this population may exhibit greater positive effects when allowed some flexibility with attendance as a mechanism for the regulation of treatment dosage.

For a diagnosis of PTSD in non-substance-using populations, the American Psychological Association (APA) identifies exposure-based therapy as highly effective treatment with strong research support (DeAngelis, 2008; Foa, Keane, Friedman, & Cohen, 2010). Prolonged exposure (PE) involves repeated recounting of the traumatic events including thoughts, emotions, and physiological sensations associated with the memories. A meta-analysis of 13 randomized controlled trials of prolonged exposure found it to be a “highly effective treatment for PTSD that confers lasting benefits across a wide range of outcomes” (Powers et al., 2010, p.639). Though PE is considered an evidenced-based practice that represents the “gold standard” in clinical care for trauma-exposed populations, some research has linked this treatment approach with poor attendance rates vis-à-vis alternative methods (Mott et al., 2014) or
increased symptom severity (e.g. suicidal ideation, depression, panic attacks) for some patients (Pitman, 2002). Thus while prolonged exposure has the capacity to facilitate significant symptom relief, tolerability has been a concern prompting research and debate.

Prolonged exposure therapy was initially conceptualized in case studies as potentially inappropriate for those with concurrent substance dependence because of cognitive impairment or increased risk of relapse, but given that most individuals with substance disorders were excluded from studies on PE, evidence may have been insufficient to make this claim (Souza et al., 2012; Mills, Teesson, & Back, 2012). Instead of rejecting the use of exposure-based techniques and their potential long-term benefits, experts in the field of substance abuse treatment have begun to consider how to use these methods for patients with co-occurring PTSD-SUD safely and effectively.

Given the particular retention difficulties inherent to work with a population diagnosed with PTSD-SUD (Najavits, 2015) and the anticipated or experienced stress associated with symptomatology and treatment, an examination of the unique contributions of type of treatment with and without Prolonged Exposure provides critical data to understand the ways patients attend in a dynamic, interactive environment. Exploring attendance patterns, patient-characteristics at baseline (e.g. years of education, number of trauma exposures, additional co-occurring psychopathology, primary substance of use), and diagnostic and symptoms changes post-treatment helps identify clinically relevant subsets of those seeking relief from PTSD-SUD, a process itself facilitative of tailored interventions maximizing opportunities for successful treatment outcomes.
Study Aims

In the primary analyses of efficacy studies, the attention paid to treatment “completers” sometimes overshadows the experiences of those who attended irregularly or dropped out prior to the fulfillment of a specified definition of sufficient treatment. Consequently, those individuals who did not pursue further participation following randomization or attended an insufficient number of sessions for full analysis in particular studies are less visible. Previous research contributes to the conceptualization of a sufficient treatment dose, but this literature does not always integrate the sometimes-divergent perspectives of clinicians, researchers, and participants. Differences in criteria for treatment completion across studies make direct comparisons and resultant interpretations challenging (Tuerk et al., 2011, 401).

Authors may note limitations related to whose data is central in their analysis and hypothesize whether there may be any unaccounted for differences between those who completed treatment and those who did not. Researchers may be able to articulate whether any differences on studied variables reached significance, but if this is the case, it is unlikely that they will be the point of emphasis. Moreover, patients with premature termination (also variably defined) from treatment have missing data, which makes it statistically and clinically challenging to determine the meaning of missing sessions. Titrators, participants who attend regularly initially and then less so as treatment progresses, (Hien et al., 2012) provided data that contributed to our understanding of clinical processes at play. When statistical means present a global picture, the obfuscation of clinically significant variance across subjects with different attendance patterns may be lost. Knowing that a one-size-fits-all approach fits some, efficacy and effectiveness studies may be able to capture and communicate the essential information regarding all treatment-seekers with greater fidelity by utilizing latent class analysis.
Co-occurring PTSD-SUD diagnoses are associated with a wide range of negative clinical outcomes including: high substance use severity (Najavits, 2007); high rates of self-destructive or high-risk behaviors (Najavits, 2007); elevated risk for treatment dropout (Ford, Hawke, Alessi, Ledgerwood, & Petry, 2007; Brady, Dansky, Back, Foa, & Carroll, 2001); and relapse following SUD treatment (Hien, Nunes, Levin, & Fraser, 2000; Najavits, 2007).

Concurrent treatment of PTSD and substance use disorders using **prolonged exposure** (COPE) is an integrated treatment that is a synthesis of Relapse Prevention (cognitive behavioral therapy for addictive disorders) and Prolonged Exposure (for PTSD) (Back et al., 2012). In its first randomized control trial (RCT), Mills and colleagues (2012) found that the combined use of COPE plus usual treatment (e.g. detoxification, maintenance therapies) compared with usual treatment alone resulted in improvement in PTSD severity without an increase in the severity of substance dependence.

This research builds on a number of case and pilot studies indicating that prolonged exposure may be beneficial among participants with co-occurring substance use disorders. Coffey, Staslewicz, Hughes, and Brimo (2006) compared six PE sessions plus group and individual SUD treatment with a comparison group receiving 6 imagery-based relaxation sessions in addition to group and individual SUD treatment. The imaginal exposure group experienced a reduction in PTSD symptoms and alcohol cravings, while there were no significant changes in trauma symptoms for those in the relaxation group (Coffey et al., 2006). These findings suggested that adding exposure-based PTSD treatment to SUD treatment might have some benefit in reducing alcohol related craving symptoms in those with PTSD-SUD in addition to positive effects on trauma symptoms (Coffey et al., 2006). Support for COPE’s methodology is also found in evidence from a randomized controlled trial of CBT for PTSD and
AUD, which demonstrated that an Integrative Therapy (IT) group with 1 or more sessions of Prolonged Exposure had superior outcomes on measures of PTSD symptom severity (blind, clinician-administered assessment) when compared to the IT group without PE (Sannibale et al., 2013). At five months post-treatment, the superiority of outcomes remained (Sannibale et al., 2013).

The larger, randomized NIDA-funded clinical trial (N=110) from which the present study derives compared the efficacy of Concurrent Treatment of PTSD and Substance Dependence (COPE) and Relapse Prevention Therapy (RPT) to an active monitoring control group (AMCG) for those with co-occurring PTSD-SUD (Ruglass et al., 2017). COPE and RPT demonstrated significant superiority in reducing PTSD symptom severity when compared to AMCG. Both active treatments were also superior to AMCG in reducing the days of use for the primary substance. Among those participants with full PTSD, COPE showed greater decreases in trauma symptomatology relative to RPT (COPE-RPT=−21.32, 95% CI-42.37 to -0.28, p=.047). In contrast, there were no significant differences between COPE and RPT on trauma symptoms among participants with sub-threshold PTSD and SUD (p=0.92) (Ruglass et al., 2017, p.6). Among participants who met criteria for full PTSD as compared to subthreshold PTSD, COPE may have a greater effect on PTSD symptoms when compared to a SUD-only treatment (p.1). The use of prolonged exposure resulted in a decline in PTSD symptom severity with no worsening of substance use (Ruglass et al., 2017). Of relevance to the current study, the primary analysis determined that the mean number of sessions attended by participants randomized did not differ significantly between treatments (COPE: mean = 6.08, SD = 4.75 vs. RPT: mean = 7.21, SD = 4.40, p = 0.27) (Ruglass et al., 2017, p.4).
The present study (N=82) conducted latent class analysis to examine the attendance pattern of treatment-seeking participants with PTSD-SUD assigned to receive 12 sessions of Relapse Prevention Therapy or COPE. In doing so, the present study built upon the variable-centered approach of the primary outcomes paper (Ruglass et al., 2017) by contributing a person-centered approach. Following the identification of distinct attendance patterns among participants, an analysis of the relationship between treatment type and attendance patterns contributes evidence regarding whether integrated therapy using prolonged exposure with a substance-dependent population differentially affects treatment dropout or titration vis-à-vis cognitive behavioral therapy without prolonged exposure (RPT). A further analysis of baseline participant characteristics and their association with attendance patterns provides an opportunity for greater understanding of which treatments may work most effectively for which individuals with PTSD-SUD. The present study examined the relationship between attendance patterns and treatment responses on measures of PTSD symptoms and substance use frequency.
CHAPTER 2: LITERATURE REVIEW
Overview

The present review examines the literature related to psychotherapy treatment attendance including research on associations between attrition and diagnostic variables related to trauma, substance use, symptom severity, and co-occurring psychopathology. Lastly, a summary of the literature on treatment for co-occurring PTSD-SUD with particular attention to treatment engagement via attendance has been included.

Treatment Attendance: Conceptual Framework and Related Methodologies

Varied definitions and determinations for dropout, attrition, treatment failure, and early or premature termination represent multiple attendance-related constructs using similar terminology and methods of operationalization (Barrett et al., 2008). Definitions of treatment completion and completers have also differed, though perhaps with a less chaotic evolution. Attendance irregularities use overlapping criteria to describe participants’ behavior including: missing the first or last session (Hatchett et al., 2002); missing consecutive sessions; failing to attend a predetermined number of total sessions, discontinuing treatment against clinical advice (Pulford, Adams, & Sheridan, 2009) or failing to achieve a predetermined ratio of sessions attended vis-à-vis sessions offered. Attendance irregularities as a term itself is a misnomer given the common occurrence of dropout, attrition, and premature termination, but will be used to encapsulate the diverse ways patients may be considered to not “complete” treatment, described most frequently as attending a specified and predetermined number of sessions considered to be sufficient by clinical researchers and/or insurance company representatives. Dropout has been used to refer to anyone who has ended treatment early, though this may include reference to study participants who drop out after 0 or 1 session or who may have attended on average 16 sessions (López-Goñi, Fernández-Montalvo, & Arteaga, 2011). This variability highlights the need for specific
definitions and draws attention to the cultural and treatment context in which particular terms are used. Dropout as a term may also include patients who received referrals to pursue treatment elsewhere due to clinic or research exclusion criteria or exhibited behavior in the midst of treatment that required a higher level of care. Occasionally early dropout increases the specificity of the term, as it may with attrition, a word that generally appears to denote the occurrence of a patient-determined ending spanning the course of treatment, variably defined. The term premature termination or early termination appears most consistently linked to the experience of a patient not informing a clinician about his or her plan to stop attending sessions or the experience of a patient and a clinician disagreeing about whether termination is indicated. This term, like dropout, also may include patients who have attended few or numerous sessions.

For clarity’s sake, this paper will use the terms dropout, attrition and attendance irregularities, but rarely early or premature termination. Specific parameters will be included when possible without becoming unwieldy. In addition, the terms treatment titration and titrators will also occur within this paper. Treatment titration refers to the patient-initiated process of beginning treatment with a high level of consistency and then, following the initial treatment phase, attending subsequent sessions with less overall consistency (Hien et al., 2012). Titrators differ from completers in that they miss more sessions than completers who demonstrate a more stable rate of overall attendance (Hien et al., 2012).

Sometimes we are able to learn something about those participants who miss sessions. However, a lack of consensus regarding attendance-related terminology (Matthieu & Ivanoff, 2006) coupled with insufficient reporting and transparency in measurement of these variables within RCTs and other clinical research contexts pose challenges to clinicians, researchers, and consumers alike in their determination of which therapies work well for whom. Warnick et al.
(2012) illustrated the difficulties of making direct comparisons of psychotherapy research given differences in construct definition. In their study of attrition, Warnick et al. (2012) found that predictors of attrition varied markedly based on which of three distinct definitions was utilized—the statistical relationships between predictors and attrition differed based on whether attrition was based on 1) clinician judgment, 2) a specified dose, or 3) a missed last appointment.

Clinicians and consumers may view treatments disparately given the potential for incongruence in the goals of symptom relief or other measure of change. Zayfert and colleagues (2005) suggested that definitions of attrition and dropout used within clinical settings vis-à-vis research settings may be especially divergent with treatment completion in clinical settings linked to positive outcomes and a mutually agreed on termination by clinician and patient. Discrepancies between dropout rates in RCTs and studies that are more naturalistic have been widely noted in the literature (Najavits, 2015). Missing sessions may occur for a multiplicity of reasons. However, those who attend treatment irregularly due to the effects of the therapeutic intervention or a discrepancy between the expectation and the actual course of treatment are particularly problematic (Foa, Keane, & Friedman, 2000).

In psychotherapy outcomes research, attrition contributes to lost data and greater ambiguity in the analysis of treatment outcomes through threats to both internal validity (through an alteration of group composition) and external validity (whenever those who leave treatment differ from those who complete it on any dimension other than attendance status) (Harris, 1998). Statistical exclusion or inclusion of dropouts from analyses has consequences of positioning therapies in a more or less favorable light than may be warranted (Matthieu & Ivanoff, 2006). Selection bias due to dropout is an occurrence that does not have an adequate correction (Matthieu & Ivanoff, 2006). Efforts to enhance retention and participant tracking, while
necessary and important, will not replace the data that is lost to dropout. While the Consolidated Standards of Reporting Trials provides guidance on reporting clearly defined attendance data for all enrolled participants as part of an intention to treat approach (Altman, 1996), there is variability in implementation of these recommendations. Complete-case analysis, imputation-based procedures and model-based procedures are the three primary methods available for statistically handling missing data (Little & Rubin, 2002). Each of these statistical approaches has associated problems (Matthieu & Ivanoff, 2006; Deluchi, 1994). Simplicity of a given statistical approach may lead to its implementation when another methodology may be more appropriate.

Literature suggests that treatment dosage does have variable impact on symptom reduction and reoccurrence of symptoms. The ways patients attend treatment sessions (e.g. lateness, missing sessions) have a direct impact on the type, quality, quantity and relational context of clinical interventions to which they are exposed. How clinicians and treatment delivery systems view non-attendance or attendance irregularity is likely to further influence client attendance. If non-attendance is viewed as a response to the dominance of a particular self-state, one that may be dissociated from other parts of a patient’s experience and that may be unconsciously resisting overwhelming affect—whether partially related to the experience of a previous intervention or as (un)conscious anticipation of what may be opened up in treatment—this is likely to impact how clinicians communicate with those who have not shown up. Thus the professional contexts in which clinicians are treating patients additionally affects responsiveness to patients’ missed sessions.

Recent research suggests that a minimum of eleven to thirteen evidence-based sessions were needed for 50-60% of clients to be recovered (defined as achieving desired symptom relief)
(Hansen, Lambert & Forman, 2002, Lambert, 2007). Though this finding may obscure variability based on individual, therapist, diagnostic, and intervention differences, it does highlight the importance of considering how patients attend therapy and promotes the consideration of what constitutes an adequate dose for whom.

The Good Enough Level Model or GEL model (Barkham et al., 1996) suggests that the level of treatment duration and the level of patient improvement serve a co-regulating function so that patients tend to leave treatment when a patient’s improvement has reached a good enough level. The GEL level may evolve over the course of treatment, likely influenced by a variety of factors including satisfaction level and symptomatology. Expectation of dose (i.e. number of therapy sessions) appears to have some influence on rate of symptom improvement (Barkham et al., 1996) though responsiveness, including adjustments to treatment length and intervention type may improve the therapeutic relationship. Barkham et al. (2006) studied the GEL model via an application of reliable and clinically significant improvement (RCSI) (Jacobson & Traux, 1991), a construct that requires 1) reliable pre-post improvement and 2) clinically significant change frequently operationalized as a shift from a clinical to a non-clinical presentation. The large individual differences in achieving reliable and clinically significant improvement (Barkham et al., 2006) suggest that imposing standardized limitations on session number, a common practice among insurance companies and treatment clinics for resource-related purposes, may be inappropriate. The negative acceleration of the aggregate dose-effect curve for psychotherapy does not mean the average individual dose-effect curves for psychotherapy would also show negative acceleration. Session twelve is not inherently less potent than session three; on an aggregate curve, easier to treat patients will have responded by session twelve and ended treatments, while those with more intractable challenges remain in treatment. Thus, at successive
time points on the dose-effect curve different aggregations of patients are represented (Kopta et al., 1994). Consequently, the aggregate will yield a negatively accelerating curve even though there may be some patients or some presenting problems with linear dose-effect responses.

Various efforts can be made to increase retention and reduce attendance irregularities: including phone reminders (Gariti et al. 1995), motivational interventions (Dench & Bennett, 2000), role induction (Zwick and Attkisson 1985), positive reinforcement (Petry, Martin, Cooney, & Kranzler, 2000) though these have had mixed results (Ogrodniczuk, Joyce, & Piper, 2005). Consequently, some suggest focusing efforts on treatment-fit including increased availability to shorter term interventions that may maximize the likelihood that a patient receives the optimal intervention suited to likely attendance (Pulford, Adams, & Sheridan, 2009; López-Goñi et al., 2011). This approach, particularly if involving patients in the decision-making process, may support patient self-efficacy and facilitate a strong initial therapeutic alliance (Reis & Brown, 2006; Barrett et al., 2008), a factor implicated in treatment completion and positive treatment outcomes. Patients report greater rates of staff, program-related, and logistical issues for dropout than do clinicians (Ball, Carroll, Canning-Ball, & Rounsaville, 2006). These differences in perspective could be explained in part by attribution theory (Heider, 1958), which suggests that individuals are more likely to attribute negative personal experiences to external factors while attributing the negative experiences of others to internal causes. Utilizing patients’ preferences, goals, and logistical realities to inform treatment planning in its initial stages in a respectful manner may be effective in maximizing intervention hours and increasing openness to the range of psychotherapeutic approaches in the future. Some patients may be able to reduce or discontinue treatment prior to “completion” with no ill effects, though this may not be the case for others. A number of factors influence how individuals attend treatment, but there is a paucity
of research linking attendance patterns to diagnostic and clinical variability at baseline as well as to treatment outcomes.

**Treatment Attendance and Demographic Data**

There are several patient-specific variables studied in relation to psychotherapy attendance and dropout; however, only a few have demonstrated a more consistent association. Though entry into mental health or substance-specific treatment settings may vary, gender is not necessarily a predictor of retention, completion, or outcome once treatment has been initiated (Greenfield et al., 2007). Key demographic variables including the experience of economic disadvantage, racial/ethnic minority status, and limited education have demonstrable links to early disengagement from psychological treatment (Barrett et al., 2008). Defife et al. (2010) found “individuals with greater barriers to care such as those who are younger, ethnic minorities, living farther away from treatment settings, poorly insured, less educated or of lower socioeconomic status have greater no-show rates” (p. 414). Younger or emerging adults (below age 30) have higher rates of dropout than mature adults (Edlund, 2002; Olfson et al., 2002). Low socioeconomic status (SES) is the strongest predictor of attendance among studied demographic factors (Beckham, 1992). Epidemiological survey research further corroborated the finding that low SES has been fairly constant in its association with psychotherapy dropout rates (Edlund et al., 2002) with moderate effect sizes between .23 and .37 (Wierzbicki & Pekarik, 1993; Edlund et al., 2002). The impact of SES, however, appears to be particularly significant in the initiation period of psychological treatment. A meta-analysis that differentiated between early dropout and later dropout (after session four) revealed the association between low SES and dropout was more closely linked with early dropout as opposed to later attrition (Barrett et al., 2008). While research suggests that attrition early in a treatment process may be attributable to a differing set
of factors than attrition later in treatment (Barrett et al., 2008), this level of analysis is absent from much of the psychotherapy process literature.

**Treatment Attendance and Traumatic Exposure**

Evidence suggests that the experiences and symptoms associated with PTSD are associated with higher rates of treatment attendance irregularities (Najavits, 2015; Schottenbauer, Glass, Arnkoff, Tendick & Gray, 2008). The emotion regulation deficits central to the disorder in conjunction with the difficulties inherent in creating and maintaining trust for individuals who have experienced interpersonal traumas necessitate an intentional therapeutic approach. Thus, the current standard of practice for post-traumatic therapy is a three-phase model focusing on: 1) safety and stabilization 2) memory reconstruction and emotional processing and 3) integrated learning and adaptive living (Courtois & Ford, 2009, p. 49-52). Trauma-specific treatments vary in the emphasis placed on one or more of the aforementioned phases, a characteristic linked to the specific theoretical underpinnings of the intervention and evidence related to symptom reduction, recovery, and integration. Those individuals with severe PTSD or complex trauma are thus particularly vulnerable to difficulties with treatment engagement and titrating session participation may serve as a means to regulate anxiety and other forms of distress (Hien et al., 2012).

Evidence suggests that high PTSD symptom severity is associated with treatment attrition. In a retrospective chart-review of veterans receiving one of two EBPs for PTSD (Prolonged Exposure or Cognitive Processing Therapy), a history of psychiatric inpatient hospitalization was associated with decreased likelihood of treatment completion (Mott et al., 2014). Farrugia and colleagues (2011) found that individuals with PTSD-SUD who had experienced childhood trauma had more severe and chronic clinical presentations than those with
PTSD-SUD whose trauma exposures occurred only in adulthood. As a group, those with childhood trauma exposure exhibit greater clinical severity in multiple ways related to both substance use and trauma. With regard to substances, those with PTSD-SUD and childhood trauma exposure have higher scores on measures of substance dependence; higher numbers of drug treatment episodes, higher numbers of drug classes used over the life course, have an earlier age of first use and of first intoxication. This population of individuals with PTSD-SUD and childhood trauma is also associated with more extensive lifetime exposure to trauma, more diversity in type of trauma exposure, and experiences longer duration of PTSD symptoms (Farrugia et al., 2011). Individuals with child trauma exposure and childhood sexual abuse in particular are vulnerable to re-traumatization as adults (Farrugia et al., 2011, p.322). Retraumatization is associated with more complex PTSD symptom presentation in addition to co-occurring anxiety disorders of various types, depression, and self-harm (Farrugia et al., 2011, p.322).

Those exposed to trauma as children who later develop PTSD–SUD often have experienced or witnessed interpersonal violence within the context of their closest relationships. Early, repeated trauma exposure can lead to neurobiological changes in emotional sensitivity levels (Siegal, 1999) with increased vulnerability to subsequent emotional challenges and a lowered threshold for dysregulation (Hien, Litt, Cohen, Miele, & Campbell, 2009). Childhood maltreatment is associated with HPA axis dysregulation as an adult (Koenen, 2010), a finding which details the pervasive impact of trauma on multiple physiological regulatory processes – including those related to the capacity to modulate mood and emotion, factors in turn related to treatment engagement.
Those with Complex PTSD resulting from chronic or long-term exposure to trauma (Herman, 1997) have relatively high rates of attending treatment inconsistently. This may occur within the context of ongoing communication with providers whether by phone contact or by disappearing and resurfacing. Variable treatment engagement is reflective of the disturbed attachment patterns often seen in those with Complex-PTSD (Hien, Litt, Cohen, & Miele, 2004; Hien et al., 2010; Herman, 1997). Avoidance is a central element of PTSD, with the avoidance of trauma-related thoughts, feelings, and situations not infrequently transferred to the avoidance of therapy itself.

Dropout rates from randomized controlled trials of CBT for PTSD range dramatically from 0% (Glynn et al., 1999; Zayfert et al., 2005) to 43% (Power et al., 2002). Dropout from CBT for PTSD has been associated with baseline anxiety (Taylore, Fodoroff & Koch, 1999; van Minnen, Arntz, & Keijser, 2002), depression, (Bryant, Moulds, Guthrie, Dang, & Nixon, 2003), guilt, an additional psychiatric diagnosis, and PTSD symptom severity (Taylore, Fodoroff & Koch, 1999). Within a clinical treatment setting using conservative criteria for completion, Zayfert et al. (2005) found baseline PTSD avoidance symptoms to be associated with lower rates of treatment completion of CBT for PTSD.

Despite significant allocation of resources by the Department of Veterans Affairs to offer evidence-based treatments for PTSD (Shiner et al., 2013), specifically Prolonged Exposure and Cognitive Processing Therapy, 25-30% of veterans who begin the ten- to fifteen-week intervention do not complete the ‘prescribed’ treatment course with eight sessions denoted as the minimum dose (Hernandez-Tejada et al., 2014). A majority of those veterans meeting criteria for full PTSD (DSM IV) at baseline who received in-person therapy (as opposed to telemedicine) indicated that they felt no clinical reason to continue treatment (Hernandez-Tejada et al., 2014).
While it is unlikely that this set of responders was wholly asymptomatic, the finding does dovetail with a meta-analysis of 13 Prolonged Exposure studies that revealed “no significant relationship between effect size and dose (number of sessions)” (Powers et al., 2010, p.640) to suggest that the parameters of a “good enough” recovery may elude generalizability.

**Treatment Attendance and Substance Misuse**

The findings regarding the relationship between substance misuse and attendance irregularities are mixed. Early age of substance use has been associated with higher dropout rates (Agosti, Nunes & Ocepeck-Welikson, 1996) as well as poly-drug use (Fishman, Reynolds, and Riedel, 1999; Wickizer et al., 1994). Active substance use negatively influenced regular appointment attendance in a clinical setting (DeFife et al, 2010). Individuals in treatment for substance misuse have high rates of early dropout, with rates as high as 50% in the first month (Stark, 1992).

Some evidence suggests that the ways patients attend treatment have a relationship to the primary substance of misuse. In a Spanish study, Lopez-Goni et al. (2011) found that a significantly higher proportion of those who left a 12-month treatment program early initiated treatment for alcohol misuse vis-à-vis cocaine misuse, while other researchers have shown higher dropout rates among cocaine users (McKellar, Kelly, Harris, et al., 2006; McKellar, Harris, Moos, 2006). Divergent expectations and definitions of attendance and treatment completion may explain some of these differences as may the good enough level (GEL) model.

Among others, Flores (2001) conceptualized substance misuse as maladaptive coping to facilitate internal self-regulation in lieu of interpersonal relationships. This conceptualization suggested that individuals with substance misuse who also have anxious attachment styles or poor social support are particularly vulnerable to leaving treatment early.
While some individuals are ambivalent regarding reducing or abstaining from alcohol or substances particularly in the absence of less adaptive coping skills, co-occurring difficulties, some of which patients may recognize as driving or related to use, often inspire far less ambivalence. Still, many with co-occurring disorders who also have substance misuse have challenges accessing treatment for other problems if alcohol or substance use exceeds parameters set by clinics that deem themselves ill-suited for work with heavy substance users. Many patients with dual diagnoses encounter limitations in their access to the full range of available treatments. Stigma and the cloak of invisibility it casts on co-occurring problems, greater accessibility of abstinence-only self-help programs, and structural separation from other behavioral health provision lead many patients toward a path of addressing substance issues first in isolation from PTSD and other co-occurring disorders which many are attempting to minimize via self-medication. The need for substance detoxification and rehabilitation facilities remains; however, it is understandable that treatment dropout will be higher for clients who in wanting to address co-occurring depression, anxiety, or posttraumatic symptoms receive the message that their treatment goals and priorities are of secondary importance. The potential for less attuned clinical experience is elevated when the roots and co-occurring complexities of an individual’s diagnostic picture remain out of focus. Less choice in the clinical context related to an insistence on sequential treatment with substances addressed first may in turn contribute to weak initial alliance, more negativistic attitudes toward treatment, reduced confidence in treatment-efficacy, increased hopelessness regards to the intractability of clients’ own problems. The negatively reinforcing elements of this feedback loop are well-documented predictors of attrition.
Treatment Attendance and Co-occurring Psychopathology

Beyond demographic, trauma and substance-related predictors, psychiatric severity has demonstrated links with missed psychotherapy appointment rates, particularly for those on either end of the symptom spectrum (DeFife et al., 2010, p. 414). High symptom severity at initial presentation to treatment is predictive of premature termination (Derisley & Reynolds, 2000, p. 371), however treatment completers are also often considered to have greater impairment than treatment non-completers (Barkham et al., 1996).

There is evidence that patients’ diagnostic symptoms and classifications may be a partial determinant of the ways in which they attend psychotherapy. While patients in varied treatment settings tend to have co-occurring mental disorders, the evidence base for specific psychotherapies has been based largely on participants with single disorders given delineated exclusion criteria maximizing internal validity (Miranda, Azocar, and Burnam, 2010, p. 205).

There are high rates of co-occurring depression, anxiety and borderline personality disorder among studies using samples of individuals with PTSD-SUD (Farrugia et al., 2014), a finding that holds true despite the exclusion of those who are actively self-harming or suicidal when assessed. Evidence suggests that when PTSD-SUD occurs in conjunction with other disorders, it is more difficult to treat—particularly when the additional disorders implicate high levels of negative affect. Major Depressive Disorder as well as Persistent Depressive Disorder can be characterized—at least in part—by prolonged, intense and frequent experiences of high negative affect, with a high symptom correlation between self-report and clinician-report (Farrugia et al., 2014; Owens, 2014, Gross, 1998). Norman, Tate, Wilkins, Cummins & Brown (2010) found that the severity of depression symptoms among those who also met criteria for PTSD-SUD was greater when compared to a similar population of depressed individuals who did
not meet criteria for PTSD-SUD. Relatedly, comorbid PTSD-Depression was also found to be more difficult to treat when compared to the treatment of a single disorder in two veteran studies (Campbell et al., 2007; Walter, Barnes, & Chard, 2012; Owens 2014). More severe depression was negatively associated with retention in depression treatment (Bech et al., 2003) and among those with polysubstance use and MDD, treatment retention has been shown to be problematic (Schaub et al., 2011).

In addition to the association between high negative affect and higher levels of substance misuse (frequency and quantities consumed), high negative affect has been shown to interfere with cognitive processes that are facilitative of adaptive coping (e.g. effective decision-making) (Henderson, 2011), factors which in turn are associated with psychotherapy attendance irregularities including missed sessions.

Using an urban primary care patient population, Mohr et al. (2006) found a significant relationship between depression and increased perception of emotional barriers to psychotherapy (e.g. concerns about what others would think, discomfort talking about personal issues, concerns about being seen while emotional) whereas practical barriers (e.g. proximity to psychotherapy, time constraints, transportation difficulties) were not consistently associated with depression. Co-occurring depressive symptoms or diagnoses were associated with higher rates of both treatment refusal and dropout among outpatients with anxiety disorders (Isaakidis & Andrews, 2004).

Severity of psychiatric and medical symptoms was found to be related to retention rates among women in residential treatment for substance dependence (N=203), in which those with greater number and severity of problems had lower retention rates (Greenfield et al., 2007). However, in a residential treatment center for substance dependence with participants exhibiting high rates of traumatic exposure, Ghee, Johnson, Burlew & Bolling (2009) found that retention
rates were higher for those with higher depression scores at baseline when implementing
treatment as usual or a condensed present-centered treatment for co-occurring PTSD-SUD
(Seeking Safety).

**Treatments for Co-occurring PTSD and SUD**

Historically, providers recommended sequential care—with SUD treated first and PTSD addressed subsequently following the achievement of abstinence. An empirically supported shift towards a harm reduction approach in the treatment of substance use disorders has occurred contemporaneously to movement in clinical PTSD research from efficacy trials on interventions designed to address simple PTSD to those focused on both efficacy and effectiveness for those with complex PTSD and co-occurring disorders. Growing evidence indicates the need for concurrent treatment as patients with comorbid PTSD and SUDs have unique clinical concerns that require an approach that is distinct from PTSD patients without SUDs. For example, when compared with either disorder alone, co-occurring PTSD-SUD is associated with higher rates of additional comorbidities (Jacobsen et al., 2001); higher symptom severity, lower psychosocial functioning, worse physical health, elevated risk for suicidality, and negative treatment outcomes (Capone, Eaton, McGrath, McGovern, 2014). Unique clinical concerns for those with PTSD-SUD also include comparatively worse outcomes in substance use treatments and elevated risk for substance-related relapses (Glasner-Edwards et al., 2013; Read, Brown, & Kahler, 2004; Resko & Mendoza, 2012; Kacskurkin, et al., 2016). Though those with PTSD-SUD are difficult to treat, there is evidence that has demonstrated dual-focused treatment to be superior to single-focused treatment (Abueg & Fairbank, 1991; Ouimette, Moos & Finney, 2003; Cocozza et al., 2005). Failing to address PTSD in patients with PTSD-SUD may contribute to more entrenched dysfunction; patients with PTSD and Alcohol dependence, for example, relapse sooner than
those with alcohol dependence and other co-occurring Axis 1 psychiatric diagnoses (Foa, Yusko, and McLean, 2013).

In response to the need for integrated evidence-based treatments that are both effective and cost efficient, new therapies were developed including present-focused interventions, such as Seeking Safety (Najavits, 2002) and Integrated Cognitive Behavioral Therapy (ICBT) For PTSD and Substance Use (McGovern, Lambert-Harris, Alterman, Xie, Meier, 2011) and those focused on the in-depth processing of past trauma. Concurrent treatment of PTSD and substance use disorders using Prolonged Exposure (COPE) (Back et al., 2012) and Cognitive Processing Therapy (Resick & Schnicke (1993) are methods which directly address experiences of past trauma. Like the trauma-specific treatments with a more narrow focus, interventions for co-occurring PTSD-SUD often emphasize a single phase of the aforementioned three phases of trauma treatment delineated by Herman (1997). Seeking Safety (Navajits, 2002), for example, which addresses issues of safe coping and stabilization via attention to interpersonal and emotional regulation, privileges this first phase and stage of treatment. In contrast, the COPE treatment moves from a focus on safety and stabilization in early sessions (1-4) to a central focus on phase two of trauma treatment – the emotional processing of traumatic memories.

The challenge of developing a treatment for patients with SUD and PTSD centers on the primary tasks of bolstering skills to initiate and maintain sobriety, while also using effective trauma techniques that will promote rather than interfere with recovery from substances. Hien et al. (2009) acknowledges the inherent difficulties working within the therapeutic window with individuals with PTSD-SUD given the diagnostic centrality of avoidance and emotional dysregulation; errors in the pacing of treatment for this population may result in clients using absences to modulate their affective and interpersonal experiences of therapy.
The field lacks consensus regarding what constitutes the best treatment for those with PTSD and co-occurring SUD (Najavits and Hien, 2013; Berenz & Coffey, 2012). While certain treatments are the gold standard for either PTSD or Substance Use Disorders, there is considerable variation in the ways that clinicians are working with individuals with one of these disorders and even greater treatment diversity for those with a dual diagnosis. Some psychotherapy research scholars have challenged the validity of gold standard claims—arguing that it is rare for one treatment to outperform another non-waitlist intervention, with successful treatment hinging on more universal therapeutic elements. Though both sides of this debate have amassed considerable research, the argument denoting the value of common therapeutic elements does not itself provide sufficient evidence to discredit the demonstration of the success of gold standard therapeutic approaches for some patients in specified contexts. Prolonged Exposure for PTSD and Relapse Prevention Therapy for Substance Use Disorder have received the gold standard designation, making both therapies worthy of consideration in the formulation of integrated treatment for PTSD-SUD given utilization outcomes for the targeted single disordered populations. Exposure-based methods including Prolonged Exposure has been shown to decrease other traumatic stress-related difficulties including anger, guilt, and depression (Hernandez-Tejada et al., 2014) emotional factors that are also implicated in substance misuse.

A recent study of U.S. veterans found that among those who completed at least eight sessions of PE treatment, the “proportion of patients screening positive for PTSD on the PTSD Checklist decreased from 87.6% to 46.2%” (Eftekhari et al., 2013, p.410). However, assignment to treatment type was not random and approximately one quarter of participants who initially agreed to PE treatment dropped out prematurely (Morris, 2015). Study design, reporting methods, and loss of contact with subjects no longer pursuing treatment result in scant
information related to those dropping out prematurely or attending treatment with greater irregularity. Though premature dropout is a clinical occurrence across treatment types, the extent to which dropout or treatment titration occurs more within Prolonged Exposure treatments vis-à-vis other therapies is of clinical import. Najavits (2015) as the author of a present-centered approach to addressing PTSD-SUD, advocated for the designation of gold standard to be assigned to those with strong performance in both RCTs and in the “real-world” with its wider array of settings, programs and patients.

Early research on Prolonged Exposure with co-morbid PTSD-SUD used case studies of individuals with PTSD and SUD (varied types) treated with prolonged exposure, and demonstrated mixed results (Brady, Dansky et al., 2001). Souza et al. (2012) published a case study of an individual with co-occurring PTSD, Alcohol Use Disorder and Cannabis Use Disorder with sustained positive outcomes at six months post-treatment, while other examples presented contradictory findings.

Building upon case analyses, Brady and colleagues (2001) found that participants with PTSD and cocaine dependence who received exposure therapy (n=39) and attended at least ten of the sixteen scheduled sessions (n=15) demonstrated reduction in PTSD symptoms across all diagnostic symptom clusters (e.g. re-experiencing, increased arousal) and cocaine use, changes sustained at six months post-treatment. Characteristics between treatment completers (ranging from ten to sixteen sessions attended) and non-completers differed on two baseline variables: completers reported fewer avoidance symptoms on a self-report measure (Impact of Events Scale) though not on a clinician-administered assessment (CAPS) and were more educated (Brady et al., 2001).
Concurrent treatment of PTSD and substance use disorders using prolonged exposure (COPE) is an integrated treatment that is a synthesis of Relapse Prevention (cognitive behavioral therapy for addictive disorders) and Prolonged Exposure (for PTSD) (Back et al., 2012). In its first randomized control trial, Mills and colleagues (2012) found that the combined use of COPE plus usual treatment (e.g. detoxification, maintenance therapies) compared with usual treatment alone resulted in improvement in PTSD severity without an increase in the severity of substance dependence. Cocaine-dependence was the primary substance addressed in the original COPE manual though subsequent alterations, including the one used in the current study, address problem-behaviors associated with diverse drug classes. Ruglass et al. (2017) compared COPE to RPT and an active monitoring control group, and found both COPE and RPT to have a significant impact on PTSD symptom severity and days of substance use. While COPE and RPT did not have significant differences in PTSD severity outcomes in the intent-to-treat sample, those participants with full PTSD (vs. subthreshold PTSD) showed greater reduction in PTSD symptom severity when receiving COPE as compared to RPT. The use of PE did not worsen substance use among those with PTSD-SUD.

**Treatment Attendance and Co-occurring PTSD-SUD**

A review of fourteen studies including 1,506 participants with PTSD-SUD found that simultaneous or integrated treatment of trauma and SUD was more effective (small effect) than treatment as usual; SUD only or trauma-only treatment, despite lower rates of treatment completion with use of trauma-specific treatment (Roberts, Roberts, Jones and Bisson, 2016).

Although this is not exclusive to this particular population, the absence or varied nature of reporting treatment attendance data among those with PTSD-SUD makes it challenging to draw conclusions regarding treatment effectiveness. In a comprehensive review of the treatment
literature with this dually diagnosed population, Najavits and Hien (2013) name a primary limitation of their analysis as the inability to address treatment attendance. Attendance was “defined inconsistently in studies, sometimes with no clear denominator (how many sessions were available to clients), sometimes reported only for those attending a certain amount of the study treatment, and sometimes not reported” (Najavits & Hien, 2013, p. 434). In a meta-analysis of therapies for co-occurring PTSD-SUD, Roberts et al. (2016) also reported multiple studies with methodological problems with “high” or “unclear” risk of bias related to detection and attrition. If those assigned to a particular treatment drop out early due to the perceived or experienced nature of the assigned intervention (whether positive or negative), failure to include this data potentially misrepresents treatment viability or the need to differentiate therapeutic services based on patient characteristics. Treatments with the best empirical support may not be as widely effective as sometimes portrayed, even if successful with a significant subset of an impacted population.

Alcohol and benzodiazepine use have predicted dropout and influenced treatment outcomes in patients receiving Prolonged Exposure for PTSD (van Minnen et al., 2002). Daily benzodiazepine use was associated with reduced likelihood of dropout from PE; however, this therapy was less effective for this population subset, perhaps due to hypothesized interference with fear activation during exposure, the mechanism believed to drive effective habituation (van Minnen et al., 2002; Foa & Kozak, 1986).

Hien and colleagues (2012) examined attendance patterns and treatment outcomes for women involved in 12-sessions of two different types of rolling group treatments: Seeking Safety and Women’s Health Education. This randomized clinical treatment study included women with co-occurring diagnoses of full or subthreshold PTSD and a substance use disorder.
The Seeking Safety treatment (Najavits, 2002) is a short-term manualized therapy, which uses cognitive behavioral strategies to reduce the negative impact of trauma exposure and active substance use in either the group or individual modality (Hien et al., 2012, p. 33). For this study, only the group modality was utilized. Women’s Health Education (Miller et al., 1998) is a psychoeducational intervention that focuses on knowledge of the physical body, human sexual behavior, pregnancy and childbirth, nutrition, and general health. Hien et al. (2012) found three different latent attendance patterns of significance across this multi-site trial. Completers attended at least 80% of sessions (~48% of the sample); while titrators had high rates of attendance through the seventh session and more sporadic attendance thereafter with session attendance probability falling between 50-80% (28% of the sample). The third subset of the sample, denoted droppers, tended to discontinue treatment by the fourth session (24% of the sample). For those in Seeking Safety, there was no evidence suggesting that completers derived additional benefits from a greater dose of therapy in comparison to the titrators with respect to substance use, a finding that remained over the course of a 12-month follow-up period (Hien et al., 2012, p.37).

**Case Illustration: Handling the PTSD-SUD Attendance Data**

An RCT (N=165) conducted by Foa and colleagues (2013) examined patients with co-occurring alcohol dependence and PTSD who were randomly assigned to one of four groups: prolonged exposure therapy plus naltrexone (100mg/d); prolonged exposure therapy plus pill placebo; supportive counseling plus naltrexone (100mg/day) or supportive counseling plus placebo. Figure 1 of the primary outcomes paper detailed the flow of participants through the trial (p.490) with a 32.1% dropout rate (53 participants across all 4 groups) prior to the end of the treatment period with no statistically significant variance in rates by group. Rates of dropout
were reported as follows: 26% dropout for supportive counseling+placebo; 31% for supportive counseling+naltrexone; 35% for prolonged exposure+naltrexone; and 38% for prolonged exposure+placebo. Twelve participants from the study were removed for adverse effects described as non-study related. Foa and colleagues (2013) include the level of detail regarding participants’ attendance and dropout data that meets (if not exceeds) the standard of care and transparency required for publication in peer-reviewed journals with significant impact factors (JAMA). In addition, statistical analyses occurred with the intent-to-treat sample meaning data for all participants was included. Replacement or imputation of data was not necessary given the use of hierarchical linear and nonlinear modeling. The mean and standard deviation for the two groups receiving prolonged exposure were included in the paper; however, these statistics were not reported for supportive counseling+placebo and supportive counseling plus naltrexone. There is a somewhat ambiguous definition provided for dropout, which while less troublesome when viewed in isolation given the statistical methods employed, is more problematic for cross-study comparison. While a research article in a separate but cited journal provides details regarding the study design and methodology, it is unclear which sessions focused on psychoeducation or consolidation of skills, and which utilized in vivo or imaginal exposure (Foa et al., 2013).

If as a researcher, clinician or informed consumer, it were easy to examine the session numbers when key interventional elements are introduced vis-à-vis session attendance data for each treatment phase, important clinical research data regarding tolerability, avoidance, symptom relief and recovery might be highlighted in ways more conducive for future study. Reporting every detail lacks feasibility, however, greater clarity with regard to the timing of participants’ departure from treatment or the numbers attending the first imaginal exposure session vis-à-vis the introductory session may depict a more nuanced view of the process. Some useful data
regarding attendance for this and other studies might include: the relative proportion of early vs. later dropouts, the extent to which some dropouts may be better understood as *tirators*, and whether those who did dropout or titrate treatment were experiencing relief or evidence of non-responsiveness.

**Statement of Hypotheses**

Specifically, the current study examined whether there are distinct attendance patterns in a sample of participants diagnosed with PTSD-SUD and whether there were differences in attendance between the two active randomly assigned treatments, COPE and RPT. The study aimed to add to a body of literature interested in the ways in which attendance patterns may be associated with particular change trajectories as well as client/clinician individual differences given the implications of this knowledge is greater individualization and effectiveness in treatment planning for those impacted by PTSD-SUD. The current study aims to elaborate upon the primary findings of Ruglass et al. (2017) in addition to those of Hien et al. (2012), the latter of which modeled differential treatment effects which showed that the benefits of a trauma-focused treatment were most evident among a class of *tirators* (defined as attending between 50-80% of offered sessions). The current analysis presented an opportunity to examine whether an integrated treatment that incorporates prolonged exposure (COPE) will be associated with attendance/outcome relationships similar or distinct from the group-implementation of a present-centered Seeking Safety treatment studied by Hien and colleagues (2012). Thus, the current study expands on the variable-centered primary outcome adherence analysis by using a person-centered approach in efforts to clarify whether more flexibility with regard to treatment attendance may benefit subsets of this hard-to-treat population.
Hypothesis 1

In a sample of individuals with PTSD-SUD, multiple patterns of treatment attendance were expected. Variations in the ways individuals with PTSD-SUD attended treatment sessions occur in naturalistic studies as well as in RCTs (Najavits, 2015). Besides highlighting subsets who drop out of treatment within the first few sessions (Foa et al., 2013), a number of studies have shown that some individuals with PTSD-SUD remain connected to treatment providers after initial engagement, but in a manner that involves decreased regularity in attending subsequent prescribed treatment sessions (Hien et al., 2012). Meaningful sub-groupings have been noted with this population (Greenfeld et al., 2007; Greene et al., 2017) with clinical treatment studies noting at least two (Foa et al., 2013) if not three (Hien et al., 2012) sub-groupings based on the ways therapy sessions were attended.

Hypothesis 1A

An association among attendance patterns and socioeconomic status as well as a number of diagnostic and clinical variables pertaining to the complexity and chronicity of symptoms were expected. Specifically, attendance patterns were expected to be associated: with severity of substance use (DeFife at al., 2010), type of substance use (van Minnen et al., 2002), number of trauma exposures, childhood exposure to trauma (Herman, 1997), and the presence of additional co-occurring disorders characterized by emotional dysregulation, specifically Major Depressive Disorder (Ghee et al., 2009; DeViva, 2014).

Hypothesis 1 B

If multiple latent attendance classes among this sample of subjects with PTSD-SUD are identified, the distribution of attendance class membership across treatment type could provide additional information of value. For those randomized to COPE vis-à-vis RPT, fewer treatment
completers were anticipated, given some association between high symptom severity or the presence of comorbidity with less receptivity to exposure therapy (Jaeger, Echiverri, Zoellner, Post, & Feeny, 2009). Some evidence that dropout from Prolonged Exposure typically occurs prior to the imaginal exposure suggested that greater numbers of *droppers* and *titrators* might be found among COPE recipients compared to RPT recipients (Schottenbauer, et al, 2008; Zayfert et al., 2005).

**Hypothesis 2**

The current study hypothesized that treatment attendance will have an effect on outcome measures of post-traumatic stress and substance use given the significant implications that problems with retention and dropout have for treatment outcomes (Hoge et al., 2014; Najavits, 2015). An examination of attendance class membership on posttraumatic stress symptoms and substance use was planned.
CHAPTER 3: METHOD
Study Design

This study was a secondary analysis of a subset of the data from a NIDA funded clinical trial with a randomized, controlled, repeated measures design that assessed the efficacy of two active treatments, Concurrent Treatment of PTSD and Substance Dependence (COPE) and Relapse Prevention Therapy (RPT), to a delayed treatment control condition in treating individuals with substance dependence and PTSD. Eligible participants (See Sample) were randomly assigned to one of three groups: (1) COPE, (2) RPT, or (3) an Active Monitoring Control Group (AMCG). This clinical trial used repeated outcome measures at baselines; post-treatment; and 1, 2, and 3 months post-treatment. Trained therapists with at least a Master’s degree administered the COPE and RPT interventions on an individual basis for twelve 90-minute weekly sessions. RPT was administered in 90-minute sessions to eliminate the potential confounding factor of session length. Patients randomized to the AMCG condition participated in weekly self-assessments in addition to alcohol and drug tests monitored by administrative staff as opposed to a single designated clinician, as was the case for those randomized to RPT and COPE.

First, treatment trajectories were examined to see if there were distinct ways participants engaged with regards to attending sessions (e.g. early dropout, treatment titration, treatment completion). Subsequently, demographic and diagnostic subject-specific baseline characteristics were studied to determine whether they were predictive of attendance class membership. The study considered whether the number and nature of trauma exposures, the presence of a co-occurring MDD diagnosis, and substance use severity predicted the ways subjects attended sessions. Next, the distribution of participants’ attendance class patterns across the two active treatment types was examined to assess whether treatment dropout or titration occurred at higher
rates for those randomized to a treatment involving prolonged exposure, a method of direct
eengagement with details of the trauma the subject continues to experience as most distressing.
Lastly, the study was limited in its capacity to examine relationships between attendance pattern
and treatment outcomes due to sample size.

Procedure

Sample

Participants in this sample (N=82, 33% Female, 59.76% Black/African American) were
men and women drawn from a larger study sample (N=110) of individuals with co-occurring
PTSD-SUD located at The City College of New York’s Trauma and Addiction Project and
assigned to COPE (N=39), RPT (N=43), or AMCG (N=28) (Ruglass et al., 2017). Those
randomized to AMCG were not included in this secondary analysis due to methodological
differences for recording session attendance for this group. AMCG participants had greater
flexibility surrounding their clinical engagement, as the weekly commitment was not linked to a
specific, individual therapist with limited availability, making any comparisons with active
treatment groups invalid.

Participants were eligible for treatment study inclusion if they met Diagnostic and
Statistical Manual of Mental Disorders 4th ed. – text revision (DSM-IV-TR) (American
Psychiatric Association, 2000) criteria for full or sub-threshold PTSD in the past 30 days as
assessed by the Clinician-Administered PTSD Scale (CAPS). Participants with sub-threshold
PTSD met Criterion B (re-experiencing symptoms) and either Criterion C (avoidance of trauma
reminders) or Criterion D (hyperarousal) symptoms, but not both (Grubaugh et al., 2005). In a
treatment-seeking sample, subthreshold PTSD is associated with social and work functioning
impairment comparable to those meeting full PTSD criteria in the DSM-IV TR (Zlotnick,
Franklin, and Zimmerman, 2002). Other inclusion criteria included: being between the ages of 18 and 65; being able to understand English; having some alcohol or illicit substance use within the past 30 days; and meeting DSM-IV-TR criteria for current or past substance dependence.

Participants were excluded if they demonstrated: impaired mental cognition as evidenced by a score of 21 or less on the Mini-Mental Status Exam (Folstein, Folstein, & McHugh, 1975); significant risk of suicide or homicide within the previous 6 months as determined by the Psychiatric Research Interview for Substance and Mental Disorders (Hasin, Trautman, & Endicott, 1998); involvement in a relationship with active domestic violence; a history of schizophrenia-spectrum diagnosis or active psychosis, as clinically assessed by the Psychotic Screener of the Structured Clinical Interview for DSM Disorders (SCID); or a diagnosis of a bipolar spectrum disorder as assessed by the SCID. Additionally, participants already receiving trauma-specific treatment or those on antidepressants, mood stabilizing medications, or methadone-initiated or altered during the eight weeks prior to study participation were excluded from the study. Excluded participants received referrals for appropriate clinical services.

Recruitment of participants began in September 2008 and ended in June of 2014. Patients were recruited from advertisements on Craigslist and in free local NYC newspapers as well as from local medical research centers. Interested participants (N=2,100) completed a brief screen assessment by phone, with those passing initial eligibility (N=992) scheduled for a more formal assessment. Of those who showed up for the baseline assessment (N=595), 212 did not meet inclusion criteria and 221 met exclusion criteria. 162 of the 595 baseline participants were determined to be eligible. 110 of the 162 eligible participants were randomized in a follow-up session that focused on treatment consent and a structured motivational interviewing session (Miller & Rollnick, 2002) prior to notification of assignment. Patients were randomized to the
Concurrent Treatment of PTSD and Substance Dependence (COPE) intervention, Relapse Prevention Therapy (RPT), or a delayed treatment group. AMCG participants were re-assessed at the end of the twelve-week intervention period and if eligible received either concurrent treatment (COPE) or Relapse Prevention Therapy (RPT) at that time, or if they were no longer eligible for treatment were provided with more appropriate treatment referrals. All participants completed weekly assessments for substance use and PTSD symptoms in addition to the completion of a breathalyzer test and urine toxicology assessment. Full assessments occurred after intervention for the COPE and RPT groups at one week, one month, two months, and three months afterward.

**Randomization**

Randomization was stratified by sex in addition to baseline symptom severity. Scores on the Addiction Severity Index-Lite and the Clinician-Administered PTSD Scale were used to classify symptom severity of substance/alcohol use and post-traumatic symptoms at baseline. Urn randomization procedures were subsequently utilized to balance these factors across groups. Research assessors were blind to group assignment. Participants consented to study involvement prior to notification of group assignment by a research assistant (Ruglass et al., 2017).

**Behavioral Interventions**

**Concurrent Treatment of PTSD and Substance Used Disorders Using Prolonged Exposure (COPE).** Concurrent treatment for PTSD and SUDs with Prolonged Exposure (COPE) was developed as an integrated psychotherapy that uses empirically validated treatment approaches (cognitive behavioral strategies and prolonged exposure techniques) to address both PTSD and SUDs simultaneously. COPE is a manualized 12-week intervention designed to decrease PTSD and SUD symptoms in individuals with these co-occurring disorders. In COPE,
patients receive psychoeducation related to (1) the underlying principles of cognitive and exposure-bases therapies and (2) to the interrelatedness of PTSD and substance use. Direct teaching of coping skills, relapse prevention techniques and cognitive restructuring are used to reduce the severity of patients’ substance use, whereas in-vivo and imaginal exposure techniques are used to diminish PTSD symptom severity via fear habituation processing (Back et al., 2014).

The initial COPE sessions (1-3) focus on psychoeducation, goal-setting and cognitive behavioral strategies (e.g. connecting trauma and substance use; identifying triggers for substance use; developing a cravings plan; identifying thoughts linked to substance use; substance refusal skills and breathing retraining). In order to address avoidance behaviors and fear associated with traumatic memories, session four focuses on the development and subsequent use of an individualized in vivo hierarchy of safe yet avoided situations. The use of imaginal exposure begins in session five. In Vivo and Imaginal Exposures continues through session eleven. Participants have prolonged contact with feared situations until levels of subjective distress decrease significantly. Throughout the imaginal exposures, participants repeatedly provide a recounting of their most distressing traumatic memory in the present tense with particular emphasis on expressing thoughts, emotions, and physical sensations for 30-45 minutes during the session. Participants listen to audio recordings of their retellings daily between sessions. Relapse prevention strategies, particularly those explicitly focused on the relationship between PTSD triggers and substance use, also are a part of each 90-minute session. Participants also record their progress in exposure work, substance use cravings and use of learned coping skills (Ruglass et al., 2017, p.3). The twelfth session focuses on skills review and consolidation in addition to termination. Participants had up to fourteen weeks for treatment completion. Thirty-nine patients were randomly assigned to receive COPE.
Relapse Prevention Therapy (RPT). Relapse prevention therapy (RPT) is a widely used cognitive-behavioral approach developed to specifically address the occurrence of lapse or relapse episodes for individuals with addictive behaviors and to provide coping strategies useful in maintaining abstinence (Marlatt & Gordon, 1985; Marlatt, Parks, & Witkiewitz, 2002; Marlatt & Donovan, 2005). RPT involves supporting a client’s ability to identify and cope with high-risk situations. Through RPT, clients learned to implement self-control strategies as well as to develop lifestyles of greater balance with the aim to improve overall coping capacity and increase self-efficacy over time (Marlatt et al., 2002). The RP model does not consider (re)lapse as treatment failure, but as a complex process in which setbacks provide educative opportunities in a dynamic, multi-determined context (Hendershot, Witkiewitz, George, & Marlatt, 2011). Relapse Prevention has sustained main effects in diverse treatment settings (Witkiewitz & Marlatt, 2004) across all classes of substance use with positive outcomes in terms of both use reduction and psychosocial functioning (Carrol, 1996).

The randomly assigned Relapse Prevention Therapy group had forty-three participants in this study who were randomized to receive twelve 90-minute sessions (to control for session length). The sessions did not explicitly target trauma or PTSD symptomatology, instead focusing on increasing self-efficacy skills for the prevention of relapse. The sessions incorporated psychoeducation, role-plays, and active problem-solving exercises, with supplementary at-home assignments. Participants had up to fourteen weeks for treatment completion.

Measures

Demographic Variables

Demographic and Treatment History Form (DEMO) is a structured 62-item social and treatment history interview designed to provide basic demographic and life history information.
not limited to: family history, age of onset of substance and/or psychiatric problems, history of hospitalizations, previous treatment, symptoms, and diagnoses (Hien & Zimberg, 1991). The measure was administered at baseline, immediately following the 12-week intervention, and at 1, 2, and 3 months post-treatment.

**Attendance**

An Attendance Log recorded the dates all participants attended individual treatment sessions and assessments. Active treatment sessions (COPE, RPT) were scheduled for 90 minutes and videotaped. Session attendance ranged from 0 to 12 sessions.

**Trauma and Posttraumatic Symptoms**

*Life Events Checklist (LEC).* The Life Events Checklist (LEC) is a measure of exposure to potentially traumatic events that was used in conjunction with the Clinician-Administered PTSD Scale (CAPS) to facilitate a PTSD diagnosis (Gray, Litz, Hsu, & Lombardo, 2004). The LEC provides a snapshot of the types, timing, and frequency of trauma exposures that happened to, were witnessed by, or learned about by the respondent.

*Clinician-Administered PTSD Scale (CAPS).* The CAPS is a structured, clinical interview for assessing the presence, frequency and intensity of core and associated symptoms of PTSD. The CAPS has standard prompts and “explicit, behaviorally-anchored rating scales” (Blake et al., 1995, p. 75). The CAPS measures symptoms incorporated into the *DSM-IV-TR* PTSD diagnosis as well as associated symptoms, many of which have since been incorporated into the DSM-5 diagnosis for PTSD. Impairments in social and occupational functioning, overall response validity and overall symptom severity were also determined. Through re-assessment, the CAPS has the capacity to capture the degree of improvement since an earlier rating. The CAPS has demonstrated strong concurrent validity with the PTSD Symptom Scale-Interview (PSS-I) total.
score \( r = .87 \) and strong convergent validity with the Structured Clinical Interview for DSM-IV (SCID)–PTSD module \( r = .83 \) (Foa & Tolin, 2000, p. 189). The CAPS has excellent psychometric properties: test–retest reliabilities ranged from .77 to .96 for the three symptom clusters and from .90 to .98 for the 17-item core symptom scale (Blake et al., 1995).

*The Modified PTSD Symptom Scale Self-Report (MPSS-SR).* The modified PSS-SR (Falsetti, Resick, Resnick, & Kilpatrick, 1992; Falsetti, Resnick, Resick, & Kilpatrick, 1993) measures frequency and severity ratings of PTSD and has been used in treatment and community samples. The modification of the PSS-SR is found to have good overall internal consistency and good concurrent validity with the SCID (Falsetti et al., 1992; Falsetti et al., 1993). Additionally, the scale was shown to be valid with a sample of participants with SUD; the measure had 89% predictive validity with clinician-administered diagnostic interviews (Coffey, Dansky, Falsetti, Saladin, & Brady, 1998). The MPSS-SR has demonstrated high concurrent validity with the CAPS among similar co-morbid PTSD-SUD treatment samples (Ruglass, Lopez-Castro, Cheref, Papini, & Hien, 2014), suggesting its reliability as a tool for PTSD symptom monitoring (Ruglass et al., 2017).

The LEC, CAPS and MPSS-SR were utilized during baseline assessment. The CAPS was utilized at the end of the 12-week intervention period and subsequent follow-up assessments for those randomized to COPE and RPT. The MPSS-SR was used by participants across all groups to provide a weekly self-assessment of PTSD symptoms at baseline, randomization and at each of the scheduled COPE, RPT intervention or AMCG session including the post-intervention assessment. Administration of the MPSS-SR and CAPS also occurred at follow-up sessions for COPE and RPT participants.
Substance Use

*Addiction Severity Index-Lite (ASI-Lite)* is an abbreviated version of the Addiction Severity Index-5 that includes the most essential elements in a form that is reliable and valid as a composite measure of the severity of recent problems (McLellan, Caccioloa, Alterman, Rikoon, & Carise, 2006, p. 17). The ASI-Lite was used to gather information regarding alcohol and substance use within the past thirty days and was administered at baseline, post-treatment, and follow-up assessments. The scores from the ASI-Lite were used to balance groups during randomization. The Substance Use Inventory (SUI) was administered to gather and record frequency, quantity, context and consequences of alcohol and drug use. The SUI (Weiss, Hufford, & Navajits, 1995) was administered weekly to collect self-reported days of primary substance use during the seven days prior. This study provided the opportunity to examine whether attendance class membership might be predictive of substance use outcomes as measured by the SUI.

Co-occurring Psychopathology

Clinical assessors utilized the Structured Clinical Interview for DSM-IV (SCID) to identify the presence of a co-occurring diagnosis of an Anxiety disorder, Major Depressive Disorder, or Dysthymia (renamed Persistent Depressive Disorder in DSM-5) and symptom severity. Lobbestael, Leurgans, & Arntz (2010) found moderate to excellent inter-rater reliability for the twelve Axis I disorders of SCID I (DSM-IV) in a mixed sample of n=151 inpatients, outpatients, and non-patient controls.

The *Brief Symptom Inventory (BSI)* is a 53-item-self-report instrument designed to assess psychological symptoms during the past seven days (Derogatis, 1993). The BSI has high convergent, discriminant, and construct validity. The BSI is comprised of nine primary symptom
dimensions, with two symptom dimensions utilized in the present study, Depression and Anxiety. The dimensions provide data regarding specific symptoms experienced in addition to symptom intensity using a 5-point Likert scale. Scores are reported using standardized area T-scores.

The *Difficulties in Emotion Regulation Scale* (DERS) is a 41-item self-report measure with high internal consistency, good test-retest reliability ($r=.88$), high internal consistency ($\alpha = .93$); and adequate construct and predictive validity (Gratz & Roemer, 2004). The DERS was administered on five occasions: at baseline; immediately following the 12-week intervention; and at one, two, and three months post-treatment.

**Data Analytic Approach**

Data for participants (N=82) was entered using the data analytic software MPlus version 7.4. Latent Class Growth Analysis (LCGA) was used to account for heterogeneity and sub-groupings within the larger sample (Jung & Wickrama, 2008; Collins & Lanza, 2009). Latent class growth analysis, as a person-centered data analytic approach that focuses on the relationships among individuals, accomplishes the goal of classifying distinct subgroupings based on individual response patterns (Jung & Wickrama, 2008, p. 303). Attendance across twelve time points (twelve sessions) was the binary outcome variable with attendance patterns as the latent class. While there are no specific class size requirements for latent class growth analysis with high entropy delineating models that closely fit the data, it is possible that with larger sample sizes, more classes may be identified (Curran, Obeidat, & Losardo, 2010). To facilitate increased accuracy in the identification of the best fitting model, entropy is utilized in conjunction with other criteria. Bayesian Information Criterion (BIC) provides a way to measure a model’s goodness of fit by consideration of both the number of parameters and the number of
observations. MPlus reports the relative entropy or a rescaled version of entropy to convey the degree of certainty of classification. Thus, Bayesian information criterion (BIC) and entropy were considered together for the determination of the best-fitting model for the attendance of participants with PTSD-SUD randomized to active treatment. Class-specific response probabilities are parameterized using logit equations, as is typical of logistical regression analysis. Consequently, latent class model parameters can also be tested using Wald tests and Wald-based power analyses (Gudicha, Tekle & Vermunt, 2016, p. 32).

The current study employed an analytic method developed by Fournier (Fournier et al., 2009), which allows for the test of a range of potential predictors across construct domains while maintaining sufficient power (Zandberg et al., 2016, p.2). The Fournier approach was used to examine whether a number of demographic and diagnostic variables were predictive of attendance class membership and does so by grouping possible predictors or moderators within relevant domains. Given that this approach allows for the identification of variables that are predictive over other variables of interest within their domain, Type I error is minimized. In addition, Type II error is minimized in this approach because the analysis does not use all possible predictors in a single large model (Zandberg et al., 2016, p.4). In this study, the Fournier approach was used to identify baseline predictors of attendance via analyzing possible predictors within four primary domains of interest: demographic data, trauma variables; substance use (alcohol dependence; substance dependence; days of primary substance use); and additional co-occurring psychopathology. Analyses were conducted using stepwise logistic regression. In step 1, all potential predictors of attendance pattern within a domain were entered in the logistic regression conducted at p=.15 level. Subsequent analysis at p=.1 level after removing
non-significant predictors and then at the \( p=.05 \) level allows for the variables significant at this level within given domains to be into the final model.

Within the demographics domain, the variables analyzed were: age, years of education, sex, employment status, marital status, and race/ethnicity. Given the nature and size of the sample as well as power constraints, racial identification for the analysis was classified as person of color or white, with the first category including individuals who identified as Hispanic/Latinx, bi-racial, multi-racial or other. The creation of a dichotomous variable in this manner may result in the failure to detect important differences pertaining to specific racial and ethnic groups and limits the interpretability of results on this demographic dimension (See Chapter 5 for further elaboration).

The trauma/posttraumatic stress variables that were analyzed included continuous variables: severity scores by PTSD symptom cluster: re-experiencing/intrusion; avoidance; arousal; negative alterations of cognition/mood as well as by dichotomous variables such as: childhood trauma (yes/no), multiple traumas meeting DSMIV-TR criteria (yes/no), trauma type: physical assault (yes/no) and sexual assault (yes/no). The primary type of substance misuse (e.g. alcohol, substance) and the frequency of this use (e.g. number of days the primary substance was used in the past 7 days) were examined as potential predictors of attendance class membership. In addition, continuous and dichotomous variables related to other psychopathology that is frequently identified among those with PTSD-SUD were also examined for possible predictive relationships to attendance class membership. The baseline participant-characteristics examined included continuous variables, such as emotion dysregulation (total score on the Difficulties in Emotion Regulation Scale (DERS), depression severity by self-report (BSI), anxiety severity by
self-report (BSI), as well as dichotomous variables related to a current MDD diagnosis (yes/no) or Anxiety diagnosis (yes/no) according to the baseline clinician-administration of the SCID.

The associations between baseline diagnostic and demographic subject-specific variables and attendance class membership were analyzed using the Likelihood ratio Chi-squared test, a variant of Pearson’s Chi-Squared test. The test was used to compare observed and expected frequencies (under the given model) and determine whether the actual data point was equal to an expected outcome. For validity purposes, the test is well-suited to a larger sample size with a limited number of variables. The log-likelihood function is a function of the observed data points for all participants and the model parameters.

The variables that were determined to have statistically significant relationships with attendance class were entered into the final regression model, while non-significant variables were excluded to minimize Type II error and create a more parsimonious model. Multi-linear regression within Latent Class Growth Analysis was used to evaluate associations between the attendance patterns and treatment outcomes. The study then assessed whether attendance class membership was distributed differently according to the two active treatment types: RPT and COPE.
CHAPTER 4: RESULTS
Baseline Characteristics

Of the participants randomly assigned to receive COPE (n=39), thirty-four attended between one and twelve sessions. Five did not receive this intervention according to protocol, with four participants not attending any sessions following the Motivational Interviewing/Randomization session and one participant discontinued from treatment due to an adverse event determined to be unrelated to study participation. All 39 participants were included in the analysis.

Of those assigned to RPT (n=43), four did not receive the intervention as randomized (did not attend any sessions) with 39 participants attending at least one RPT session. Twenty participants completed 1-week follow-up, twenty-nine completed 1-month-follow-up, twenty-five completed 2-month follow-up, with twenty-three completing 3-month follow-up. All 43 participants were included in the analysis. The baseline characteristics of 82 randomized participants are presented in Table 1.
### Table 1. Demographic and Clinical Characteristics at Baseline

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>COPE (n=39)</th>
<th>RPT (n=43)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, years</td>
<td>43.08±10.00</td>
<td>44.21±9.05</td>
</tr>
<tr>
<td>Female</td>
<td>11 (28.2)</td>
<td>16 (37.2)</td>
</tr>
<tr>
<td><strong>Race/ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black/African American</td>
<td>21 (53.8)</td>
<td>28 (65.1)</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>10 (25.6)</td>
<td>9 (20.9)</td>
</tr>
<tr>
<td>White</td>
<td>6 (15.4)</td>
<td>6 (14.0)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (5.1)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Employment Pattern (past 3 yrs)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>14 (35.9)</td>
<td>8 (18.6)</td>
</tr>
<tr>
<td>Part time/student</td>
<td>15 (38.5)</td>
<td>18 (41.9)</td>
</tr>
<tr>
<td>Unemployment/disability</td>
<td>10 (25.6)</td>
<td>17 (39.5)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years completed</td>
<td>13.31±1.92</td>
<td>13.13±2.46</td>
</tr>
<tr>
<td><strong>Crit. A Trauma Exposure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical assault</td>
<td>22 (56.4)</td>
<td>28 (65.1)</td>
</tr>
<tr>
<td>Sexual assault</td>
<td>17 (43.6)</td>
<td>17 (39.5)</td>
</tr>
<tr>
<td>Accident or disaster</td>
<td>1 (2.6)</td>
<td>5 (11.6)</td>
</tr>
<tr>
<td>Sudden injury/death of other</td>
<td>12 (30.8)</td>
<td>20 (46.5)</td>
</tr>
<tr>
<td>Other</td>
<td>6 (15.4)</td>
<td>0</td>
</tr>
<tr>
<td>Multiple trauma</td>
<td>21 (53.8)</td>
<td>35 (81.4)</td>
</tr>
<tr>
<td>Age at first trauma</td>
<td>17.90±13.64</td>
<td>18.49±14.13</td>
</tr>
<tr>
<td>Time since last trauma, years</td>
<td>16.15 ± 4.98</td>
<td>11.95±10.73</td>
</tr>
<tr>
<td><strong>Type of Use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>30 (76.9)</td>
<td>35 (81.4)</td>
</tr>
<tr>
<td>Substance dependence</td>
<td>25 (64.1)</td>
<td>30 (69.8)</td>
</tr>
<tr>
<td>Alcohol &amp; substance dep.</td>
<td>16 (41.0)</td>
<td>24 (55.8)</td>
</tr>
<tr>
<td><strong>Primary substance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>19 (48.7)</td>
<td>18 (41.9)</td>
</tr>
<tr>
<td>Cannabis</td>
<td>3 (7.7)</td>
<td>4 (9.3)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>6 (15.4)</td>
<td>6 (14.0)</td>
</tr>
<tr>
<td>Alcohol and stimulants</td>
<td>8 (20.5)</td>
<td>13 (30.2)</td>
</tr>
<tr>
<td>Other polysubstance</td>
<td>3 (7.7)</td>
<td>2 (4.6)</td>
</tr>
<tr>
<td><strong>Other diagnoses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Depressive Disorder</td>
<td>13 (33.3)</td>
<td>16 (37.2)</td>
</tr>
<tr>
<td>Anxiety (panic, phobia, SAD, GAD)</td>
<td>13 (35.1)</td>
<td>16 (43.2)</td>
</tr>
</tbody>
</table>

*Note. Values are mean ± SD or n (%).*
Hypothesis 1

Within a sample of treatment-seeking individuals with PTSD-SUD, subjects were expected to demonstrate multiple patterns of treatment attendance. Latent class growth analysis in MPlus version 7 (Muthén & Muthén, 2000; Muthén & Muthén, 2000) tested the hypothesis that multiple patterns of attendance would better characterize the sample than a single pattern of treatment attendance. Attendance was operationalized as a binary variable at each of twelve time points. Model information criteria (i.e. Aikeke Information Criteria (AIC), Bayesian Information Criteria (BIC), Sample Size Adjusted BIC), entropy and the adjusted Lo-Mendel-Rubin likelihood ratio test, and parsimony were all considered in determining the best-fitting model.

Table 2. Global Fit of Attendance Pattern Models

<table>
<thead>
<tr>
<th>Model</th>
<th>1 class</th>
<th>2 classes</th>
<th>3 classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIC</td>
<td>1238.33</td>
<td>713.2</td>
<td>560.89</td>
</tr>
<tr>
<td>BIC</td>
<td>1245.55</td>
<td>730.57</td>
<td>587.36</td>
</tr>
<tr>
<td>SSA BIC</td>
<td>1236.09</td>
<td>708.49</td>
<td>552.67</td>
</tr>
<tr>
<td>Entropy</td>
<td>NA</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>LMR Adj LRT</td>
<td>NA</td>
<td>p &lt; .001</td>
<td>p &lt; .001</td>
</tr>
</tbody>
</table>

Note: A 4-class model failed to converge.
AIC=Aikeke Information Criteria; BIC=Bayesian Information Criteria
SSA BIC=Sample-Size Adjusted Bayesian Information Criteria
LMR Adj LRT=Lo-Mendell-Rubin Adjusted Likelihood Ratio Test

A three-class LCGA was determined to be the model of best fit with the lowest information criteria, high entropy (.98) suggestive of strong class delineation] (Gudicha, Tekle, & Vermunt, 2016), and a significant adjusted Lo-Mendel-Rubin likelihood ration test, p < .001. A four-class model failed to converge and the three-class model was superior to the one or two-class models. Posterior probabilities of the best fitting model were utilized to classify individual subject’s attendance pattern.
Three distinct attendance patterns were identified. *Completers* (n=30, 36.6%) had high probabilities of attending all twelve treatment sessions (M=11.47, SD=0.82, range=10-12), whereas *Titrators* (n=26, 31.7%) demonstrated high probabilities of attending through session four and lower probabilities of attending subsequently (M=6.5, SD=1.63, range=4-9). *Droppers* (n=26, 31.7%) had a high probability of dropout within the first few weeks of treatment (M=0.92, SD=1.02; range=0-3).

**Hypothesis 1A**

If multiple attendance patterns were identified, these patterns were expected to be associated with diagnostic variables including: severity of substance use, number of trauma exposures, childhood exposure to trauma, and the presence of additional co-occurring disorders characterized by emotional dysregulation (e.g. M.D.D.); and possibly associated with markers of socio-economic status (i.e. education, employment).
Demographic Variables

No demographic variables were statistically significant predictors of attendance class type. The demographic variables analyzed were: age $\chi^2(2, N=82)=3.21$, $p=.20$, education $\chi^2(2, N=82)=.58$, $p=.75$, sex $\chi^2(2, N=82)=.83$, $p=.66$, employment status $\chi^2(2, N=82)=1.42$, $p=.49$, marital status $\chi^2(2, N=82)=1.91$, $p=.39$, and race/ethnicity $\chi^2(2, N=82)=2.52$, $p=.88$.

Trauma Variables

Baseline assessments of trauma offered multiple ways to describe participants’ exposure and symptomatology: PTSD symptom severity by diagnostic cluster; trauma type (physical vs. sexual); number of traumas (utilizing the definition of trauma as an event that meets criterion A of the PTSD DSMIV-TR diagnosis); childhood trauma exposure vs. trauma exposure in adulthood only). An initial analysis was conducted setting the significance level at .15 to determine which symptoms might be worthy of closer analysis, with subsequent analysis of high hyperarousal symptom severity and multiple-criterion A traumas needed. After other trauma variables were removed and an analysis with a .1 significance level was conducted, high hyperarousal symptoms were determined to not reach significance, however, having experienced multiple-criterion A traumas at baseline was significantly associated with attendance membership class when tested at the .1 and .05 levels. Specifically, titrators were statistically more likely to have experienced multiple criterion-A level traumas compared to the droppers, $b=-1.55$, Wald $\chi^2(1)=5.34$, $p<.05$. 

50
Table 3  
Baseline Trauma Variables as Predictors of Attendance Class

<table>
<thead>
<tr>
<th>Trauma Variable</th>
<th>χ²</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-experiencing/Intrusion</td>
<td>0.58</td>
<td>.75</td>
</tr>
<tr>
<td>Avoidance</td>
<td>1.06</td>
<td>.59</td>
</tr>
<tr>
<td>Arousal</td>
<td>4.20</td>
<td>.12</td>
</tr>
<tr>
<td>Negative Alterations</td>
<td>3.49</td>
<td>.18</td>
</tr>
<tr>
<td>Physical Assault</td>
<td>2.31</td>
<td>.32</td>
</tr>
<tr>
<td>Sexual Assault</td>
<td>2.78</td>
<td>.25</td>
</tr>
<tr>
<td>Multiple Traumas</td>
<td>6.04</td>
<td>.049</td>
</tr>
<tr>
<td>Child Trauma</td>
<td>0.84</td>
<td>.66</td>
</tr>
</tbody>
</table>

Notes. Measurement taken at the baseline assessment. The CAPS provided symptom cluster scores. Childhood Trauma denotes trauma exposure (according to criterion A in DSM IV-TR) prior to 18 years.  

a Initial analysis conducted at p=.15 level  
b Analysis conducted at p=.1 level with one other variable  
c Analysis conducted at p=.05 level as single variable

Substance Use Variables

Baseline assessments of substance use allowed for an analysis of possible relationships between attendance class-membership and substance-related variables. Among a sample of those already meeting criteria for SUD, the type or frequency of use was not significantly associated with attendance class membership. Specifically, there were no significant associations between type of dependence at baseline and attendance class: current alcohol dependence at baseline did not predict attendance class membership, χ² (2, N=82) =1.70, p=.43, nor did current substance dependence, χ² (2, N=82) = 2.63, p=.27. There was also no significant relationship between the number of days the primary substance was used in the 30 days prior to baseline and attendance class membership, χ² (2, N=82) = 2.18, p=.36.
Other Psychopathology Variables

Baseline assessments provided the opportunity to determine if psychopathology other than PTSD and SUD, specifically current Major Depressive Disorder (MDD); diagnosis of an anxiety disorder; emotion dysregulation; anxiety severity (BSI dimension); and depression severity (BSI dimension); were associated with attendance group class. The presence of a current MDD diagnosis was associated with class membership as noted in Table 4. Specifically, titrators were significantly more likely to have a current MDD diagnosis than completers, b = -1.76, Wald $\chi^2 (1) = 7.88$, p < .01. No other indicator of co-occurring psychopathology or psychopathology severity was found to be significantly associated with attendance class.

<table>
<thead>
<tr>
<th>Other Psychopathology Variables as Predictors of Attendance Class</th>
<th>$\chi^2$</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotion Dysregulation</td>
<td>0.51&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.77&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Depression Self-Report</td>
<td>0.61&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.74&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Anxiety Self-Report</td>
<td>3.31&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.19&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Current MDD Diagnosis</td>
<td>8.98&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.01&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Current Anxiety Diagnosis</td>
<td>2.31&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.17&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Notes. The Emotion Dysregulation variable is the Difficulties in Emotion Regulation Scale (DERS) Total Score. Depression and Anxiety Self-Report scores were scale scores from the Brief Symptom Inventory. Current MDD (Major Depressive Disorder) and Anxiety diagnoses were drawn from the clinician-administered SCID.

<sup>a</sup> Initial analysis conducted at p = .15 level
<sup>b</sup> Analysis conducted at p = .1 level with one other variable
<sup>c</sup> Analysis conducted at p = .05 level as single variable

In the final model, multiple trauma $\chi^2 = 6.17$, p = .04, and co-occurring current MDD diagnosis, $\chi^2 = 9.56$, p = .01 were significant predictors of attendance class. Specifically, dropers
were less likely to have experienced multiple trauma relative to *titrators*, OR=0.19, 95% CI [0.05, 0.74], p=.02, and *completers* were less likely to have comorbid depression relative to *titrators*, OR=0.15, 95% CI [0.04, 0.55], p=.004. See the final model including all significant variables predictive of attendance class in Table 5.

Table 5

*Final Model: Baseline Predictors of Attendance Class Membership*

<table>
<thead>
<tr>
<th></th>
<th>$\chi^2$</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Traumas</td>
<td>6.17</td>
<td>.04</td>
</tr>
<tr>
<td>Current MDD</td>
<td>9.56</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note. Significant at the $p<$0.05 level.
MDD=Major Depressive Disorder

**Hypothesis 1 B**

If different attendance classes were identified among a treatment-seeking sample of participants with PTSD-SUD, it was expected that the dropout, titration, and completion rates for those randomized to RPT would differ from those randomized to COPE. More engagement vis-à-vis titration was hypothesized for the COPE group. No significant results were found for Hypothesis 1B. Though different attendance classes were identified, there were no significant differences in the distribution of attendance patterns according to treatment type. The distribution of participants following each attendance pattern was not significantly different between treatments: $\chi^2 (2)=1.57$, $p=.46$. See Table 6.
Table 6

*Distribution of attendance patterns according to treatment type*

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Completers</th>
<th>Titrators</th>
<th>Droppers</th>
</tr>
</thead>
<tbody>
<tr>
<td>COPE</td>
<td>13&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11&lt;sup&gt;a&lt;/sup&gt;</td>
<td>15&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>% within treatment</td>
<td>33.3%</td>
<td>28.2%</td>
<td>38.5%</td>
</tr>
<tr>
<td>% within pattern</td>
<td>43.3%</td>
<td>42.3%</td>
<td>57.7%</td>
</tr>
<tr>
<td>RPT</td>
<td>17&lt;sup&gt;a&lt;/sup&gt;</td>
<td>15&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>% within treatment</td>
<td>39.5%</td>
<td>34.9%</td>
<td>25.6%</td>
</tr>
<tr>
<td>% within pattern</td>
<td>56.7%</td>
<td>57.7%</td>
<td>42.3%</td>
</tr>
</tbody>
</table>

Notes: COPE=participants were randomly assigned to a 12-week intervention of Concurrent treatment of PTSD and substance use disorders using *prolonged exposure* (COPE); RPT= participants were randomly assigned to a 12-week intervention of Relapse Prevention Therapy (RPT).<sup>a</sup> Pattern categories do not differ significantly from each other at the .05 level.

**Hypothesis 2**

Membership to a particular attendance class was expected to have an effect on outcome measures of post-traumatic stress, substance use and global psychiatric functioning. This hypothesis was tested using a mixed-effects model with attendance class membership as the independent variable and the Post-traumatic Stress Symptom-Self Report (MPSS-SR), Clinician Administered PTSD Scale (CAPS) and Substance Use Inventory (SUI) as outcome variables. Given the data that was absent for the *droppers* from sessions that were not attended, it was not possible to make meaningful interpretations regarding symptom changes for this attendance class during the initial treatment period or post-treatment. Interpretations are more possible for *titrators* and *completers*. 
Titrators and completers are not distinguishable from each other in terms of attendance from baseline assessment through the fourth session, with attendance diverging at this juncture for session five with titrators then becoming significantly less likely to attend each subsequent session in contrast with completers. At baseline, titrators and completers are not significantly distinguishable from each other on measures of PTSD symptom severity (MPSS-SR) though a significantly higher proportion of titrators experienced a multiple criterion-A traumas relative to completers. Data from Baseline through session 4, indicate that titrators report a more rapid decline in post-traumatic symptom severity vis-à-vis completers as evidenced by a significant interaction of time by attendance class, F(5,305)=3.07, p=.01. (See Figure 2).

Figure 2. PTSD Symptoms in the Initial Treatment Phase

BL = Baseline Assessment, MI=Motivational Interviewing session/Randomization S1 = Treatment Session 1 with subsequent sessions numbered accordingly
The non-significant differences between completers and titrators on self-reported PTSD symptoms seen prior to the initiation of treatment proper (e.g. the divergence between BL and S1) appears to be due in part to a placebo effect. Recent fMRI research of placebo in a clinical trial for chronic pain suggests that there may be greater activity in the middle frontal gyrus brain region during a placebo effect, suggesting that increased attention and emotional support directed toward the self may have healing effects (Tétreault, Vachon-Presseau, Schnitzer, Apkarian, & Baliki (2016). Prior treatment history may influence expectancy of treatment benefits suggesting potential value in controlling for this variable.

Analyzing this same initial treatment period in relation to substance use, titrators and completers were not significantly different from each other in mean days of primary substance (SUI). Completers and Titrators show a similar decline from a mean of around four use days of the past seven to fewer than two by session 4 (See Figure 3).
Figure 3. Mean Days of Use of the Primary Substance for the Prior 7 Day Period

BL = Baseline Assessment, MI=Motivational Interviewing session/Randomization S1= Treatment Session 1 with subsequent sessions numbered accordingly

Following an analysis of the initial treatment response, post-treatment data was analyzed though findings were inconclusive given the lack of sufficient sample size to accurately determine an effect for these time points. Notwithstanding, the data gathered post-treatment reveals a possible avenue for further investigation as the mean PTSD scores on the CAPS were lower for completers who attended follow-up sessions relative to the titrators who attended follow-up sessions at all post-treatment assessments at one-month, two-month and three-months subsequent to active treatment. Post-treatment data showing use days of the primary substance was non-interpretable, with no indicated trend for exploration across the one-month, two-month and three-month follow-up periods.
CHAPTER 5: DISCUSSION

Irregular treatment attendance has been a noted concern in the PSTD-SUD literature (Brady et al., 1994). Treatment seekers with PTSD-SUD are expected to have poor rates of treatment attendance with vulnerability to disengagement from the therapies that have been shown to facilitate considerable relief and recovery (Pineles et al., 2011). Recent literature has demonstrated that for some patients with PTSD-SUD, attending treatment sessions 50-80% of the time is associated with equal or greater outcomes when compared to participants attending all sessions within the same study (Hien et al., 2012). The nuances of the treatment dose-response relationship and its variability will benefit from on-going research to elucidate meaningful subsets of those with full or subthreshold PTSD-SUD (Hien et al., 2015). Treatments for the complex co-occurring problems of those with PTSD-SUD utilize approaches that demand differing levels of cognitive, affective, and bodily engagement (Courtois & Ford, 2009); the expectations and realities of treatment vary, with both exerting influence on the way patients engage in treatment initially and attend (ir)regularly over time.

Few studies have examined whether patients with PTSD-SUD attend treatment in predictably different ways when randomly assigned to a treatment with prolonged exposure (COPE) or a cognitive behavioral therapy focused on substance dependence without direct engagement of the trauma (e.g. Relapse Prevention Therapy). The present study elucidates the ways a subject’s diagnostic complexity at baseline may be predictive of attendance patterns and irregularities. This person-centered study illustrates that within a population of those with PTSD-SUD, co-occurring diagnoses of depression and the multiplicity of trauma exposures experienced relate to the ways individuals drop out, titrate or complete a prescribed course of psychotherapy. The present study is consistent with literature showing individuals with PTSD-SUD who receive
treatment that addresses trauma directly may experience significant decreases in symptoms with far less than perfect attendance (e.g., Kaysen et al., 2014; Hien et al., 2012; Mills et al., 2016). A more detailed examination of study findings will be presented in the following section contextualized by the subsequent discussion of limitations and future directions for research. Finally, clinical implications and conclusions will be discussed.

Summary of Findings

Like the sample used in a treatment effectiveness study of Seeking Safety (Hien et al., 2012), the heterogeneity of the current group of treatment seekers with PTSD-SUD was effectively characterized by demarcations according to attendance data. Though the clustering of participants in this dissertation study looked somewhat different from the all-female sample using a present-focused therapy for PTSD-SUD in a group format, the samples from Hien and colleagues (2012) and the current study (Ruglass et al., 2017) are both aptly described by three class models, showing distinct classes of participants who interact with service delivery by 1) dropping out of treatment early, 2) titrating treatment with declining probabilities of attendance in later sessions, or 3) attending all or almost all intervention opportunities as treatment completers.

Demographic variables were not predictive of treatment attendance patterns in the current dissertation research. Psychotherapy research in applied mental health settings (Defife, 2010) and within epidemiological research literature (Edlund et al., 2002) found low socio-economic-status as the most consistent predictor of treatment attrition (e.g. years of formal education, employment, financial stability) though some research qualifies this as a more robust predictor in the early phase of treatment (Barret et al., 2008). Despite this trend, variables that are markers of socio-economic status in PTSD and PTSD-SUD psychotherapy research are only sometimes
predictive of attrition in controlled trials or in studies with a more restricted range. Overall, the majority of the participants in the present study had limited financial means and low socio-economic status. Consequently, the limited diversity within this sample in terms of SES-related variables (e.g. employment status, years of education) made it unlikely that these variables could be predictive of attendance class membership in this particular study. Those with PTSD-SUD and high SES are unlikely to seek treatment in a clinical research study involving randomization. While there have been some exceptions, most PTSD psychotherapy research has not found demographic differences between those who drop out and complete treatments (van Minnen et al., 2002), however differences among operationalized definitions of attendance-related terminology (Najavits & Hien, 2013) and methodological limitations could obfuscate possible de facto demographic predictors. While no attendance differences were found according to race or ethnicity in this sample, the groupings of patients according to person of color vs. white may be considered problematic given the limited number of White participants (n=12). Black/African American (n=49) as the comparison group would have greater capacity for interpretability. While the White comparison group was selected due to failure of specification by this writer and become the default choice of the supporting statistician, this occurrence despite representing such a small subsample, reflects the pervasive and insidious nature of racism where white participants have assumed a privileged visibility in research studies. This writer managed the choice through the rationalization that the racial and class divides impacting participants were such that people of color more so than whites could have experienced heightened vulnerability to treatment barriers given the realities of a country which continues to legalize hegemony. This rationalization, however, is questionable and contradicts the recommendations of Burlew, Feaster, Brecht & Hubbard (2009) who suggest that the comparison of a group of various ethnic
minorities to a non-Hispanic White sample may not only ignore important group differences among various ethnic minority groups, but may also lead to erroneous conclusions about treatment responsiveness and treatment effects.

Although there were no demographic variables that were predictive of attendance class membership, there were clinical variables that did predict how participants attended treatment sessions. Recently, Cui et al. (2016) found few variables to be significantly predictive of treatment attendance, and hypothesized that this might be attributable to the complexity of co-occurring disorders. Mills and colleagues (2016) noted the possibility that a lack of predictors of treatment outcomes may be related to small sample size, though this was also used as an argument for the wide applicability of COPE. Consistent with Cui et al. (2016), the current study (N=82) identified only two variables that were predictive of treatment attendance. Specifically, the presence of current co-occurring Major Depressive Disorder and the number of traumatic exposures were predictive of attendance class membership, facilitating differentiation among *dromers, titrators* and *completers*.

Subjects classified as *titrators* (according to the model of best fit) could not be distinguished from *completers* in terms of attendance differences until the fourth session, after which point *titrators* had lower probabilities of attending the remaining sessions. The attendance patterns of the participants classified as *dromers, titrators*, and *completers* can be distinguished from each other not only by attendance patterns, but also by baseline-characteristics. Current MDD diagnosis was predictive of attendance pattern; *titrators* were more likely to have current MDD than *completers*. Again, this is consistent with the literature on patients with SUD and co-occurring disorders which found a positive correlation between additional co-occurring diagnoses with higher rates of attendance irregularities (Tate et al., 2011). While additional co-
occurring diagnoses often suggest a more difficult treatment course, current MDD was not the only additional co-occurring disorder (see Table 1), suggesting that those with MDD-PTSD-SUD experienced a unique relationship among symptoms, treatment, response, and attendance. The thoughts (e.g. negativistic perspective, concentration difficulties, suicidal ideation), emotions (e.g. hopelessness, sadness, guilt), and behaviors (e.g. social isolation, withdrawal, changes in sleep and energy level) associated with MDD may make it more challenging for participants to both to decide to attend each therapy sessions and execute this decision. Those who titrated treatment reported a more rapid initial decline in trauma symptoms, which may have driven reduced attendance subsequently. Perhaps some *titrators* who began to attend fewer sessions were less optimistic about the effects of further treatment. Some *titrators* may also have been attempting to manage emotion (dys)regulation through attending fewer sessions. *Titrators* had decreased probabilities of attending later sessions in a Seeking Safety study (Hien et al., 2012) as they did in this COPE study, however, the earlier titration process begun in the study of COPE may point to a link between perceived tolerability, titration, and the use of *in vivo* and imaginal exposures, though there are other potentially confounding differences, such as group modality and present vs. past-focused treatment.

*Titrators* in the present study were more likely to have been exposed to multiple traumas compared to those subjects who were *doppers*, the participants who left treatment early in the protocol and attended the fewest overall sessions. Subjectively, *doppers* may have experienced less need for treatment vis-à-vis *titrators* and *completers*, perhaps due to more limited impact of trauma exposure on the life course. In the context of the GEL model, which posits that patients tend to leave treatment when a patient’s improvement has reached a good enough level (Barkham et al., 2006), *doppers* may have gained sufficient relief from the experience of the
Baseline Assessment, Motivational Interviewing and initial session(s), whereas titrators may have achieved sufficient relief following sessions four through nine. Alternatively, it is also possible that droppers had the most difficulty with the development of the therapeutic alliance, a factor interfering with motivation to attend and openness to the varied elements of the offered treatment.

Studies have shown that treatment completers with PTSD-SUD demonstrated greater levels of impairment when compared to non-completers, variably defined (Brady et al., 2001; Najavits et al., 1998; Hien et al., 2012). While completers may have exhibited higher levels of motivation regardless, this finding also suggests that those who complete treatment may also be compelled to do so by subjective experiences of distress.

There were no significant differences in the distribution of the three distinct attendance patterns across the two active treatment types. The lack of significant findings suggests that the use of an integrated PTSD-SUD treatment utilizing prolonged exposure (COPE) did not lead to higher rates of early dropout or greater numbers of titrators when compared to those randomized to Relapse Prevention Therapy (RPT). In a study of veterans with co-occurring PTSD-SUD-MDD, Cui et al. (2016) found that the use of specific trauma-treatment for individuals with PTSD-SUD-MDD did not result in higher rates of dropout as compared to treatment that did not specifically address the trauma. A notable methodological difference, however, was the use of a two-phase treatment approach with all veterans first enrolled in 12 weeks of integrated cognitive behavioral therapy for depression and substance use delivered in a group prior to receiving either 12 weeks of individual CBT or 12 weeks of individual Cognitive Processing Therapy modified to address co-occurring PTSD-SUD (Cue et al., 2016). Cui et al. (2016) and the current dissertation study demonstrated results that appear counter to Roberts and colleagues (2016) who
found fewer participants completed trauma-focused treatment than treatment as usual (although given greater positive effects with use of trauma-specific interventions for PTSD-SUD, these therapies were still recommended as the most effective option).

Given the size of this dissertation sample, a lack of significant findings for hypothesis 1B could also represent failure to detect a small difference in distribution of attendance class membership by treatment type. Cui et al. (2016) demonstrated individual, integrated trauma treatment as effective after a group treatment; the 12-week group process may have facilitated safety and stabilization for subsequent processing of traumatic memories (Herman, 1997) using a modification of Cognitive Processing Therapy (as opposed to PE). If failure to detect a difference in the distribution of attendance class patterns by treatment type occurred in this dissertation research, findings such as those of McDonagh and colleagues (2005) who found higher dropout (>40%) associated with PE as opposed to present-centered trauma treatment, would be buttressed. Consequently, caution regarding the interpretation of the lack of a significant difference in the distribution of attendance class membership across the two active treatments (COPE and RPT) is necessary.

Though the sample was limited in terms of participant numbers, the racial and ethnic diversity of the sample with considerable heterogeneity in trauma exposure, substance use, motivation level and functioning does mirror the population found in many community SUD programs and mental health clinics (Ruglass et al., 2017). If the finding that COPE does not lead to higher rates of dropout and treatment titration compared to RPT or other SUD-only treatment can be further replicated, clinical providers and the treatment settings within which they operate may experience further incentive to employ integrated treatments with prolonged exposure and deliver treatment that is empirically supported rather than discrepant and avoidant of engaging
traumatic memories directly. Further replication would reduce possible misinterpretations of failure to detect significant differences, especially given the inherent complexities of working with a dually diagnosed population (Cui et al., 2016; Robert et al., 2014).

In the initial treatment phase (Baseline – session 4), subjective post-traumatic stress symptom severity decreased more quickly for titrators than it did for completers, (a factor which may be driving the lower probabilities of attendance among titrators for later treatment sessions). There were no significant differences in substance use among completers and titrators within the initial treatment phase (Baseline – session 4). In an early randomized, controlled trial of COPE, Mills et al. (2012) suggested that decreases in substance-related symptomatology lagged behind decreases in trauma symptoms. Consequently, significant differences in substance use in the initial treatment phase by attendance class were not anticipated.

The non-significant differences between completers and titrators on self-reported PTSD symptoms seen prior to the initiation of treatment proper (e.g. the divergence between BL and S1) may be explained by a placebo effect. Recent fMRI research of placebo in a clinical trial for chronic pain suggests that there may be greater activity in the middle frontal gyrus brain region during a placebo effect, suggesting that increased attention and emotional support directed toward the self may have healing effects (Tétreault, Vachon-Presseau, Schnitzer, Apkarian, & Baliki (2016). Prior treatment history may influence expectancy of treatment benefits suggesting potential value in controlling for this variable.

Attrition impacted the numbers of participants available for analysis of the relationship between attendance pattern and treatment outcomes at the end of the intervention period. There was insufficient power to detect associations between attendance class membership and treatment outcomes on PTSD and substance use at 1 week post-treatment and for the three-
month follow-up phase given both the difficulties recruiting a large sample initially (Ruglass et al., 2017) and the extent of attrition subsequently. For a more comprehensive explanation of methodological concerns related to secondary analyses see Hien et al. (2015). Though no conclusions can be drawn, collected data does indicate a possible trend for exploration: the mean PTSD severity scores of completers (generated by assessors blind to treatment type using the CAPS) are lower than the mean scores for titrators at one month, two months, and three months post-treatment. While this may be an artifact of selection bias, it is possible that those with more rapid initial decline in trauma responses begin to titrate treatment engagement via attendance when higher rates of attendance could help maintain symptom reduction over a longer period.

In summary, measurement of co-occurring depression and trauma exposure at baseline predicts how individuals with PTSD-SUD attend treatment and thus warrants increased attention in the therapeutic relationship and larger service delivery systems.

The relationship between attendance class and treatment outcomes can be situated in the context of the main outcome paper analyzing participants (N=110) randomized to COPE, RPT, and the Active Monitoring Control Group (AMCG) (Ruglass et al., 2017). The AMCG group differed from the two treatment groups [lower CAPS scores relative to each treatment groups; significantly lower proportion of individuals with current MDD compared to RPT and COPE]. A difference in the numbers of sessions attended among COPE, RPT, and AMCG was found, and was attributable to the difference between COPE and AMCG specifically. However, the number of sessions attended was not a significant covariate when included in the outcomes model for the original analyses (Ruglass et al., 2017, p.6). In contrast, Mills and colleagues (2016) found the number of COPE sessions attended significantly predicted change in PTSD symptom severity in an Australian sample of participants receiving COPE+treatment as usual (N=55). When viewed
alongside Ruglass et al. (2017) the predictive relationship of sessions attended with PTSD symptom severity in Mills and colleagues (2016) might be related to differing attributes of the sample and the function of these differences as moderator variables. Bias related to detection or attrition in either sample may also help explain the difference in findings.

**Limitations and Future Directions for Research**

As the original study was not designed to compare intervention lengths, attendance patterns were participant-driven. Utilizing prescribed treatment dosages (Jacquart et al., in press) would have afforded greater understanding of the nature of the treatment dose-response relationship as well as the possible influence of subject-expectancy effects of prescribed treatment dosage on attendance. Future studies that manipulate treatment dose may provide additional data regarding treatment-dose-response and attendance-related variables. In future research on COPE, specific dose manipulation of the imaginal exposure sessions may be particularly useful for improved patient-treatment matching. Imaginal exposures of shorter duration (20 minutes of a 60 minute session) have already been shown to be equally effective to those of longer duration (40 minutes of a 90 minute session) (Nacach et al., 2015).

The limited sample size of the present study impeded the examination of attendance pattern on outcomes at one, two, and three months post-treatment. Reduced attendance during the follow-up period in addition to selection bias makes the data from this phase beneficial for hypothesis generation more than hypothesis testing. Cloitre, Petkova, Su, & Weiss (2016), found the combination of symptom burden and patient strengths to be predictive of differential responses to PTSD treatments that were skills-based, exposure-based, or provide both types of intervention. While replication is needed for those with PTSD and those with PTSD-SUD, findings suggest that those with high symptom load relative to emotion regulation did best when
receiving skills and exposure, least well in an exposure-only group and moderately well when receiving a skills-only treatment, specifically Skills Training in Affect and Interpersonal Regulation (STAIR) (Cloitre et al., 2016). The sample used does not reflect the full heterogeneity of the current sample with PTSD-SUD, but provides evidence that differential responses based on identification of meaningful moderators may become apparent only in follow-up rather than immediately post-treatment. The impact of sample size on power to detect an effect in the follow-up period suggests challenges in the identification of the most vulnerable to deterioration across and within treatments. The approach of Cloitre and colleagues (2016) of identifying combined moderators that also incorporate strengths points to useful methodological approaches for future research related to the identifications of clinically meaningful patient subgroups, differential treatment effects and precision medicine.

The study of interaction effects in this dissertation research was also impacted by sample size. For example, it was not possible within the current study to examine the extent to which participants with multiple traumas and current MDD had superior trauma-related outcomes when they titrated their response to COPE as opposed to completed COPE or whether titration was a more effective strategy for those with MDD when randomized to COPE as opposed to RPT. Furthermore, the scant outcome data available for dropers limited this study in its ability to capture the full scope of the relationship between treatment attendance and outcomes.

An additional limitation of the study was the failure to include participant’s alteration of a particular treatment dose via the full range of attendance irregularities, specifically late arrivals or early departures from sessions.

The present study indicates that those who would go on to be classified as titrators, but had not shown attendance differences from completers through session four, experienced a
steeper initial decline in PTSD symptoms on a self-report measure. Additional study would be required to understand the extent to which symptom relief and intra-subjective comparison of current relief to the “good enough level” may have contributed to the subsequent decreased likelihood of attending subsequent sessions. Those who titrated treatment seem to have experienced some relief in terms of trauma symptoms on the self-report measure; however, some of those who dropped out or titrated treatment may have left treatment due to the expectation that either treatment or further treatment would not be helpful or would become less tolerable.

A clinician-assessment of participants’ trauma symptoms at session 3 or 4 could have provided a valuable comparison to the self-report data. For those receiving COPE, in vivo exposure begins in session four and imaginal exposure begins in session five. Were there some participants who were responding to the pace of the treatment and uncertainty regarding repeated retelling of personal trauma? Tapping into the (un)conscious participant rationale for reduced attendance could provide useful evidence regarding whether expectations for and experiences of exposure interventions may be a partial contributor to attendance titration. Were there different explanations for titration among RPT recipients? The extent to which unique factors related to treatment type (e.g. imaginal exposure) contribute to titration for particular subsets of individuals seeking help for PTSD-SUD requires further examination.

Further study may be useful in understanding the extent to which patients’ formulation of an individual “good enough level” is impacted by an initial or evolving understanding of treatment type. If the relationship between initial symptom relief, attendance and outcomes was clarified for sub-groupings of participants and this data was shared or discussed thoughtfully with participants themselves, would attendance patterns be impacted? If so, would that be helpful in bringing unformulated or overwhelming affect into the room? Is it possible that this would be
counter-productive? Can we understand a titrated experience of treatment differently if for some patients “less is more”? If therapeutic work is happening in between sessions or continues to be experienced even after a protocol is finished (Symington, 2012), does this change the view of treatment titration? Are there ways to deliver flexible treatment that are respectful of the limitations of human and financial resources? This study engenders more questions than answers, some of which may be resolved through studying the influence of other variables on treatment attendance.

The literature indicates that additional variables, not measured directly in the present study, may be predictive of attendance pattern including social support (perhaps partially captured in the present study by demographic variables related to marriage and employment); therapeutic alliance; motivation; and past treatment history (Mills et al., 2016). Psychotherapy researchers have established the important role of therapeutic alliance, training, perceived empathy of clinician as well as other factors, such as social support, which have direct influence on an individual’s likelihood of making effective use of a therapeutic relationship in terms of attendance and outcomes. Specifically, “therapeutic alliance has been associated with better treatment engagement, better adherence, and less dropout across various treatments and disorders” (Keller, Zoellner, & Feeny, 2010, p. 974). Though the quality of therapeutic alliance is seen to impact treatment effectiveness across diverse types of therapies and therapists, evidence of the predictive capacity of alliance on outcome may vary by psychiatric disorder (Sawaya, 2013, p.18) with early alliance measurement as a more powerful predictor than later alliance measurement (Barber, Connelly, Crits-Cristoph, Gladis & Siqueland, 2000; Sawaya, 2013). In a comparison of ten weeks of Prolonged Exposure to ten weeks of medication (sertraline) among individuals with chronic PTSD, Keller et al. (2010) found “early alliance
[Working Alliance Inventory] was associated with PE adherence (r=.32, p .05) and overall treatment completion (r=.19, p .05)” (p. 974) with trauma-related social support predicting early alliance strength. A measure of early therapeutic alliance may have been able to predict developing attendance patterns for titrators and completers, an experience that may guide clinicians to adjust their efforts to develop rapport and engage participants through more tailored means within the treatment.

The present study did not identify differences in motivation at baseline. The class of treatment completers may capture participants who are both highly motivated in terms of attending any therapeutic services offered as well as implementing strategies from either therapy designed to promote recovery and reduce negative outcomes including substance or alcohol use. A subject’s readiness and confidence in the capacity to make change can be seen as indicative of self-efficacy, a construct that is consistently associated with improvement in alcohol-related outcomes (Williams, Horton, Samet, & Richard, 2007, p.432). Classifying participants’ motivation level prior to randomization may have identified a latent factor contributing to attendance patterns. However, there is at least some indication that motivation and its relationship to attendance may be complicated. Tate et al. (2011) did not find motivation to be related to treatment retention though differences between self-reported motivation and clinician-assessed stage of change may be markedly different.

Subsequent studies may benefit from the inclusion of a clinician-administered measure to assess baseline motivation prior to and following the randomization process, as this may be predictive of participant attendance in treatment and be responsive to type of treatment being received. Motivation for change may be captured by an assessment that operationalizes the Transtheoretical Model or Stages of Change (Prochaska & Velicer, 1997) foundational in
Motivational Interviewing (Miller & Rollnick, 2002) such as the University Rhode Island Change Assessment Scale (URICA) (Pantalon et al., 2002). Audio recordings of the pre-randomization Motivational Interviewing session could be used to code participants’ communications according to criteria indicative of: pre-contemplation, contemplation, preparation, action, or maintenance. In community samples, those in the precontemplation phase would be unlikely to seek treatment for PTSD, endorsing beliefs that they can handle difficulties on their own, outside of the traditional mental health framework (Koenen, Moffitt, Caspi, Taylor & Purcell, 2003). While participants in the present study came from the community in addition to those seeking mental and physical health services, monetary compensation for study participation may have resulted in higher rates of inclusion of those in the precontemplation phase, than may have occurred without compensation.

The present study highlights the need for greater transparency with regard to treatment attendance data in treatment efficacy, effectiveness, and applied research. Clear and more consistent definitions of attendance-related terminology and classification are warranted. Mills and colleagues (2016) successfully communicated how many participants attended each COPE session (Figure 1); this transparent reporting practice may help researchers make cross-study comparisons with greater effectiveness. Future clinical research studies comparing treatments for those with PTSD-SUD will benefit from this methodology in the reporting of attendance data. Including data regarding the relative proportion of early vs. later dropouts, as well as the extent to which some dropouts may be better understood as titrators, may increase capacity for informed decision-making related to treatment-fit and service delivery. Furthermore, additional research with larger sample sizes is necessary to identify clinically meaningful subgroupings within difficult-to-treat heterogeneous populations, like those with PTSD-SUD, and will provide
psychological care that is most effective (Hien et al., 2015; Lopez-Castro et al., 2015; Hien et al., 2012). Building upon the current study, the link between symptom relief (and other meaningful measures of change that may be more difficult to quantify), treatment titration and post-treatment outcomes will benefit from further investigation, particularly in terms of understanding the “good enough dose” and its relationship to treatment-fit.

**Clinical Implications and Conclusions**

While evidence suggests that a large majority of individuals with PTSD-SUD greatly prefer to receive integrated treatment addressing trauma and substance related symptoms (Back, Brady, Jaanimagi, & Jackson, 2006; Brown et al., 1998), a substantial subset of these same participants may likely drop out of an integrated treatment addressing PTSD symptoms with Prolonged Exposure prior to the initiation of exposure procedures (McDonagh et al., 2005). Seventy-five percent of drop-outs in a preliminary study of COPE (differently named) left treatment prior to the use of in vivo or imaginal exposure (Brady et al., 2001), whereas within the current study 38.5% of those receiving COPE dropped out of treatment prior to utilization of in vivo or imaginal exposure techniques.

Early and on-going discussions with patients regarding desired symptom reduction and role functioning, as an informal assessment of patients’ formulation of “good enough” relief, can occur in the context of dialogue regarding patient’s expectations for intervention components (e.g. prolonged exposure). Open discussion of patient concerns may help reduce attrition (Killeen, Back, & Brady, 2011) to respond to individual differences in the therapeutic window (Hien et al., 2009).

Client-specific baseline variables of co-occurring depression and multiplicity of trauma exposure are associated with the ways individuals attend treatment, and thus warrant increased
attention during service provision for individuals with PTSD-SUD. Further studies that examine interaction effects between patient characteristics and treatment type with this population may allow for greater individualization in regards to treatment, making effective use of the identification of sub-groupings and their differential responses to therapeutic intervention (Project MATCH Research Group, 1997; Miller & Rose, 2009; Hien et al., 2012; Cloitre et al., 2016; Mills, et al., 2016). A clarified relationship between treatment attendance patterns and outcomes may offer support for treatment delivery models of increased flexibility. Participants with co-occurring PTSD and SUD who are motivated for recovery may be in the best position to determine when, how often, or which sessions to attend; such perspectives might not only be empowering to patients but might be efficacious as well. Understanding the ways patient-characteristics of individuals with PTSD-SUD relate to treatment titration (via irregularities in attendance) has the potential to improve overall treatment engagement on an individual and programmatic level as well as treatment outcomes.
References


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Identifying attendance patterns in a smoking cessation treatment and their relationships with quit success.


