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Treatment Outcome from Cognitive Processing Therapy Examined Three Ways

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Abstract

Cognitive Processing Therapy (CPT), a Cognitive Behavioral Therapy for treating Post Traumatic Stress Disorder (PTSD), is an evidence-based treatment that has been demonstrated to be effective in treating PTSD. Nonetheless, CPT can have a high rate of treatment non-completion. Attrition from therapy has been operationally defined using multiple contrasting methods. Understanding attrition using a definition with the most clinical utility is essential to improving outcomes from efficacious treatments. Two clinically relevant definitions for attrition, session attendance and symptom improvement, are critical to understanding attrition. Combining information from both definitions, to create four separate groups, will provide more accurate information about treatment outcomes, referred to as the Two-Part Definition of Attrition (TPDA). The present study examined factors related to treatment attendance, treatment response, and the TPDA. Examined in isolation, only initial depressive symptoms were related to treatment completion whereas both gender and initial depressive symptoms were related to treatment response. Using the TPDA, only two groups differed by initial depressive symptoms, early terminators and those who completed and responded to treatment as anticipated. This study demonstrates that the definition used for attrition will impact the results and in turn inform the application of the results. Specifically, these results can inform clinicians' decisions to use strategies to reduce attrition with clients who are most at risk of unilaterally terminating treatment. Additionally, researchers may utilize these results to select the most relevant definition for their study.

Keywords: PTSD, treatment, attrition, attendance, response

Treatment Outcome from Cognitive Processing Therapy Examined Three Ways

Presently, psychotherapy is the most effective treatment for Post Traumatic Stress Disorder (PTSD; Merz et al., 2019). Nonetheless, therapy is not universally effective, and many people do not recover following treatment. One estimation indicated that 20-50% of clients continue to meet criteria for PTSD following treatment (Resick et al., 2008). In addition, a large portion of clients do not complete treatment for PTSD (Holmes et al., 2019). It is essential to modify effective treatments to improve treatment outcomes. This cannot be accomplished without adequately understanding the iatrogenic effects of treatments such as treatment noncompletion and lack of symptom improvement or worsening of symptoms during treatment (Teachman et al., 2021). There are factors that are related to different treatment outcomes, such as demographic variables and clinical presentation factors. Through an understanding of these factors, changeable and unchangeable, treatment may be modified and improved to reduce the number of individuals who leave treatment early or do not respond.

Defining Attrition

Attrition has been referred to by multiple terms including, “attrition, dropout, early termination, premature termination, early withdrawal, and unilateral termination” (Swift et al., 2009). The concept of attrition can be operationally defined in multiple ways which are outlined in Table 1 (Hatchett & Park, 2003; Swift & Greenburg, 2012; Swift et al., 2009). Importantly, the operational definition used for attrition impacts the rate of dropout reported (Swift et al., 2009). In other words, the same sample of clients can yield different rates of attrition depending on the operational definition chosen. In the past, therapist judgment was the preferred operational definition (Swift & Greenberg, 2012);

however, each therapist may conceptualize dropout differently leading to low consistency. More recently, completion of a protocol has been the preferred definition of attrition (Swift & Greenberg, 2012). This means that if a client misses the final session in a protocol, but has otherwise responded, they are still noted as a dropout. Many of the definitions in Table 1 assess attrition at face value, however, each metric alone may not capture the complete phenomenon of attrition. For example, using the clinically significant change metric fails to capture individuals who completed treatment but have not improved. These individuals would be better identified as a non-responder rather than a dropout. Due to the numerous operational definitions and the differences between them, it is difficult to build a consistent body of literature on the concept of attrition.

For research on attrition to be useful, an appropriate operational definition of attrition, with acceptable sensitivity and specificity, must be utilized. Not all current definitions consider the core reason attrition is a problem—those who dropout are less likely to have improved. Accordingly, the definition must include a measure of symptom reduction. In addition to treatment responsiveness, when the client left treatment is essential information in determining if a client dropped out. Further, treatment attendance and symptom improvement are interrelated in that those who attend more sessions are also more likely to reduce their symptoms (Stefanovics & Rosenheck, 2020; Szafranski et al., 2017). Consequently, a comprehensive definition of attrition for an evidence-based treatment (EBT) must include information related to the satisfactory completion of a protocol and a metric of symptom relief. An operational definition of such a Two-Part Definition of Attrition (TPDA) is: a client has terminated early if they did not complete a specified number of sessions of an EBT and did not experience a clinically significant

reduction in symptoms (Figure 1). This definition can distinguish between Early Terminators, or those who dropped out, and Early Responders to treatment—those who did not require the complete treatment to improve. It also will accurately categorize those who completed treatment with symptom relief (TPDA-Responders) or without symptom relief (TPDA-Non-Responders). Thus, according to this definition, only those who do not complete treatment and have not responded are considered early terminators. By having additional groups with distinct treatment outcomes, sensitivity, and specificity are increased by more accurately classifying individuals compared to more limited definitions of attrition.

Swift and Greenberg (2012) similarly suggest combining therapist judgment with either protocol completion or clinically significant change to obtain a more complete definition of attrition. Although therapist judgment does incorporate individualized data that may be only assessed by the therapist, it is too subjective to be consistent across studies. The inconsistency of therapist judgment goes against the very goal of standardizing the definition of attrition. Thus, the TPDA utilizes the secondary suggestions made by Swift and Greenberg (2012) of treatment completion and clinically significant change. These concepts can be operationally defined using EBTs and computing clinically significant levels of change.

The TPDA provides both researchers and clinicians with helpful information related to who is responding to treatment (TPDA-Responders, Early Responders, TPDA-Non-Responders) as well as those who dropout (Early Terminators). Using this definition researchers can be confident they are studying the target concept and a robust literature can be built upon a shared operational definition. Additionally, clinicians can accurately

assess the future directions of their practice by employing additional strategies to mitigate dropout or provide a new direction of treatment for TPDA-Non-Responders. There are limitations to this definition. This definition is only useful for treatments that have an overall structure and an anticipated number of sessions. Therefore, it is not helpful in assessing attrition for less structured or unstructured treatments. For less-structured treatments, symptom improvement or therapist judgment may be more helpful in determining attrition.

A benefit of a generalizable definition, like the TPDA, is that it can be applied across disorders, such as PTSD, which will be the focus of this paper. A meta-analysis reported that attrition across treatment modalities for PTSD is on average 21% (Swift & Greenberg, 2014). In strictly controlled research settings attrition from PTSD treatment is estimated to be 18% using author-defined attrition in a meta-analysis (Imel et al., 2013), whereas in a community clinic RCT, only 58% of participants completed the entire CPT protocol (Holmes et al., 2019). Because attrition has a negative impact on individuals, research, and clinicians it is critical to understand the contributing factors and consider strategies for reducing attrition from PTSD treatments. Aspects of PTSD can impact attrition. It is important to understand unique factors that may impact attrition for specific disorders like PTSD that would be unobserved if only studying attrition generally.

PTSD Treatment

The APA and the International Society of Traumatic Stress Studies (ISTSS) have released guidelines for treating PTSD (Guideline Development Panel for the Treatment of PTSD in Adults & APA, 2019; Bisson et al., 2019) identifying Cognitive Processing Therapy (CPT) as one of the frontline treatments for PTSD. CPT is based on the

Information Processing Theory of PTSD and has treatment components related to psychoeducation, exposure, and cognitive therapy (Resick & Schnicke, 1992). CPT is a structured, manualized protocol consisting of 12 sessions. Initially, treatment focuses on psychoeducation, exposure, and self-directed thoughts, especially those of self-blame. The second half of treatment addresses beliefs that are commonly impacted by experiencing trauma in the form of targeted modules.

Treatment begins with a session of psychoeducation about PTSD, including symptoms, maintenance factors, and rationale for treatment. An essential component of successful treatment is the creation of a stuck point log of assimilated and overaccommodated beliefs. Assimilated stuck points are beliefs about the self, such as “I am permanently damaged” or “I should have done more to prevent the trauma.” Overaccommodated stuck points are beliefs about the world and the future, including “The world is dangerous” and “I cannot trust my judgment.” The stuck point log is developed collaboratively between the client and therapist using session time and homework assignments. To assist with identifying stuck points, the client completes an impact statement where the client details what influence the trauma has had on their life and their rationale for why the trauma may have occurred. Further, treatment may also include a written account of the traumatic event outlining what transpired as well as their thoughts and emotions during the event and while writing the account. Writing the account can be viewed as an exposure experience. A dismantling study found that excluding the written account from CPT clients improved more than when it was included (Resick et al., 2008). Additionally, the client is concurrently completing homework consisting of thought records where the client identifies events, thoughts, and emotions; evaluations their

rationality and/or helpfulness; and identifies alternative thoughts. Session time during the first 6 sessions is primarily focused on self-blame related to the trauma and Socratic questioning is the primary cognitive strategy used.

The second 6 sessions of treatment introduce additional cognitive strategies, including identifying cognitive distortions and challenging questions, and culminating in the challenging beliefs worksheet, which combines components of prior worksheets. The client utilizes the challenging beliefs worksheets to address stuck points that have been identified as well as events or symptoms that occur between sessions. During the second half of treatment, session topics include safety, trust, power & control, intimacy, and esteem. Each of these topics are viewed as they relate to self and others; how beliefs may have changed since the trauma or had been reinforced by the trauma; and alternative thoughts.

As outlined above, treatment is structured in that there are 12 sessions with specific topics to address, however, there is space for individualization. For example, addressing one session's worth of material may take place over multiple sessions if warranted for the client. Additionally, the second half of treatment, the modules, may be administered out of order depending on the relevance of each module to the client's presenting concern.

There are specific times during treatment when clients are at an increased risk of premature termination. Multiple studies have reported that early in PTSD treatment is the highest risk time to lose a client, specifically prior to session 4 (Garcia et al., 2011; Mott et al., 2014; Niles et al., 2018). Although, the first 6 sessions have also been identified as a high-risk time for premature termination (Gutner et al., 2016). As the session number

increases, individuals are at a reduced likelihood of attrition (Fernandez et al., 2015). Together these studies emphasize that early to mid-treatment are particularly risky times for client dropout. Multiple session thresholds have been used to determine attrition including 4 sessions (Davis et al., 2013), 6 sessions (Holder et al., 2019), 7 sessions (Shiner et al., 2017), and 8 sessions (Gros et al., 2018). Thus, there is significant variability in what has been used as an acceptable minimum level of treatment engagement to receive what is believed to be an effective dose.

Symptom exacerbation, or symptom worsening, can occur in the early phases of PTSD treatment. One study reported that 28.6% of clients receiving CPT and 14.7% of clients receiving CPT without a written account had symptom exacerbations (Larsen et al., 2016). These clients were more likely to have higher PTSD symptoms and meet criteria for PTSD post-treatment (Larsen et al., 2016). Despite this, these clients did demonstrate clinically significant improvement and were not more likely to dropout than those without symptom exacerbation (Larsen et al., 2016). A separate study reported that 67.3% of clients had a symptom exacerbation, but in this study, symptom exacerbation was not related to end-state PTSD symptoms, PTSD diagnosis, treatment trajectory, or dropout (Larsen et al., 2020). Yet, some have found that PTSD symptom exacerbation does not occur on a general basis and should not be a significant area of concern (MacDonald et al., 2011). Thus, there is some evidence that some clients do experience temporary symptom worsening during PTSD treatment, but this is not consistent across studies and does not appear to relate to dropout.

Clinical and Demographic Factors related to PTSD Treatment Outcome

Identity factors

Understanding what facets of a person's identity may be related to treatment outcome has captivated researchers. Despite the large body of research, only age has been most consistently related to treatment outcome, though, other factors do have some support including race, gender, socioeconomic status (SES), education, and marital status. Although largely unmodifiable, aspects of identity are a portion of case conceptualization and can help signal therapists to employ techniques to reduce attrition or improve treatment.

Age. The age one experiences a traumatic event can impact their overall well-being. Traumatic events experienced in childhood rather than adulthood continue to cause more symptoms of PTSD in a sample of older adults (Ogle et al., 2013). The more intense impact childhood trauma has on an individual may relate to younger individuals dropping out at a higher rate as they are in closer time proximity to the distressing event.

Age and attrition have been well studied across disorders and the research literature is consistent. One meta-analysis and meta-regression reported that across disorders and treatments, younger age was significantly associated with attrition (Swift & Greenberg, 2012). This pattern continues to be true for those specifically in PTSD treatment with younger individuals being more likely to dropout. This pattern has been examined in samples of Veterans in the United States, Israeli Veterans, and civilians as outlined in Table 2 (e.g., Harte et al., 2013; Kehle-Forbes et al., 2016; Levi et al., 2019). Several explanations have been suggested to account for the relationship between younger age and higher dropout. It may be that younger individuals are busier with current life demands (Goodson et al., 2017) or they have a higher sense of independence (Levi et al., 2019). Other explanations include younger individuals who are less familiar

with mental health care and are less likely to identify potential benefits (Harte et al., 2013).

Regarding treatment response, only one study identified older age as related to optimal treatment outcomes. Older age was linked to improved treatment outcomes for those in trauma-focused cognitive behavior therapy (Deisenhofer et al., 2018). In contrast, younger age was related to higher rates of symptom reduction for active-duty military members engaged in CPT (Resick et al., 2020). Additionally, in a study of women in the community, younger age was related to improved treatment outcome (Szafranski et al., 2017). In a systematic review of PTSD treatment trajectories, younger age was related to being in the responder trajectory in the majority of the 11 studies reviewed (Dewar et al., 2020). It has been suggested that younger individuals may have higher cognitive flexibility increasing younger individuals' abilities to challenge current thoughts and beliefs, a key aspect of CPT, than older individuals (Dewar et al., 2020). Thus, most research suggests that younger age is related to being more likely to dropout, but also more likely to have improved symptoms.

Gender. Gender is a construct that is generally assessed across studies and included in a case conceptualization. Gender can impact an individual's response to trauma. Women have more severe PTSD symptoms (Holbrook et al., 2002) and are more likely to develop PTSD following trauma (Kessler, 1995). There are also differences in the types of trauma different genders experience. In a sample of Veterans, women experienced more physical and sexual trauma whereas men experienced a higher level of combat trauma (Freedy et al., 2010). Taken together, women are more likely to

experience trauma that more frequently leads to PTSD and to have a worse symptom presentation.

Given this information, attrition may be influenced by an individual's gender. Across treatments and disorders, a meta-regression has shown that samples with more female participants had lower rates of attrition (Swift & Greenberg, 2012). Within the same study, one sample, but not the other, male participants were more likely to dropout prior to session 3 from PE than females (van Minnen et al., 2002). Despite women experiencing trauma that is more likely to lead to PTSD and experiencing more severe symptoms, women are less likely to prematurely terminate. In addition to attending more sessions, women are more likely to benefit from PTSD treatment. In a sample of veterans receiving intensive treatment for PTSD, women had greater PTSD symptom reduction when compared to men (Stefanovics & Rosenheck, 2020). Importantly, this finding was partially accounted for by women attending more sessions than men (Stefanovics & Rosenheck, 2020). This study highlights the interaction between engagement in treatment and response to treatment. In a second study of veterans, women were more likely than men to have "substantial improvement" when receiving treatment for PTSD on an outpatient basis (Shiner et al., 2019).

There are several potential underlying reasons for gender differences in treatment outcome. Traditional masculine beliefs may interfere with treating PTSD in men, but explicitly discussing this phenomenon with clients may increase retention (Lorber & Garcia, 2010). Also, factors like gender match between therapist and client may be important. Male gender match between client and therapist led to higher dropout in PTSD treatment, which meant leaving prior to session 8 (Shiner et al., 2017). In addition, there

are potential reasons that women are more likely to complete treatment. Women may have better outcomes from treatment leading them to be more likely to continue in treatment (Békés et al., 2016; Shiner et al., 2019; Stefanovics & Rosenheck, 2020). Further, cultural beliefs about whom therapy is intended for or who is allowed to ask for help may help explain why women are more likely to benefit from PTSD treatment. This research literature demonstrates the role gender can play, particularly culturally driven beliefs about gender. These beliefs impact the client's perceptions of who the treatment is for and may in turn impact who completes and benefits from treatment.

Race. One demographic factor that has been examined frequently is race or ethnicity. Across races there are disparate rates of trauma exposure, developing PTSD, and treatment-seeking (Roberts et al., 2011). There are differences in the types of traumatic events minorities experience that interact with salient variables such as discrimination (Asnaani, & Hall-Clark, 2017). Further, race or ethnicity affects how a client's trauma symptoms may be conceptualized. For instance, Latino immigrants may describe PTSD as sadness, nervousness, or anger along with somatic symptoms (Eisenman et al., 2008). When considering disparate rates of attrition between races, it is essential to understand the context in which different races experience trauma and how that may impact their treatment.

No consensus has been reached in the literature regarding racial differences in attrition from PTSD treatment. Black individuals are more likely to terminate therapy prematurely across disorders (Fortuna et al., 2010). Conversely, in a study of women with PTSD, there were no differences in treatment dropout between Black or White participants (Zoellner et al., 1999). In women with a history of interpersonal violence,

Black women were more likely to have dropped out of PTSD treatment, but there were overall no differences in improvement (Lester et al., 2010). One study demonstrated that minority participants were significantly more likely to dropout from PE than White participants, but this relationship did not hold true for CPT (Keefe et al., 2018). After accounting for relative proportions in treatment, Black participants were more likely to complete PTSD treatment compared to other races (Maguen et al., 2019). Accordingly, there is no clear answer across studies if race may be an important factor related to attrition. One barrier to clarity regarding racial differences in attrition is the lack of a consistent definition for attrition. Three of the above-cited studies did not operationally define attrition (Keefe et al., 2018; Lester et al., 2010; Zoellner et al., 1999).

Regarding treatment response, there is more evidence suggesting that there are racial differences. When examining variable treatment lengths for CPT, among active-duty military members, being a Black service member was a predictor of not responding to treatment or requiring additional sessions (Resick et al., 2021). Similarly, in a separate sample of veterans, being a Black veteran was related to lower odds of achieving clinically significant change while in treatment for PTSD compared to their Caucasian counterparts (Sripada et al., 2019). In a sample of women, however, there were no differences in treatment outcomes between White and Black participants (Zoellner et al., 1999). The above studies demonstrate that there is some initial evidence that suggests that Black clients may benefit less from PTSD treatment.

Expectations for treatment may impact attrition and treatment response in racial minorities. Black individuals have higher expectations of treatment (Lester et al., 2010) along with positive perceptions of treatment (Kessler et al., 1994). After treatment,

however, Black clients reported more negative perceptions of treatment and indicated that they are less likely to use mental health treatment in the future (Diala et al., 2000). Thus, expectations for treatment may influence attrition or treatment response, but this may be related to prior experiences with mental health treatment.

As the ecological model of multicultural guidelines outlines, both client and therapist bring their own identities to the therapeutic relationship that exists within the larger context of society (Clauss-Ehlers et al., 2019). As such, racial pairing in therapy may impact attrition or treatment response. In a study of male veterans, both Black and White therapists perceived their Black clients as less committed, less consistent in attendance, and less improved related to violent behaviors (Rosenheck et al., 1995). Black clients with White therapists dropped out at higher rates and attended fewer sessions than Black clients with Black therapists. This study demonstrates that therapists, regardless of their race, do have biased perceptions of their clients; however, it only impacted treatment when White therapists were paired with Black clients. Minority clients are more likely to receive biased care leading them to be understandably more apprehensive of therapy in the future. Thus, experiences with bias within treatment may impact treatment attendance, treatment response, and future treatment engagement for minority clients.

Clinical Factors

It is critical to examine factors of PTSD that may relate to premature termination. Factors considered in the present study include the initial severity of PTSD, individual PTSD symptom clusters, and depressive symptoms. Despite presenting for the same treatment for the same disorder, each client has their own unique pattern of symptoms

and variable severity of each of those symptoms. Further, PTSD and depression are highly comorbid, and as such, depression should likewise be examined as an important variable of interest.

PTSD Symptom Severity. Research regarding pretreatment PTSD symptom severity related to dropout is inconsistent. There has been research demonstrating higher pretreatment symptom severity results in higher dropout and research reporting no relationship between symptom severity and attrition. In a sample of clients receiving CBT for PTSD in a community clinic, initial PTSD symptoms were related to an increased risk of dropout (Zayfert et al., 2005). For veterans in residential treatment for PTSD, those with higher PTSD symptoms when beginning treatment were more likely to leave treatment early (Smith et al., 2019). Additionally, higher PTSD symptom severity was related to veterans not initiating CPT treatment through telehealth (Grubbs et al., 2015). At the same time, there are multiple studies that did not report a difference in attrition related to initial PTSD symptom severity (Cloitre et al., 2002; Doran & DeViva, 2018; Eftekhari et al., 2019; Gros et al., 2013; Kehle-Forbes et al., 2016; Niles et al., 2018). There are fewer studies that suggest that higher PTSD symptom severity may be an important factor compared to studies that did not find a difference. As there are currently no studies suggesting that higher severity is related to being retained in treatment, clients with a more severe presentation may tentatively be considered at a higher risk of dropout.

Beyond not completing treatment, PTSD symptom severity can influence the amount of symptom reduction a client experiences during therapy. More severe initial PTSD symptoms were related to not responding to PTSD treatment during group therapy

and trauma focused CBT (Murphy & Smith, 2018). In a sample of veterans, those who reported the highest levels of PTSD symptoms at pretreatment had the lowest rates of symptom change over 12 sessions of CPT (Schumm et al., 2013). Further, for those engaged in PE, clients with the highest pretreatment symptom severity also had the highest levels of PTSD symptoms at the end of treatment (van Minnen et al., 2002). In a review of 11 articles examining PTSD treatment trajectories, two studies reported that higher initial PTSD symptom severity was related to being a non-responder (Dewar et al., 2020). Yet, four studies examined in the review did not find a significant relationship between pretreatment PTSD severity with any treatment trajectory (Dewar et al., 2020). Further, a study of combat veterans indicated that those who reported the most severe PTSD symptoms initially, had the greatest symptom change, but had the worst overall symptom functioning at post treatment when compared to participants with lower initial PTSD symptoms (Elliott et al., 2005). Taken together, higher baseline PTSD symptom severity may be an important indicator for risk related to dropout or suboptimal treatment outcome.

PTSD Clusters. Beyond overall PTSD symptom severity, there are specific PTSD symptoms that could impact treatment including avoidance (APA, 2013, p. 272). Higher pretreatment avoidance is related to higher rates of attrition using three operational definitions—treatment completion, mutual agreement on meeting therapy goals, and dropout prior to session 4 (Bryant et al., 2003; Garcia et al., 2011; Zayfert et al., 2005). Attrition could be conceptualized as one manifestation of the symptom cluster of avoidance; the ultimate strategy to avoid confronting trauma reminders in therapy (Bryant et al., 2007). Additionally, higher pretreatment avoidance symptoms are related

to not improving during PTSD treatment (Fletcher et al., 2021). Avoidance may function as an attempt to regain a sense of control (Zayfert et al., 2005) as avoidance does provide temporary relief from other PTSD symptoms, however, in the long term, avoidance serves to maintain PTSD symptoms.

In addition to avoidance, persistent negative cognitions about the self, others, and the world can impact a client's risk of leaving treatment early (APA, 2013, p. 272). A study reported that more trauma-related negative cognitions about self-blame increased treatment retention when measured continuously, as in more than 6 sessions (Holder et al., 2019). The opposite, however, has been found such that those with more catastrophic thoughts and higher avoidance were less likely to complete treatment (Bryant et al., 2007). In other words, the combination of avoidance and negative beliefs is related to increased attrition. Individuals may have specific beliefs related to treatment. Men with negative beliefs about PTSD therapy were less likely to complete treatment (Valenstein-Mah et al., 2019). A client's negative cognitions are applied to their entire world, including therapy. Thus, successful treatment must involve addressing the client's negative cognitions about therapy which may become therapy interfering.

Further, hypervigilance, or a heightened awareness of danger, can interact with PTSD treatment (APA, 2013, p. 272). Hypervigilance has been correlated with increased rates of dropout (Zayfert et al., 2005). Further, increased hyperarousal symptoms at the beginning of treatment were related to PTSD treatment nonresponse (Stein et al., 2012). In a study of inpatient treatment for adults with PTSD with a history of childhood trauma similarly reported that higher arousal symptoms at intake were related to lower rates of symptom reduction (Rosenkranz & Muller, 2011). The physical sensations that

accompany hyperarousal may make it difficult to fully engage in treatment. Initially focusing treatment on relaxation strategies may help the client cope and alter their physiological responses.

Little research has examined the interaction between pretreatment re-experiencing symptoms and attrition or treatment response. One study of veterans reported that levels of re-experiencing symptoms were not significantly related to attrition (Erbes et al., 2009). A recent study reported that higher initial re-experiencing symptoms are related to treatment-resistant PTSD (Fletcher et al., 2021). Currently, there is a lack of evidence if re-experiencing may be related to attrition and minimal research suggesting the importance of re-experiencing for treatment response.

Depressive Symptom Severity. Depression is a common comorbidity that accompanies PTSD. It is estimated that half of those with PTSD also have a co-occurring diagnosis of depression (Flory & Yehuda, 2015). Multiple studies have reported that those with higher depression symptoms are more likely to drop out of PTSD treatment. In a naturalistic study of veterans receiving treatment for PTSD, a comorbid diagnosis of depression was related to an increased risk of dropping out of treatment (Doran & DeViva, 2018). Likewise, in a sample of Israeli veterans, high pretreatment depressive symptoms were related to PTSD treatment noncompletion (Levi et al., 2019). Further, veterans with comorbid depression were at increased risk of not fully engaging with CPT delivered via telehealth (Grubbs et al., 2015). In a community clinic setting, dropout from CBT for PTSD was related to comorbid depression, and regression analyses indicated that depression accounted for a significant amount of variance in dropout (Zayfert et al., 2005). Nevertheless, in a sample of veterans receiving outpatient treatment for PTSD,

depressive symptoms at baseline were not related to PTSD symptom change or dropout (Asamsama et al., 2015). Largely, evidence suggests that comorbid depressive symptoms are related to poorer treatment attendance.

Clients with comorbid depression at treatment presentation are also less likely to respond to PTSD treatment (Murphy & Smith, 2018). Further, in a review of PTSD treatment trajectory studies, initial depressive symptoms or a comorbid depression diagnosis were strongly related to a nonresponse trajectory (Dewar et al., 2020). In one such study, those who were diagnosed with depression prior to beginning treatment for PTSD were more likely to be coded as part of the non-responder pathway (Stein et al., 2012). A recent meta-analysis examined baseline depression as it related to PTSD treatment outcomes reporting that when measured continuously, depressive symptoms were related to less improvement in PTSD symptoms during treatment (Kline et al., 2021). At the same time, continuous depressive symptoms were not related to attrition, and when assessed categorically, which included fewer studies, the presence or absence of a depression diagnosis was not related to either treatment response or dropout (Kline et al., 2021). Comorbid depression may limit one's ability to consistently attend treatment and receive maximum benefit from PTSD treatment. Factors like avoidance, hopelessness, or external locus of control can make attending and engaging in PTSD difficult for those with comorbid depression (Levi et al., 2019; Zayfert et al., 2005).

Current Study

Prior research has demonstrated that demographic factors (e.g., DeViva, 2014; Levi et al., 2019; van Minnen et al., 2002) and clinical presentation aspects (e.g., Levi et al., 2019, Niles et al., 2018; Smith et al., 2019) are related to early termination from

PTSD treatment. These studies were based on disparate definitions of attrition and therefore were not assessing the same aspects of attrition. The present study explored these relationships using clearly defined operational definitions of attrition. Additionally, a new definition of attrition, the TPDA, was examined to determine the usefulness of this new conceptualization of attrition for both clinical and research applications.

The present study sought to understand factors that relate to session attendance, treatment response, and the more nuanced grouping provided by the TPDA. This information furthers the current body of literature by providing additional information about treatment outcomes based on different definitions of attrition. Information from this study allows for more accurate clinical decision-making and identification of potential areas for treatment improvement. Further, this study provided additional clarity regarding the most useful definition researchers should use for structured treatment protocols such as CPT. The aims of the current study included: 1) Understanding what factors differed between those who completed treatment and those who prematurely terminated; 2) Examining what factors differed between those who responded to treatment and those who did not respond; 3) Examining the new conceptualization of attrition, the TPDA, to understand factors related to treatment outcome.

Hypotheses

Hypothesis 1

Potential interactions between variables of interest were examined. It was hypothesized that due to the high rate of comorbidity and symptom overlap between PTSD and depression, the metrics for symptom severity will be interrelated. Further, it is anticipated that gender will interact with PTSD symptom severity.

Hypothesis 2

The impact of demographic and clinical characteristics on session attendance were examined. It was hypothesized that:

- 2a. Clients who completed treatment will be older, female, and White.
- 2b. Clients who completed treatment will have lower initial PTSD symptom severity (including symptom clusters), and/or depressive symptom severity. Specifically, those with lower rates of avoidance and/or hypervigilance will be more likely to have completed treatment.
- 2c. Older age, female gender, lower avoidance, lower hypervigilance, lower overall PTSD severity, and/or lower depressive symptom severity will be significant predictor variables for completing treatment.

Hypothesis 3

The influence of demographic and clinical characteristics on PTSD symptom improvement during treatment were examined. It was hypothesized that:

- 3a. Clients who responded to treatment will be younger, female, and White.
- 3b. Clients who had lower initial PTSD total and depressive symptom severity will be more likely to be classified as treatment responders. Clients with lower symptoms in the clusters of avoidance, hypervigilance, and re-experiencing will be more likely to be a treatment responder.
- 3c. Younger age, female gender, White race, lower avoidance, hypervigilance, re-experiencing symptoms, lower baseline PTSD symptom severity overall, and/or lower symptoms of depression will be significant predictor variables for being a treatment responder.

Hypothesis 4

The demographic and clinical differences between the four groups defined by the TPDA were examined. It was hypothesized that:

4a. Clients who are TPDA-Responders will be older, female, and /or White.

4b. The clinical variables of total PTSD severity, avoidance, hypervigilance, re-experiencing, and/or depressive symptom severity will be lower amongst those who are classified as TPDA-Responders.

4c. Younger age, female gender, White race, lower avoidance, hypervigilance, and re-experiencing symptoms, lower baseline PTSD symptom severity overall, and/or lower symptoms of depression will be significant predictor variables for being classified as a TPDA-Responder.

Method

Participants

Participants included clients who began Cognitive Processing Therapy (CPT) at the Center for Trauma Recovery (CTR) between January 1st, 2012 and ended treatment prior to March 16th, 2020. The start date was selected based on regulations for the length of physical file retention at the clinic. The end date was selected to ensure consistency and avoid cohorting effects due to the potential impact of the COVID-19 pandemic. During this period, 139 clients completed at least one session of CPT. Clients were separated into multiple groups based on session attendance, treatment response, and the TPDA. Clients were classified as a treatment completer if they attended a minimum of 6 sessions of CPT, which has been previously identified as a therapeutic dose of CPT (Holder et al., 2019). Clients who had an improvement in symptoms of 30% or greater

were considered treatment responders in line with current recommended definitions for treatment response for PTSD treatment (Varker et al., 2020). Utilizing this method, clients who improved significantly despite continuing to meet PTSD criteria (i.e., initial PCL of 70 and final PCL of 40, a 42% reduction despite continuing to meet criteria for PTSD) and those who had a lower percent improvement but end-state functioning that no longer meets criteria for PTSD (i.e., initial PCL of 40 reduced to 28, a 30% reduction, but they no longer meet criteria for PTSD) were both captured as treatment responders. As outlined above, these two definitions were combined to create the TPDA leading to four groups: TPDA-Responders, Early Responders, TPDA-Non-Responders, Early Terminators.

Procedure

CTR is a community clinic that serves those in the community who have experienced a traumatic event and are struggling with psychological symptoms related to their experience. Clients must be 18 years or older to receive services at CTR and must not have been charged with a violent crime to promote client safety.

Clients were treated by Ph.D. graduate students in the clinical psychology doctoral program at the University of Missouri-St. Louis under the supervision of a licensed clinical psychologist with expertise in CPT. Based upon the assessment and depending on the client's needs, the client may begin CPT or PE, begin a non-trauma related treatment protocol, or be referred for services elsewhere if the clinic is unable to meet the needs of the client.

Data used in the present study were from a deidentified CTR clinic dataset. No identifying information was recorded in the data set (i.e., name, full address, date of

birth). Demographic data collected included age, gender, race/ethnicity, education, marital status, and zip code. The use of this data was approved by the Institutional Review Board of the University of Missouri-St. Louis.

Measures

Posttraumatic Diagnostic Scale (PDS-IV)

Between 2012-2015, the PDS for DSM-IV was utilized to track PTSD symptom severity throughout treatment (Foa et al., 1997). The PDS-IV consists of 17 items assessing DSM-IV criteria, including re-experiencing, avoidance, and arousal, for PTSD experienced within the last month (Foa et al., 1997). This self-report measure includes item response options that range from 0 “not at all or only one time” to 3 “five or more times a week/almost always” (Foa et al., 1997). A severity score is determined by summing the individual’s responses to the 17 items (Foa et al., 1997). Higher scores indicate more severe PTSD symptoms. The psychometric properties were tested on a sample drawn from PTSD treatment centers and community centers with high rates of trauma (i.e., women’s shelters) leading to a sample that had a mean age of 38.49, 45% women, and 65% White (Foa et al., 1997). The PDS-IV has demonstrated sufficient reliability, including internal consistency ($\alpha = .92$) test-retest reliability (kappa = .74; 11-21 days between tests), and convergent validity with the SCID (sensitivity = .89 and specificity = .75; Foa et al., 1997).

PTSD Checklist (PCL-IV)

In addition to the PDS-IV, the PCL-IV was also used to measure PTSD symptom severity throughout treatment. This measure has 17 items corresponding to PTSD symptoms determined by the DSM-IV. The specific version was used so that each client

reported their symptoms related to their own personal stressful experience. Clients indicate their symptoms on a Likert response scale ranging from 1 “not at all” through 5 “extremely.” Clients with a higher total score are experiencing worse PTSD symptoms. In a sample of male veterans, the PCL-IV demonstrated high internal consistency ($\alpha = .94$) and convergent validity with the Clinician Administered PTSD Scale ($r = .79$; Keen et al., 2008). Additionally, test-retest reliability for the PCL-IV was examined in a sample of university students (58% women, 19.7 years old on average, 85% White; Ruggiero et al., 2003). Test-retest was acceptable at one-week ($r = .88$) and two-week ($r = .68$) intervals (Ruggiero et al., 2003).

PTSD Checklist (PCL-5)

Following the switch from DSM-IV to DSM-5, the clinic transitioned to utilizing the PCL-5 (Weathers et al., 2013) to monitor client symptoms during treatment. The PCL-5 is available in two versions: for assessing symptoms in the past month and the past week. Both versions are 20 items with a Likert scale with five response options ranging from 0 “Not at All” to 4 “Extremely.” The sum of all symptoms endorsed indicates the overall severity of PTSD symptoms with higher scores indicating increased severity. The psychometric properties of the PCL-5 were assessed on a sample of university students who were predominantly women (70%), on average 20 years old, and White (81%; Blevins et al., 2015). The PCL-5 has demonstrated acceptable psychometric properties including internal consistency ($\alpha = .94$), test-retest reliability ($r = .82$; ~1 week), convergent validity ($r_s = .74 - .85$) and discriminant validity ($r_s = .31 - .60$; Blevins et al., 2015).

Beck Depression Inventory 2nd edition (BDI-II)

Due to the high co-occurrence between PTSD symptoms and depressive symptoms (Flory & Yehuda, 2015), the BDI-II (Beck et al., 1996) was utilized to assess the client's symptoms of depression throughout treatment. The BDI-II is a 21-item, self-report measure assessing depressive symptoms in the past two weeks. Each item consists of four statements describing increasing severity levels of a single symptom. For example, the symptom of low mood is assessed by asking clients to endorse the statement that aligns with how they have felt in the past two weeks from the following statements: 0 "I do not feel sad," 1 "I feel sad much of the time," 2 "I am sad all the time," or 3 "I am so sad or unhappy that I can't stand it" (Beck et al., 1996). Higher total scores indicate worse depressive symptoms. The BDI-II criterion validity was tested on students receiving services at a university counseling center (58% women, average age of 22 years, 90% White; Sprinkle et al., 2002) and test-retest reliability was tested on new clients at a university counseling center (61% women, 21.6 years old on average, 98% White; Sprinkle et al., 2002). Lastly, consistency was assessed on a sample of Canadian university students (67% women, 21 years old on average, 79% White). The psychometric properties of the BDI-II are acceptable and have demonstrated appropriate criterion validity ($r = .83$), test-retest reliability ($\alpha = .96$; 1-12 days with an average of 3.2 days between administrations; Sprinkle et al., 2002), and consistency ($\alpha = .92$; Dozois et al., 1998).

Demographics

The demographic variables that were examined in this study are age, gender, and race. The age utilized in these analyses is the age at the first session. Gender and ethnicity were self-identified by the client on intake paperwork. To increase the ability to draw

meaningful conclusions from the data, analyses of race were limited to clients who identified as either Black or White. For these analyses gender was coded as 0 for female and 1 for male and race was coded as 0 for White and 1 for Black.

Group Assignment

As the following analyses include several different groupings of the same clients, group assignment is detailed here. Hypotheses 2 examining treatment completion was separated based on if the client attended 6 or more sessions of CPT, a cutoff previously used to indicate a therapeutic dose of treatment (Holder et al., 2019). Participants were coded as a non-completer if they attended 1-5 sessions of CPT. For hypothesis 3, participants were in the responder group if they had a 30% or greater reduction in symptoms compared to baseline, in other words, a clinically meaningful change in symptoms (Varker et al., 2020). If the individual had a 29% reduction or less, including if their symptoms worsened compared to baseline, they were considered a non-responder.

Using both cut points noted above, 6+ session attendance and 30% symptom reduction, were combined to create four groups of the TPDA. Thus, the TPDA-Responder attended 6 or more sessions and had a 30% or greater reduction in symptoms. An Early Responder attended fewer than 6 sessions of CPT but, nonetheless, experienced a 30% or greater symptom reduction. Both the TPDA-Non-Responder and Early Terminator did not experience a clinically significant reduction in symptoms (< 30% change), with the difference between these two groups laying in the number of sessions they attended.

Data Analytic Plan

Data were assessed for missing data, outliers, and statistical assumptions. Nominal variables, such as age or education, were replaced and excluded in a pairwise manner. Clients with missing clinical data, specifically the BDI, PCL, or PDS, were replaced using within-person mean imputation. For clients who did not complete measures either at the initial session or the final session, the nearest observation was carried forward if no adjunct treatment was administered, and the nearest observation was within two sessions of the desired observation. Outliers were assessed using Mahalanobis' distance. Outliers were excluded from these analyses if they exceed the chi-squared cutoff score associated with the number of predictors in the model. Further, the assumptions of singularity, normality, linearity, homoscedasticity, and multicollinearity were assessed. Singularity was assessed using Pearson product-moment correlations. Normality and linearity were determined based on a Q-Q plot whereas homoscedasticity was assessed using a residuals plot. Finally, multicollinearity was determined based on Tolerance and VIF metrics.

As the data for this study was collected over several years, which included the release of a new version of the *DSM*, the symptom measures for PTSD were not consistent. Three measures of PTSD symptoms were used: PDS-IV, PCL-IV, and PCL-5. To allow for this data to be used in conjunction, data from these measures were transformed into z-scores. By using z-scores, the data from each of these measures follow a normal curve and therefore was able to be combined into one single index of PTSD symptomology.

Hypothesis 1

It was hypothesized that due to the high rate of comorbidity and symptom overlap between PTSD and depression, the metrics for symptom severity will be interrelated. Further, it was anticipated that gender would interact with PTSD symptom severity. Additional potential interactions between variables of interest were also examined.

- Pearson product-moment correlations were conducted including all continuous variables examined: age, PTSD symptoms, and depressive symptoms. For categorical variables, *t*-tests were used to examine gender and racial differences.

Hypothesis 2

The impact of demographic and clinical characteristics on session attendance was examined. It was hypothesized that:

2a. Clients who were older, female, and/or White will be more likely to be a treatment completer.

- *T*-test and chi-squared analyses were used to demonstrate differences between those who were completers and those who prematurely terminated.

2b. Clients who had lower initial PTSD symptom severity (including for symptom clusters), and/or depressive symptom severity will be more likely to be classified as treatment completers. Specifically, those with lower rates of avoidance and/or hypervigilance will be more likely to have completed treatment.

- To test for differences between groups, *t*-tests were used to examine differences in initial symptom severity between those who completed treatment and those who prematurely terminated.

2c. Older age, female gender, lower avoidance, lower hypervigilance, lower overall PTSD severity, and/or lower depressive symptom severity will be significant predictor variables for completing treatment.

- A logistic regression was used to identify variables that predict treatment completion. As we are not trying to control for demographic variables, but rather examine them along with clinical factors, variables that were significantly different between groups as determined by hypothesis 2a and 2b were included in the model simultaneously.

Hypothesis 3

The influence of demographic and clinical characteristics on PTSD symptom improvement during treatment were examined. It was hypothesized that:

3a. Clients who responded to treatment will be younger, female, and/or White.

- To examine these differences, *t*-tests, and chi-squared analyses were used to examine differences in demographic variables between those who had responded to treatment and those who did not.

3b. Clients who had lower initial PTSD total and/or depressive symptom severity will be more likely to respond to treatment. Clients with lower symptoms in the clusters of avoidance, hypervigilance, and/or re-experiencing will be more likely to respond to treatment.

- To examine which PTSD symptom clusters, overall PTSD severity, or depressive symptom severity relate to treatment response, *t*-tests were utilized.

3c. Younger age, female gender, White race, lower avoidance, hypervigilance, re-experiencing symptoms, lower baseline PTSD symptom severity overall, and/or lower symptoms of depression will be significant predictors of treatment response.

- In a similar manner conducted in hypothesis 2c, a logistic regression was used to examine which variables predict treatment response. Both demographic and clinical variables were entered concurrently.

Hypothesis 4

The demographic and clinical differences between the four groups defined by the TPDA were examined. It was hypothesized that:

4a. Clients who were TPDA-Responders will be more likely to be older, female, and/or White.

- ANOVA and chi-squared analyses were used to identify demographic variables that significantly differed between the 4 groups defined by the TPDA.

4b. Those who were TPDA-Responders will have lower total PTSD severity, avoidance, hypervigilance, re-experiencing, and/or depressive symptom severity.

- ANOVAs were utilized to determine which of these factors related to treatment outcome as outlined by the TPDA.

4c. Younger age, female gender, White race, lower avoidance, hypervigilance, re-experiencing symptoms, lower baseline PTSD symptom severity overall, and/or lower symptoms of depression will be significant predictor variables for being classified as a TPDA-Responder.

- To determine the relative significance of each variable examined, logistic regression models were utilized to investigate the predictor variables for each group (i.e., TPDA-Responder compared to all other clients, etc.). A logistic regression was run for each group that has significant variables identified in Hypotheses 5a or 5b.

Data Preparation

Between January 1, 2012, and March 15, 2020, a total of 235 clients were seen for at least one appointment. Of these clients, 137 of them had at least one session of CPT. The 98 clients who did not engage in CPT were either determined to be inappropriate for trauma-focused treatment, dropped out before beginning treatment, or engaged in PE. In the group of 137 clients who engaged in CPT, 4 clients were referred for a research study and were excluded from these analyses examining community members who self-referred to treatment. Four clients were administered different PTSD symptom measures at initial and final appointments (e.g., PDS and PCL-4) prohibiting analyses comparing pre/post symptomology. The final number of clients included was 129.

Clients missing individual items on symptom measures (PDS, PCL-4, PCL-5, BDI-II), were replaced using within-person mean imputation. At the initial time point, 7 clients were missing PTSD items (5 clients missing 1 item, 2 clients missing 2 items) and 12 clients were missing items within the BDI-II (3 clients missing 2 items; 9 clients

missing 1 item). Those missing items at the final session were 5 clients missing PTSD items (3 clients missing 1 item, and 2 clients missing 4 items). No clients were missing BDI-II items at the final session.

After using within-person mean imputation, those without initial/final values, because the measure was not administered, were assessed for suitability for carrying the most recent value forward/backward. Twenty-two clients were missing at least one value between initial and final depressive and PTSD symptoms (6 clients missing 1 value; 15 clients missing 2 values; 1 client missing 4 values).

Of the 9 clients missing initial symptom values, 5 of them were given symptom assessments for the first time at a second assessment session. Two had measures administered for the first time ahead of their first CPT session, which was later than the second assessment session. For all seven of these clients, their earliest value will be considered the baseline value of their symptoms. Two clients remained with missing initial BDI data; the first was because the BDI-II was never administered during treatment and the other did not complete the BDI-II until session 4 of CPT.

Of the 16 clients with missing final symptom values, 4 were administered symptom measures in the session immediately before termination and 3 were assessed two sessions prior to termination. For all seven of these clients, none participated in any adjunct treatment. For the remaining 9 clients, the last observation carried forward could not be utilized for a variety of reasons. For 8 clients, the last time a symptom measure was administered was greater than two sessions ahead of treatment termination. One client's symptom measures were not available following the first measurement.

Of note, one client had an initial PTSD score of 0, however, at their second assessment appointment their score was 73. It is possible that the individual misunderstood the measure or learned more about PTSD symptoms during the first assessment session. As this individual would never have received PTSD treatment without significant PTSD symptoms, the client's second PTSD assessment of 73 is taken as their initial score.

Concerns regarding the last observation carried forward being too liberal have arisen. Of note, these concerns are related to this method being used to replace missing data that has been lost due to dropout and replacing data with a prior time point that took place a year or more apart (Lachin, 2016). The present data do not fall into either of these categories (dropout or lengthy periods between time points) as data being replaced are within two sessions – and generally approximately two weeks – of the last observation. Additionally, time points being imputed are related to appointments that were kept by the client, rather than missed sessions. Further, imputing data in this manner makes these observations more conservative in that clients would have been expected to continue improving as they continued in treatment.

Box plots were used to assess for univariate outliers. A value was considered an outlier if the value was flagged as an extreme outlier within a box plot meaning their score was at least three times higher than the interquartile range. Based on this criteria, two clients attended significantly more CPT sessions than most clients. As a result, these two clients were removed from future analyses. Following removing the two univariate outliers, all variables met the assumptions of normality and linearity through examination of Q-Q Plots, and skew and kurtosis values were between -2 and 2. Examination of

residuals plots demonstrated that the data met the assumption of homoscedasticity.

Mahalanobis distance was utilized to identify multivariate outliers. A chi-squared cutoff of 16.27 was utilized as there were 3 continuous predictor variables assessed (age, initial PTSD, initial MDD). Using this criterion, no clients were identified as multivariate outliers.

Pearson product-moment correlations were used to assess for variables that may be highly correlated with each other. Initial PTSD symptoms and initial PTSD symptom clusters were highly correlated, which was to be expected to a degree, but the variables were so highly correlated that they cannot be included in the same model due to singularity concerns. Specifically, intrusive, alterations in cognition and mood, and hypervigilance clusters were all highly correlated ($r > .8$) with overall symptoms.

Further concerns about the independence of variables were raised by tolerance and VIF levels. VIF levels were extremely high for initial PTSD symptoms (VIF = 59.49) and were somewhat elevated for intrusive symptoms (7.98), alterations in cognition and mood (9.99), and hypervigilance (8.34). Tolerance levels also indicated multicollinearity concerns with initial PTSD symptoms, intrusive symptoms, alterations in cognition and mood, and hypervigilance all having tolerance below .20. This pattern validated the high correlation identified using Pearson product-moment correlations. As research thus far has focused primarily on initial PTSD symptom total score related to treatment outcomes, the PTSD total score was retained in the model while the individual clusters were excluded. This reduced model demonstrated acceptable levels of Tolerance (Tolerance = $> .20$) and VIF (VIF = < 5).

Results

After removing outliers, the final sample was comprised of 127 individuals (Table 3; see Table 4 for TPDA descriptors). The sample was primarily female (67.7%), White (71.7%), and in their mid-thirties ($M = 36.42$, $SD = 12.09$). Clients attended an average of 10.09 ($SD = 6.07$) sessions of CPT. On average, clients reduced their PTSD symptoms by 38% ($SD = 43\%$). Initial PTSD symptoms were transformed to a z-score leading to a transformed average of .003 ($SD = .99$) suggesting severe PTSD symptoms. Initial BDI-II scores were 31.36 ($SD = 12.47$) on average indicating severe depressive symptoms. For ease of interpreting the following analyses, negative values in PTSD percent change indicate improvement in symptoms whereas positive values suggest worsening of symptoms. For PTSD z-scores, negative values indicate less severe PTSD symptoms and positive values indicate more severe symptoms.

Hypothesis 1

Pearson product-moment correlations were re-run with the reduced sample adjusted for outliers and excluding PTSD symptom clusters (See Table 5). Initial PTSD symptoms were correlated with age ($r = .201$, $p = .024$) and initial depressive symptoms ($r = .760$, $p < .001$), such that those with higher initial PTSD symptoms were older and had higher depressive scores. Percent change in PTSD symptoms was correlated with age ($r = .214$, $p = .018$) and sessions attended ($r = -.230$, $p = .011$). Those who were younger and those who attended more sessions experienced greater PTSD symptom reduction.

Differences in categorical variables were assessed using *t*-tests. Women experienced greater benefits from treatment compared to men as demonstrated through an on average higher percent change in PTSD symptoms ($t(120) = 2.41$, $p = .018$; Levene's Test $F = 3.27$, $p = .07$). Specifically, women on average experienced a 44% reduction in

PTSD symptoms ($SD = 40\%$) whereas men experienced a 24% reduction ($SD = 48\%$). There were no significant differences between men and women in initial PTSD or depressive symptoms, age, or sessions attended.

Regarding race, Black clients presented with worse initial PTSD ($t(116) = 3.23, p = .002$; Levene's Test $F = 1.53, p = .22$) and depressive symptoms ($t(114) = 3.21, p = .002$; Levene's Test $F = .53, p = .47$). Black clients had higher initial PTSD symptoms ($M = .52; SD = .80$) and White clients had lower initial symptoms ($M = -.16; SD = 1.00$). Black clients had higher depressive symptoms ($M = 38.16; SD = 11.06$) compared to White clients ($M = 29.69; SD = 12.31$). It is important to note, that there were no differences in treatment response by race despite these initial differences in symptoms. Additionally, there were no differences in the number of sessions attended or age between black and White clients.

Hypothesis 1 is partially supported as initial PTSD and depressive symptoms were correlated. Although gender was not correlated with symptom severity, it was related to treatment response, which was not directly hypothesized.

Hypothesis 2

Hypothesis 2a is rejected as neither age, gender, nor race were related to treatment completion. Hypothesis 2b is partially supported. Only initial depressive symptoms ($t(123) = -2.63, p = .01$, Levene's Test $F = .15, p = .70$) differed between those who had completed and those who dropped out. Clients who completed had lower initial depressive symptoms ($M = 29.57; SD = 12.25$) compared with those who dropped out ($M = 35.95; SD = 12.01$). Baseline PTSD symptoms did not differ based on session attendance.

Despite there being only one variable that differed between treatment completers and dropouts, the logistic regression model was run to examine the utility of initial depressive symptoms as a predictor of session attendance. The overall logistic regression model was not significant $X^2(8) = 7.66, p = .47$, and explained only 7.7% of the variance in session attendance ($R^2 = .077$). The model was able to correctly classify 71.2% of cases. Despite the overall model not reaching the threshold for significance, initial depressive symptoms remained a significant predictor ($p = .012$) of treatment attendance. Notwithstanding, the odds ratio was not above 1, indicating that depressive symptoms did not meaningfully contribute to session attendance. Thus, hypothesis 2c is partially supported as depressive symptoms explain a small portion of the variance in session attendance.

Hypothesis 3

Hypothesis 3a is partially supported. More women than expected responded to treatment and more men did not respond to treatment than expected ($X^2(1) = 6.11, p = .013$). Response to treatment also differed by age ($t(120) = -2.08, p = .05$ Levene's Test $F = 3.44, p = .07$). Those who responded to treatment were younger on average ($M = 34.28; SD = 12.92$) compared to those who did not respond ($M = 38.81; SD = 9.63$). There were no differences in treatment response by race. As only initial depressive symptoms were related to treatment response, hypothesis 3b is partially supported ($t(118) = -2.24, p = .027$, Levene's Test $F = 1.42, p = .24$). Clients who responded to treatment had significantly lower initial depressive symptoms ($M = 29.18; SD = 13.08$) compared to those who did not respond to PTSD treatment ($M = 34.32; SD = 11.08$). There were no differences in initial PTSD symptoms based on treatment response.

A logistic regression was utilized to examine the effects of age, gender, and initial depressive scores on treatment response. The overall model was not significant $X^2(8) = 11.30, p = .19$, and the predictor variables included explained 15.8% of the variance in treatment response ($R^2 = .158$). The model was able to correctly classify 65.8% of cases. Individual significant predictor variables included gender ($p = .01$) and initial depressive symptoms ($p = .02$). In the full model, age was no longer a significant predictor of treatment response. Despite gender and initial depressive symptoms being significant individual predictors, neither had odds ratios above 1 indicating that the variables are not meaningfully impacting the odds of being a responder or non-responder. The gender and depressive symptom aspects of hypothesis 3c were supported.

Hypothesis 4

To examine which variables should be included in models to examine the TPDA, chi-squared was used to assess categorical variables and ANOVA was used to examine continuous variables. No descriptive variables (age, gender, race) significantly differed among the four TPDA groups. Thus, hypothesis 4a was not supported. Only initial depressive symptoms differed between those who are TPDA-Responders and Early Terminators ($F(3, 116) = 3.32, p = .02, eta-squared = .08$). TPDA-Responders ($M = 28.20; SD = 13.11$) had lower initial depressive symptoms compared to Early Terminators ($M = 37.03; SD = 12.26$).

Although only one variable differed between two of the four TPDA groups, logistic regression models were run to assess the usefulness of initial depressive symptoms in explaining variance in each response. When comparing TPDA-Responders to the other three TPDA groups, the overall model with one predictor was not significant

$X^2(8) = 12.36, p = .14$. This model explained 8.2% of the variance between the groups ($R^2 = .082$) and was able to correctly classify 65.8% of cases. Nonetheless, initial depressive symptoms remained a significant predictor ($p = .008$). Similarly, the logistic regression model comparing Early Terminators to the three other groups was not significant $X^2(8) = 10.38, p = .24$. Initial depressive symptoms explained 8.3% of the variance between the groups ($R^2 = .083$) and the single predictor model was able to classify 80.8% of cases. In a similar manner to the TPDA-Responder model, initial depressive symptoms continued to be a significant predictor ($p = .016$). Initial depressive symptoms did not have an odds ratio above 1 for either model indicating that it is not meaningfully contributing to the outcome. As such, hypothesis 4c was partially supported.

Discussion

Further examining different treatment outcome definitions and the variables that relate to differing outcomes is essential for both clinicians and researchers. Increased specificity in patterns of treatment response furthers providers' ability to tailor treatment and researchers gain increased clarity in their inquiries. In the past, treatment response and session attendance have often been examined as separate constructs rather than interrelated entities. Throughout all four hypotheses examined, initial depressive symptoms were related to multiple definitions of treatment outcomes. Those with comorbid PTSD and depression may struggle to fully engage in treatment, experience hopelessness regarding their ability to change, and have an external locus of control (Levi et al., 2019; Zayfert et al., 2005). The present study also provided initial clarity on how results may differ depending on the definition or combination of definitions used to

operationalize treatment outcome. Only one variable, initial depressive symptoms, related to session attendance in isolation and when using the TPDA. Age, gender, and initial depressive symptoms were all related to symptom reduction. Age and gender, however, were not related to TPDA-defined outcomes.

Across hypotheses, initial depressive symptoms were consistently related to treatment outcome. This was the only variable related to treatment completion. Those who completed treatment had lower initial depressive symptoms. Differences in baseline depression symptoms appear to account for 7.7% of the variance in treatment completion. The overall logistic regression model, however, was not significant, and the odds ratio was below 1, limiting the interpretability of these results. Previous studies have demonstrated that lower initial depressive symptoms are related to increased PTSD treatment session attendance (Haven et al., 2022). This suggests that those without comorbid concerns, in this case, depression, are increasingly able to persist in CPT (Maguen et al., 2019). Further, self-report measures like the BDI-II can also be indices of overall distress. Thus, this finding may suggest that those in less distress or without comorbid psychological conditions are better able to manage regular treatment attendance.

When examining the TPDA, results suggest differences in predictive variables based on this definition. Between the four groups, only initial depressive symptoms significantly differed between TPDA-Responders and Early Terminators. Although neither logistic regression model was significant overall, initial depressive symptoms remained an individual significant predictor of outcome in both models. Specifically, initial depressive symptoms explained 8.2% of the variance in being a TPDA-Responder

and 8.3% of the variance in belonging to the Early Terminator group. Again, in neither model were initial depressive symptoms a significant contributor from an odds ratio perspective. As noted above comorbid depression increases the risk of leaving treatment early (Haven et al., 2022) and not responding to treatment (Maguen et al., 2019).

Importantly, for those with comorbid PTSD and depression, behavioral activation may be a particularly relevant treatment to consider given its effectiveness for both disorders (Etherton & Farley, 2022).

It is important to note, that there may have been too few clients per group to detect all variables that may be related to the different outcomes. Specifically, only 13 clients fell in the Early Responder group and the Early Terminator and TPDA-Non-Responder groups had 23 and 25 clients respectively. This is compared to 61 patients in the TPDA-Responder group. The sample size remaining after data cleaning was likely underpowered to detect meaningful differences between these groups. Due to the small sample size, it is understandable that the only groups with significant differences are the antithesis of each other; specifically, TPDA-Responders and Early Terminators. This approach may not be suitable for small sample sizes. It is possible that the present results for treatment response were washed out by the results from session attendance when combined using the TPDA. Thus, although this definition may be helpful for increased specificity, there may be a need for a greater sample size to adequately detect differences.

Increased session attendance was correlated with greater symptom reduction. It is not surprising that those who attend more CPT sessions experience greater PTSD symptom improvement, in agreement with numerous prior studies (e.g., Berke et al., 2019). It should be noted that this does not imply that therapy with an indeterminate

termination date will be more beneficial. Rather, attending more sessions of a time-limited, evidence-based treatment is generally more beneficial than fewer sessions. In this sample specifically, the average number of CPT sessions attended was 10 with a standard deviation of 6 sessions. Previous literature supports a more customized identification of treatment completion from CPT with 58% of participants benefiting from fewer than 12 sessions, only 8% benefiting and ending at session 12, and 34% needing 13-18 sessions to benefit fully from treatment (Galovski et al., 2012). Of note, improvement in PTSD symptoms was not correlated with initial PTSD or depressive symptoms, which contrasts with previous literature (Murphy & Smith, 2018). Higher initial PTSD symptoms correlated with higher initial depressive symptoms is also a pattern previously reported (Haven et al., 2022). Further, when examined in a binary manner below, initial depressive symptoms were related to symptom improvement.

Those who were younger, female, and had lower initial depressive symptoms experienced greater PTSD symptom reduction during treatment. All three variables were examined in a logistic regression model. The overall model was not significant, but individually, gender and depressive symptoms remained significantly predictive variables, although without meaningful odds ratios. The model overall explained 15.8% of the variance in treatment response and the model had a 65.8% correct classification rate. Of note, measures of the length of time since the traumatic event and chronicity of PTSD symptoms since trauma exposure were not available. Thus, the results related to age may be better explained by the time since the traumatic event or chronicity of symptoms. These results confirm previous research noted above indicating that women are more likely to benefit from PTSD treatment (Shiner et al., 2019; Stefanovics &

Rosenheck, 2020). Further, results also align with prior research indicating those with fewer depressive symptoms are more likely to benefit from treatment (Haven et al., 2022; Murphy & Smith, 2018). The contrast in results between hypotheses 2 and 3 suggests that there may be more variables relevant to treatment response compared to treatment attendance.

It should be noted that results pertaining to age are largely limited to early adulthood through the beginning years of middle adulthood. Although the age range included in the study was 18-68, ($M = 36.42$; $SD = 12.09$), a total of 22 clients (17.3% of sample) were above 50 years, and only two clients (1.6% of sample) were above 65 years old. In the present study, younger age was correlated with both lower initial PTSD symptoms and greater percent PTSD symptom improvement. These results contrast with previous studies that indicate older individuals typically have lower baseline PTSD symptom severity (Konnert & Wong, 2015; Reynolds et al., 2016). Specifically, Konnert & Wong demonstrated that their youngest age group (22-35 years) had significantly higher PTSD symptoms than the 46-64 and 65-87 age groups, but no differences between those aged 36-45 years (2015). Similarly, Reynolds and colleagues indicated that young adults (20-34 years) and middle-aged adults (35-64 years) had higher PTSD symptoms than older adults (65+ years) in the sample (2016). Due to the limited age range in the present study, age related differences may be identifying more nuanced differences between younger adults and middle-aged adults. There are several studies indicating a relationship between younger age and optimal PTSD treatment outcomes (Dewar et al., 2020; Resick et al., 2020; Szafranski et al., 2017). Despite this, there is also research indicating that older individuals experienced higher rates of PTSD symptom

improvement from trauma-focused cognitive behavior therapy with an age distribution like the present study ($M = 38.33$; $SD = 12.20$; Deisenhofer et al., 2018). As data regarding length of time since trauma and chronicity of symptoms were not available, it is impossible to determine if these factors would explain the results related to age. Future research should carefully examine the role of length of time since trauma and chronicity of symptoms when studying age to best determine which factor is most relevant to PTSD treatment response.

Consistent with previous literature, women benefited more from treatment than men in the present study (Shiner et al., 2019; Stefanovics & Rosenheck, 2020). Women within the sample on average experienced a 20% greater PTSD symptom decrease compared to their male counterparts. Much speculation has been made over why women may benefit more from therapy generally and from PTSD treatment specifically. Socialized gender roles may partially explain why women are more likely to have greater benefits from treatment including traditional masculine beliefs and socialization (Lorber & Garcia, 2010), such as comfortability discussing and experiencing emotions, expectations for treatment, and higher rates of gender match for women patients. Specifically, there is a higher probability of gender match given clinical psychology becoming a more female-dominated field (75% of clinical psychology graduate students were women in 2014; Clay, 2017) and women express higher treatment-seeking intentions (Mackenzie, 2006).

Black clients reported higher initial PTSD and depressive symptoms. Black Veterans have reported higher levels of re-experiencing compared to White Veterans (Coleman et al., 2019). Others, however, have indicated no differences in initial PTSD or

depressive symptoms between races (Lester et al., 2010). This pattern may reflect higher rates of daily life stressors related to the lived experiences of Black people that are perpetuated by racism and institutionalized racism. Of note, some participants in this sample may have been particularly impacted by the murder of Michael Brown by a police officer on August 9th, 2014, in nearby Ferguson, Missouri. The minority stress model (Meyer, 1995) and transgenerational trauma (Danieli, 1982; Graff, 2014) theories have been suggested as models for the phenomenon of higher PTSD symptoms in Black individuals (Coleman et al., 2019). Despite differences in initial symptom severity, there was no difference in treatment response by race. This finding is consistent with previous literature (Zoellner et al., 1999) but inconsistent with more recent studies indicating poorer outcomes for Black clients (Gross et al., 2022; Sripada et al., 2019). Although it is reassuring that Black and White clients can be anticipated to experience proportional improvements in treatment, a 30% symptom reduction for a White client is not equal to a 30% reduction for a Black client. Specifically, Black clients will continue to have higher PTSD scores at termination compared to White clients if they present with higher baseline symptoms. In all, these results add to the literature examining differences in presentation and outcome by race.

Limitations

The sample size of the study may have limited the ability to thoroughly examine the TPDA. Of course, it is also possible that there would not have been significant findings regardless. Thus, there could have been null results regardless of the sample size. The generalizability of these results is limited as the sample was predominantly female (67.7%) and White (71.7%). Further, the sample largely consisted of those in early and

middle adulthood. The drawbacks of this aspect of the sample population are significant but balanced by the fact that the sample was naturalistic and therefore is more highly generalizable to those in the community seeking treatment for PTSD. Initial PTSD symptoms were not related to any of the treatment outcomes identified, in contrast to previous studies (Haven et al., 2022; Murphy & Smith, 2018; Smith et al., 2019). It is possible that the necessity of transforming PTSD scores to z-scores to increase the sample reduced the variance within the initial PTSD symptom variable.

Future Directions

The logistic regressions conducted in the present study explained only 7.7-15.8% of the variance in treatment outcome, suggesting that other variables explain significant variance in outcome. The field would benefit from future studies examining these additional variables such as social support, the presence of other comorbidities, and SES. Further, additional studies with larger sample sizes and replication studies would be extremely beneficial to clarify with more consistency which variables are the most important for different treatment outcomes.

Conclusion

Despite the limited differences between the four groups of the TPDA, these initial results demonstrate that this definition can provide additional clarity, although a larger sample size may be required. When examining session attendance and symptom reduction independently, initial depressive symptoms were found to relate to both outcomes. PTSD symptom improvement, however, is related to age and gender in addition to depressive symptoms. When examining both outcomes simultaneously, initial depressive symptoms only related to the two most extreme groups: TPDA-Responders

and Early Terminators. Thus, this study provided an important proof of concept that this definition may provide important value in understanding variables that can impact PTSD treatment outcomes in the future.

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Table 1
Current Operational Definitions of Attrition

Study	Operational Definition
Hatchett & Park, 2003	Did not attend final session scheduled
Hatchett & Park, 2003	Terminating therapy prior to experiencing a clinically significant level of improvement
Hatchett & Park, 2003	Therapist judgement, the therapist determines on a case-by-case basis who prematurely terminated
Hatchett & Park, 2003	Median Split: take the median number of sessions attended, above and below delineate those who dropped out and those who completed
Swift et al., 2009	Therapeutic Dose: attending a specified number of sessions believed to be the minimum required to benefit from treatment
Swift & Greenburg, 2012	Client's unilateral decision to terminate therapy after initiating without improving

Figure 1
Two-Part Definition of Attrition

		Treatment Completion ¹	
		Yes	No
Symptom Relief ²	Yes	TPDA-Responder	Early Responder
	No	TPDA Non-Responder	Early Terminator

¹ Treatment completion is defined as attending 6 or more sessions of CPT.

² Symptom relief is defined as a 30% reduction in symptoms from baseline to final session.

Table 2

Study Definitions of Attrition Examining the Relationship Between Age and Attrition

Study	Definition of Attrition	Sample
Eftekhari et al., 2019	Fewer than 8 sessions	US Veterans
Goodson et al., 2017	Treatment Completion	US Veterans
Harte et al., 2013	Treatment Completion	Civilians
Kehle-Forbes et al., 2016	Treatment Completion	US Veterans
Levi et al., 2019	Treatment Completion	Israeli Veterans
Maguen et al., 2019	Treatment Completion	US Veterans
Niles et al., 2018	Fewer than 4 sessions	US Veterans

Table 3

Demographics and Clinical Characteristics (N = 127)

Characteristic	n	%
Gender (female)	86	67.7%
Race (White)	91	71.7%
Completed	90	70.9%
Responded	74	58.3%
	<i>M</i>	<i>SD</i>
Age (years)	36.42	12.09
Sessions	10.09	6.07
Initial PTSD (z scores)	.003	.99
Initial BDI-II	31.36	12.47
% Change PTSD Symptoms	-.38	.43

Table 4

Demographics and Clinical Characteristics of TPDA Groups

	TPDA- Responder: n = 61		Early Responder: n = 13		TPDA Non- Responder: n = 25		Early Terminator: n = 23	
Characteristic	n	%	n	%	n	%	n	%
Gender (female)	45	73.8	11	84.6	14	56.0	12	52.2
Race (White)	43	70.5	10	76.9	18	72.0	17	73.9
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age (years)	35.16	13.43	30.15	9.57	39.64	9.70	37.91	9.69
Sessions	12.84	4.25	3.69	1.49	12.96	5.18	2.87	1.18
Initial PTSD (z scores)	-.19	1.06	.23	.94	.09	.98	.21	.85
Initial BDI-II	28.20	13.11	34.66	12.00	31.83	9.44	37.03	12.26
% Change PTSD Symptoms	-.69	.20	-.60	.18	.06	.30	.11	.23

Table 5

Intercorrelation for Variables included in Logistic Regression Models

Variable	1	2	3	4	5
1. Age	-	-	-	-	-
2. PTSD Z scores	.201*	-	-	-	-
3. Initial BDI	.148	.760**	-	-	-
4. CPT Sessions Attended	.084	.020	-.036	-	-
5. PTSD % Change	.214*	.067	.160	-.230*	-

Table 6

Hypothesis 2: Summary of Logistic Regression Analysis Predicting Session Attendance

Variable	<i>B</i>	<i>SE</i>	<i>OR</i>	95% CI	Wald Statistic	<i>p</i>
Initial BDI	-.04	.02	.96	[0.92, 0.99]	6.32	.012

Note. CI = confidence interval for odds ratio (*OR*).

Table 7

*Hypothesis 3: Summary of Logistic Regression Analysis Predicting Treatment**Response*

Variable	<i>B</i>	<i>SE</i>	<i>OR</i>	95% CI	Wald Statistic	<i>p</i>
Age	-.03	.02	.97	[0.94, 1.01]	2.67	.102
Gender	1.07	.43	2.92	[1.27, 6.71]	6.36	.012
Initial BDI	-.04	.02	.96	[0.93, 0.99]	5.29	.022

Note. CI = confidence interval for odds ratio (*OR*).

Table 8

Hypothesis 4: Summary of Logistic Regression Analysis Predicting TPDA-Responder

Variable	<i>B</i>	<i>SE</i>	<i>OR</i>	95% CI	Wald Statistic	<i>p</i>
Initial BDI	-.04	.02	.96	[0.93, 0.99]	6.98	.008

Note. CI = confidence interval for odds ratio (*OR*).

Table 9

Hypothesis 4: Summary of Logistic Regression Analysis Predicting Early Terminator

Variable	<i>B</i>	<i>SE</i>	<i>OR</i>	95% CI	Wald Statistic	<i>p</i>
Initial BDI	.05	.02	1.05	[1.01, 1.09]	5.81	.016

Note. CI = confidence interval for odds ratio (*OR*).