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# THE ROLE OF AVOIDANCE IN PTSD SYMPTOM MAINTENANCE

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by

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## Abstract

Theories of posttraumatic stress disorder (PTSD) generally agree that, among the symptom clusters of the disorder, the avoidance cluster is central to the maintenance of PTSD. This assumption has not been adequately tested, however, leaving the empirical evidence mixed in regard to how the symptom clusters of PTSD function together. The major limitations of the prior literature include not using true PTSD samples and largely using cross-sectional research designs. Additionally, the most well-designed study to test this question (Schell, Marshall, & Jaycox, 2004) does not support the accepted theory, furthering the need to adequately test the role of avoidance in maintaining PTSD symptoms. In the current study, I used cross-lagged models to examine how the various PTSD symptom clusters predicted each other over six weeks in a clinical, chronic PTSD sample. Results indicated that reexperiencing and avoidance are both central to PTSD maintenance, challenging widely accepted views that avoidance is the central maintaining factor of the disorder. Thus, PTSD may be more accurately conceptualized in terms of a biphasic reexperiencing-avoidance maintenance cycle. Further, treatment of PTSD may benefit from a greater focus on decreasing reexperiencing symptoms.

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# Chapter 1

## INTRODUCTION

Posttraumatic stress disorder (PTSD) is a psychological condition accompanied by a myriad of negative consequences. Individuals with PTSD experience decreased quality of relationships (e.g., Riggs, Byrne, Weathers, & Litz, 1998; Zoellner, Foa, & Brigidi, 1999), increased physical health problems (e.g., Litz, Keane, Fisher, Marx, & Monaco, 1992; Schnurr, Green, & Kaltman, 2007), substance use (Brady, Back, & Coffey, 2004), impulsive behaviors (Kessler et al., 2008), binge eating (Brewerton, 2007), and impaired work performance (Greenberg et al., 1999). The economic cost of PTSD is high for individuals with PTSD, their families, and society (Brunello et al., 2001; Greenberg et al., 1999). Greenberg and colleagues (1999) found that, among those with anxiety disorders, individuals with PTSD and panic disorder had the highest rates of service utilization. Specifically, PTSD was a significant predictor of number of hospital visits, as well as visits to physicians, psychologists, psychiatrists, other specialists, counselors, and social workers. Further, PTSD is significantly associated with medical and psychosocial disability status (Brunello et al., 2001) and has a high comorbidity rate with many other psychological disorders, including depression and anxiety disorders (Brunello et al., 2001; Kessler, Chiu, Demler, & Walters, 2005). Given the high emotional and fiscal cost of PTSD to individuals with the disorder, their friends and families, and society, it is of utmost importance to understand how chronic PTSD is maintained in order to effectively target critical aspects of the disorder to reduce PTSD symptomatology and the related negative consequences.

The DSM-IV-TR (APA, 2004) describes PTSD as consisting of three symptom clusters: reexperiencing (i.e., upsetting thoughts or memories of the trauma, nightmares, reliving the trauma, distress in response to trauma cues, physiological reactivity to trauma cues), avoidance (i.e., avoiding thoughts, feelings, or conversations associated with the trauma, avoiding activities,

places, or people associated with the trauma, inability to remember aspects of the trauma, diminished interest in previously enjoyed activities, feeling detached from others, restricted range of affect, sense of foreshortened future), and hyperarousal (i.e., exaggerated startle, hypervigilance, sleep difficulty, irritability or anger outbursts, difficulty concentrating). While the DSM-IV conceptualizes avoidance as one cluster, the DSM-5 (APA, 2013) separates avoidance into two separate clusters: behavioral avoidance and negative alterations in cognitions and mood (henceforth in the document referred to as 'alterations in cognitions/mood'). In this four-cluster model of PTSD, behavioral avoidance consists of avoiding thoughts, feelings, or conversations associated with the trauma as well as avoiding activities, places, or people associated with the trauma, while alterations in cognitions/mood consists of the inability to remember aspects of the trauma, persistent negative beliefs about oneself or the world, persistent distorted blame of self or others, persistent negative trauma-related emotions, diminished interest in previously enjoyed activities, feeling detached from others, and a restricted range of affect. Behavioral avoidance is seen as the more conscious or purposeful form of avoidance. Research has been fairly consistent in supporting the four-factor model of PTSD over the three-factor model (e.g., Blake et al., 1990; Elklit & Shevlin, 2007; King, Leskin, King & Weathers, 1998; McWilliams, Cox, & Asmundson, 2005; Naifeh, Elhai, Kashdan & Grubaugh, 2008; Scher, McCreary, Asmundson & Resick, 2008).

Research on PTSD has burgeoned since its inception as a formal disorder in 1980, but which symptom cluster drives its longitudinal maintenance remains inadequately understood. This is critical in order to substantiate or disconfirm various theoretical models of PTSD. Empirically testing theories of PTSD also has strong implications for PTSD treatment. As Bradley and colleagues (Bradley, Greene, Russ, Dutra, & Westen, 2005) highlight, chronic

PTSD is difficult to treat. Up to half of those treated retain PTSD diagnoses at posttreatment, and treatment responders still often report considerable PTSD symptoms at posttreatment (Bradley et al., 2005), indicating that better understanding how PTSD functions as a disorder could lead to improvements in treatment approaches.

Both etiology and maintenance are important to examine in order to better understand how PTSD functions as a disorder. Though PTSD treatment still has room for substantial improvement, it has proven to be effective for many individuals (Bradley et al., 2005), while PTSD prevention efforts have shown less promise in that results of PTSD prevention programs are mixed at best, while some PTSD prevention programs (e.g., critical incident stress debriefing) have actually been found to increase PTSD symptoms (Feldner, Monson, & Friedman, 2007). Therefore, informing how to break the PTSD maintenance cycle is more likely to lead to improved outcomes than PTSD prevention efforts. Testing this with the ultimate goal of knowing what to initially target in PTSD treatment is needed, and examining PTSD maintenance by looking at which of its symptom clusters influences the others most strongly over time is an informative way to do this.

**Theories of PTSD Maintenance**

Many different theoretical accounts of PTSD have been formulated over the last several decades. While these theories focus on different aspects of PTSD and many differ in terms of causal etiological factors, they generally agree that avoidance is a central maintaining factor for PTSD, though avoidance is discussed in different ways throughout the different theories.

The broadest of these theories is Horowitz's (1976, 1986) stress response theory. Stress response theory is psychodynamically informed, and posits that anyone who experiences a trauma experiences initial distress, then tries to assimilate the trauma with prior experiences.

When this attempted assimilation fails, avoidance occurs. Then when defensive coping mechanisms are overwhelmed and avoidance is no longer successful, reexperiencing occurs. Once the distress becomes too much to tolerate, the avoidance phase begins again. Reexperiencing and avoidance are seen as biphasic, antithetical processes (i.e., they are mutually exclusive and cannot overlap or occur together) that work together to maintain the disorder. Avoidance precedes reexperiencing in the development of PTSD, and reexperiencing and avoidance are seen as central maintaining factors of the disorder, while emotional numbing (part of the DSM-5 negative alterations in cognitions/mood symptom cluster) is seen as a secondary part of the avoidance phase.

One of the theories that tends to be most incorporated into more recent theoretical accounts of PTSD is Keane, Zimering, and Caddell's (1985) classical conditioning theory. In this account of PTSD, stimulus generalization of fear occurs after the trauma. Avoidance of trauma-related stimuli then makes exposure to the feared stimulus incomplete, which blocks extinction. Avoidance is negatively reinforced when anxiety decreases after avoiding exposure to a feared stimulus. Avoidance causes more reexperiencing (as the avoidance is ineffective and the fear generalizes) and hyperarousal (due to frequent intrusive memories), thus driving the maintenance process.

Several theories have built on the classical conditioning model. Foa and colleagues' emotional processing theory (Foa & Rothbaum, 1998; Foa, Steketee, & Rothbaum, 1989; Rauch & Foa, 2006) and Chemtob and colleagues' (Chemtob, Roitblat, Hamada, Carlson, & Twentyman, 1988) information processing theory conceptualize trauma as uniquely represented in memory as a fear network, where psychopathology results if the trauma memory is not processed correctly. Behavioral avoidance is thought to maintain these fear networks, similar to

classical conditioning theory. In the emotional processing model, emotional numbing is caused by hyperarousal and avoidance, as the constant stress of reexperiencing and hyperarousal symptoms becomes overwhelming, so a "numbing out" effect occurs (Foa, Riggs, & Gershuny, 1995). Similarly, Jones and Barlow's (1990) anxious apprehension model is based on Keane and colleagues' (1985) classical conditioning model where "false alarms" develop following the "true alarm" of the trauma (i.e., stimulus generalization). This false alarm cycle then causes a feedback loop between hyperarousal and reexperiencing symptoms, and avoidance maintains this feedback loop.

Subsequent theories have focused on different aspects of PTSD. Janoff-Bulman's (1992) theory of shattered assumptions focuses on cognitive aspects of the disorder, where the trauma violates the three common assumptions that people have (i.e., the world is benevolent, the world is meaningful, and the self is worthy). The reexperiencing-avoidance cycle described by Horowitz arises when the shattered assumptions are unable to be assimilated to integrate the trauma, and avoidance maintains this cycle. Ehlers and Clark's (2000) cognitive model similarly focuses on cognitive processing aspects of the trauma, as they theorize that the trauma is processed in a way that leads to a sense of current threat (again, stimulus generalization), though their focus is on the cognitive processing style that occurs following the trauma, specifically excessively negative appraisals of the traumatic event and disruption of autobiographical memory via problematic cognitive processing. Ehlers and Clark posit that appraisals maintain PTSD by producing negative emotions that lead to negative coping (e.g., avoidance behavior). Negative coping then increases reexperiencing (Horowitz's reexperiencing-avoidance cycle), and avoidance is seen as one maintaining factor of PTSD.

**How Various Forms of Avoidance Inform PTSD Maintenance**

There has been a good deal of prior research conducted that is relevant to examining the role of various forms of avoidance in PTSD. While the literature generally highlights the key role of avoidance in PTSD, many of the methods have been deeply flawed. Most problematic is the use of PTSD avoidance symptoms to predict total symptom severity, which also includes the PTSD avoidance symptoms (i.e., avoidance being used to predict itself, in part). The redundancy in predicting three clusters using one of those same clusters is problematic. In order for the research to be informative, avoidance needs to be used to predict other PTSD symptoms (excluding the avoidance cluster). Additionally, it may be useful to examine other forms of avoidance (i.e., outside of PTSD specific avoidance symptoms), in order to inform avoidance processes in PTSD using a broader literature.

There are several different types of avoidance that can inform better understanding PTSD maintenance. One type that has been examined is thought suppression, or the process of deliberately trying to stop thinking about certain things (Wenger, 1989). Thought suppression is a cognitive avoidance strategy that is highly relevant to PTSD, as it is very similar to the behavioral avoidance aspect of avoiding trauma-related thoughts. Experiential avoidance, or trying to avoid feelings, thoughts, memories, physical feelings, and other internal experiences (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996), is another frequently examined form of avoidance in PTSD. Emotion regulation, or the processes in an individual that changes an activated emotion (Cole, Martin, & Dennis, 2004), is less often conceptualized as a form of avoidance; however, as most strategies of emotion regulation are aimed at reducing distress by avoiding negative emotions (e.g., refusing to accept one's emotions), it is beneficial to think of most forms of emotion regulation as a type of avoidance. Finally, as several PTSD specific

treatments focus on minimizing avoidance, the PTSD treatment outcome literature is a relevant area to examine.

**Cross-sectional studies.** Total PTSD symptom severity has been predicted by PTSD avoidance symptoms using cross-sectional designs on several occasions (Bödvarsdóttir, Elklit, & Gudmundsdóttir, 2006; Dempsey, Overstreet, & Moely, 2000; Steil & Ehlers, 2000; Tull, Gratz, Salters, & Roemer, 2004). As there is a high degree of conceptual overlap between avoidance symptoms of PTSD and these various forms of avoidance, it drastically minimizes the conclusions that can be drawn about the role of the avoidance symptom cluster in PTSD, as avoidance symptoms are included in the dependent variable. Additionally, these studies largely imply directional relationships (e.g., avoidance leads to increased PTSD symptomatology) when the authors did not use study designs to support this conclusion. Another methodological limitation is the lack of an established PTSD measure (Dempsey et al., 2000) or the use of self-report PTSD measures (Bödvarsdóttir et al., 2006; Steil & Ehlers, 2000; Tull et al., 2004) instead of an interview measure assessing PTSD symptoms. Self-report measures can be unreliable, particularly in PTSD, as avoidance is a difficult construct to assess. As those with PTSD often also have high levels of anxiety and depression (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995), it is difficult to tease out PTSD-specific distress from more generalized distress (Armour et al., 2011). Additionally, individuals with PTSD may not realize they are avoiding various people, places, etc., making it difficult for them to report on their avoidance behaviors (i.e., avoidance makes it difficult to recognize avoidance). An interview measure is an essential step to more accurately measure avoidance in PTSD, as the interviewer is able to probe more in depth about the nature of potential avoidance behaviors.

**Experimental studies.** The experimental literature largely supports the central role of avoidance in PTSD maintenance, though not all of the literature is PTSD specific. In a meta-analysis, Abramowitz and Tolin (2001) found an overall small-to-moderate effect size for thought suppression increasing thought frequency; however, there was substantial variability across studies. For example, initial basic research demonstrated that thought suppression leads to more intrusions (similar to PTSD reexperiencing symptoms) in the "white bear" experiments (Wegner & Erber, 1992; Wegner, Erber, & Zanakos, 1993; Wenzlaff & Bates, 2000); however, some researchers have found that thought suppression does not increase thought frequency (e.g., Muris, Merckelbach, & de Jong, 1993; Roemer & Borkovec, 1994). Important to note is that few clinical samples were used, let alone clinical PTSD samples. Therefore, it is unknown whether these effects generalize to those with PTSD.

**Trauma Analogue Studies.** The use of clinical samples is important in order to examine whether avoidance processes work similarly in those with psychopathology, as it has been suggested that trauma-related thought suppression operates differently than non trauma-related thought suppression (Shipherd & Beck, 2005). Trauma analogue studies are a helpful first step to inform these processes in clinical populations, though they are not sufficient to take the place of research using true clinical populations. Harvey and Bryant (1998) found increased trauma-related thoughts following a violent film clip in those instructed to suppress thoughts related to the clip compared to those not instructed to suppress, while Davies and Clark (1998) found a suppression-related “rebound effect” where thought suppression immediately decreased trauma-related thoughts, but increased the thoughts following a delay. Both of these studies used undergraduate samples.

Within PTSD-specific literature, thought suppression has generally been found to be associated with increased PTSD symptoms. Shipherd and Beck (2005) found that participants with PTSD experienced a suppression-related rebound effect (similar to Davies & Clark, 1998), while participants without PTSD did not experience this effect. Additionally, the PTSD group did not experience the suppression rebound effect for neutral cognitions (i.e., thoughts about neutral stimuli as opposed to trauma-relevant stimuli). This study supports the idea that avoidance maintains reexperiencing, and indicates that trauma-specific avoidance may be distinct from non trauma-specific avoidance in those with PTSD. Conversely, Roemer and Salters (2004) found that thought suppression in rape survivors was not associated with trauma-related thoughts, but was associated with increased physiological arousal, suggesting that avoidance may not drive reexperiencing, but may drive hyperarousal instead.

Overall, the thought suppression literature generally supports the central role of avoidance in PTSD maintenance, but some measurement limitations exist and results have not been particularly consistent across the literature.

**Treatment Outcome Studies.** Most PTSD treatments, such as prolonged exposure therapy (PE; Foa et al., 1999; Foa, Rothbaum, Riggs, & Murdock, 1991) and cognitive processing therapy (CPT; Resick & Schnicke, 1992, 1993), emphasize decreasing avoidance as a primary goal of therapy. These treatments have been shown to be effective in treating PTSD (e.g., Bradley et al., 2005; Eftekhari, Stines, & Zoellner, 2006; Foa, Keane, & Friedman, 2000; Monson et al., 2006; Resick, Nishith, Weaver, Astin, & Feuer, 2002), suggesting that targeting avoidance in PTSD is an effective treatment strategy and that avoidance may be a driving factor in PTSD maintenance. In addition, several therapies not specifically designed to treat PTSD have incorporated foci on aspects of emotion regulation [e.g., dialectical behavioral therapy (DBT),

Linehan, 1993; acceptance and commitment therapy (ACT; targets increasing acceptance instead of avoiding emotional experiences), Hayes, Strosahl, & Wilson, 1999] with success (e.g., Batten & Hayes, 2005; Linehan, Armstrong, Suarez, Allmon, & Heard, 1991; Orsillo & Batten, 2008), also indicating that decreasing avoidance may be helpful in reducing psychopathology. DBT is focused on treating those with borderline personality, which is highly comorbid with PTSD, and though it is relatively new, has had preliminary success in treating those with PTSD (Bohus et al., 2013; Bohus, Dyer, Priebe, Krüger, & Steil, 2011; Bradley & Follingstad, 2005; Steil, Dyer, Priebe, Kleindienst, & Bohus, 2011). Additionally, Harned and colleagues (Harned, Korslund, Foa, & Linehan, 2012) have integrated PE and DBT into a unified protocol, with preliminary success.

Conversely, Resick and colleagues (Resick et al., 2008) conducted a dismantling study of CPT and determined that the combination of cognitive therapy with trauma-focused writing components (designed to decrease avoidance) did not significantly improve PTSD symptoms above either the writing component or the cognitive therapy alone, indicating that targeting avoidance directly did not improve treatment outcome. However, in theory, cognitive treatment may indirectly decrease avoidance, as trauma-relevant information is being discussed, thereby rendering the client unable to completely engage in avoidance. Therefore, the literature is not straightforward regarding the role of targeting avoidance in treatment for PTSD. Clarifying this issue can inform how to best treat PTSD (e.g., it may be helpful to target certain forms of avoidance before others or it may be that initially targeting another PTSD symptom cluster is more fruitful) and if avoidance is the driving symptom cluster in PTSD maintenance.

**Longitudinal Studies.** Examining the longitudinal research is crucial to informing the role of avoidance in PTSD, as this design allows for more solid conclusions to be drawn about

which PTSD symptom cluster influences the other clusters most over time. Much of the longitudinal literature is supportive of the central role of avoidance in PTSD maintenance (e.g., Dunmore, Clark, & Ehlers, 2001; Lawrence, Fauerback, & Munster, 1996; Marx & Sloan, 2005; Plumb, Orsillo, & Luterek, 2004); however, methodological limitations significantly temper this conclusion.

Kumpula and colleagues (Kumpula, Orcutt, Bardeen, & Varkovitzky, 2011) focused on the role of experiential avoidance in predicting PTSD symptom severity. Experiential avoidance is a construct that is slightly broader than PTSD-specific avoidance. That is, the definition of experiential avoidance (trying to avoid feelings, thoughts, memories, physical feelings, and other internal experiences; Hayes et al., 1996) clearly encompasses significant aspects of PTSD-specific avoidance. This results in avoidance being used to essentially predict itself (i.e., experiential avoidance being used to predict total PTSD symptomatology, which includes PTSD-specific avoidance). Not surprisingly, Kumpula and colleagues (2011) found that experiential avoidance predicted reexperiencing, behavioral avoidance, emotional numbing, and hyperarousal one month after participants were exposed to a campus shooting. However, experiential avoidance only predicted reexperiencing and hyperarousal eight months post-shooting and did not predict behavioral avoidance or emotional numbing. While this design has the flaw of essentially using avoidance to predict itself, it is nevertheless interesting that avoidance did not predict itself eight months out, indicating that avoidance may be less stable over time than the field tends to view it.

In a longitudinal design assessing predictors of chronic PTSD following motor vehicle accidents where participants were assessed post-trauma, at three months, and at one year, Ehlers and colleagues (Ehlers, Mayou, & Bryant, 1998) found thought suppression (conceptualized as a

form of avoidance) to be a maintaining factor of PTSD. However, thought suppression was only assessed through one questionnaire item, tempering the conclusions that can be drawn. Conversely, Joseph and colleagues (Joseph, Yule, & Williams, 1994) found that reexperiencing predicted anxiety and depression 19 months following a traumatic event, while avoidance did not. Self-report measures were used, hyperarousal was not assessed, and no diagnostic interview measure of PTSD was given. Finally, Lawrence and colleagues (1996) found that PTSD avoidance predicted intrusive thoughts among burn survivors measured upon discharge from the hospital to four months post-discharge. However, they did not measure the hyperarousal symptom cluster.

The results of the literature are mixed, though the studies are not directly comparable, making it difficult to evaluate them on the same metric. Few studies have examined which PTSD symptom cluster influences the other symptom clusters most over time, and those that have contain serious methodological flaws.

**Cross-lagged designs.** In order to best inform which PTSD symptom cluster most influences the other clusters over time, a design that permits an examination of causality is imperative. The cross-lagged method is one such method that assesses causality in the absence of a true experimental design (Anderson & Kida, 1982). It compares cross-lagged regressions over various time points in order to determine whether Granger causality is present (Granger, 1969). Granger (1969) argues that through such cross-lagged methodology, causal inferences can be drawn about how one variable (x) influences the future values of another variable (y).

Three cross-lagged studies have been conducted to examine which PTSD symptom cluster most influences the other clusters over time. These studies have the potential to examine the question of the driving symptom cluster in maintaining PTSD; however, there are

methodological problems in all three studies. McFarlane (1992) used a cross-lagged panel design to examine reexperiencing and avoidance among firefighters four, eleven, and 29 months after exposure to bushfire and found that avoidance was predicted solely by reexperiencing, and did not predict reexperiencing. In this study, McFarlane did not assess hyperarousal (thereby making it impossible to fully assess how PTSD maintenance functions), and only administered a diagnostic interview at the 29 month assessment.

In the second cross-lagged study, Creamer and colleagues (Creamer, Burgess, & Pattison, 1992) used cross-lagged path analysis to measure reexperiencing and avoidance four, eight, and fourteen months after participants had been exposed to a multiple shooting in a city office block. They found that reexperiencing and avoidance both predicted broad psychological symptoms (as measured by the SCL-90-R), but that reexperiencing was a stronger predictor than avoidance. Additionally, avoidance was not a robust predictor of PTSD symptoms, and by the third time point, it did not significantly predict PTSD symptoms and was only predicted by the severity of reexperiencing symptoms. They also identified intrusive thoughts as the causal link between trauma and PTSD onset. In this study, the authors also did not assess hyperarousal, and used a self-report of PTSD instead of using an interview measure. Creamer and colleagues (1992) interpret their results in terms of their earlier cognitive theory of PTSD (Creamer, Burgess, & Pattison, 1990), in which they propose that reexperiencing precedes avoidance in the development of the disorder.

The third cross-lagged design conducted by Schell and colleagues (Schell, Marshall, & Jaycox, 2004) is the only study to utilize the cross-lagged design to fully investigate which PTSD symptom cluster most influences the other clusters over time. Schell and colleagues examined PTSD symptoms among survivors of community violence at baseline, three months, and twelve

months posttrauma, and found that hyperarousal influences reexperiencing and avoidance, but is not influenced by reexperiencing or avoidance. Though the authors identified hyperarousal as the primary driving cluster, reexperiencing also significantly predicted hyperarousal and avoidance at both time points, but not emotional numbing, while avoidance and emotional numbing did not significantly predict any other symptom clusters at either time point. Along with Creamer and colleagues' (1992) findings, this indicates that reexperiencing may have more of a causal role in PTSD maintenance than previously considered. However, Schell and colleagues used only a self-report measure of PTSD, making it impossible to determine true PTSD symptoms. Additionally, the sample almost exclusively included men (94%) and most participants identified as Hispanic (78%), all of whom survived some type of community violence resulting in physical injury, limiting generalizeability.

Of the prior literature, Schell and colleagues' (2004) study is the most compelling as they were the only researchers to assess all symptom clusters in a cross-lagged design; however, the lack of a PTSD interview measure and a generalizeable sample are problematic. Currently, the role of avoidance in PTSD maintenance is unclear given the conflict between theory and data, and consequently, a methodologically sound investigation of the role of avoidance in PTSD maintenance is needed. Strides have been made in terms of improving research designs to address this question, but no studies have adequately done so at this time. Several aspects are necessary in order to achieve this goal. Given the inherent difficulty in assessing avoidance, it seems that avoidance may not be measured correctly (across all types of studies). Clearly measuring avoidance (both PTSD-specific avoidance and other forms of related avoidance, such as experiential avoidance) is needed, but with the intention of predicting PTSD symptom severity exclusive of PTSD avoidance symptoms. Also, in order to specifically focus on the PTSD

maintenance phase, it is essential to measure all PTSD symptoms as thoroughly and effectively as possible among participants who have diagnosed PTSD and are in the clear maintenance stage of PTSD (i.e., once PTSD becomes chronic after 3 months of meeting diagnostic criteria for the disorder). Overall, the central role of avoidance in PTSD maintenance is not as clear cut as may be interpreted by the field more broadly, and needs to be tested.

**Current Study Aims, Hypothesis, and Overview**

The aim of the current study was to determine which PTSD symptom cluster most strongly influences the other PTSD symptom clusters over time in the maintenance of PTSD. The purpose of this investigation was twofold: First, to examine the discrepancy between the theory and existing data on PTSD maintenance, and second, to inform PTSD treatment. Based on the majority of existing PTSD theory and treatment, it was hypothesized that behavioral avoidance would drive the reexperiencing and the hyperarousal clusters more strongly than any other clusters would drive each other.

In the current study, I assessed PTSD symptom clusters on a weekly basis for six weeks through ideographically informed self-report (i.e., providing individualized instructions to each participant about how to accurately report on PTSD symptoms), as well as with a PTSD interview measure every three weeks. Schell and colleagues (2004) discuss how their three and twelve month measurement time lag was a limitation of their study (as the time intervals were too large); therefore, I improved upon this by measuring six consecutive weeks. Further, simultaneous measurement of PTSD symptoms via self-report and clinical interview provided helpful information regarding comparability of the two methods.

In order to more thoroughly measure the construct of avoidance and to best capture variability in avoidance over time, participants also completed a task-based measure of

avoidance. As Campbell and Fiske (1959) outline in their discussion of the multi-trait multi-method matrix, it is optimal to measure different constructs using different methods, as it is useful for parsing out shared method variance. Performance-based, PTSD-specific avoidance measures are very new, and only one study thus far has used this design (i.e., Fleurkens, Rinck, & van Minnen, 2014). However, there is some work that has been done in other anxiety disorders, largely in the area of spider phobias, that can inform task-based approaches to assessing PTSD specific avoidance (e.g., Heuer, Rinck, & Becker, 2007; McLean & Hope, 2010; Woody, McLean, & Klassen, 2005).

As it is critical to examine these processes in a clinical sample, the current study included a sample of individuals with chronic PTSD (i.e., having met diagnostic criteria for PTSD for a minimum of three months). In order to maximize the likelihood of seeing change in PTSD symptoms, the current study included a sample of individuals with a PTSD diagnosis who were in outpatient therapy, as individuals in treatment for PTSD have been shown to evidence significantly more symptom change (i.e., symptom reduction) over time than waitlist controls (Van Etten & Taylor, 1998). While PTSD-specific treatment has shown these effects, it has also been posited that clients in treatment, regardless of focus on a specific disorder, also show more change over time than those not in treatment (Chatoor & Kurpinck, 2001; Messer & Wampold, 2002). Therefore, participants did not need to be in treatment specifically for PTSD. Further, as the study involved several interviews regarding traumatic events in participants' lives, requiring these individuals to be in outpatient therapy was also a safety consideration to make sure they had a place to fully process any reactions to study interviews and/or questionnaires.

# Chapter 2

# METHOD

## Participants

Participants included 26 individuals of varying ages and backgrounds who were in outpatient therapy at the Penn State Psychological Clinic ($n$ = 14), at surrounding community clinics ($n$ = 9), or with independent practitioners ($n$ = 3). Participants were between the ages of 18 and 65. All participants had a diagnosis of chronic PTSD at the time of their initial laboratory session. Exclusion criteria included a concurrent diagnosis of schizophrenia or active psychosis, an intellectual disability, or not being able to read and write in English. Sexual abuse/assault was the most common Criterion A traumatic event, with 19.2% ($n$ = 5) of the sample experiencing childhood sexual abuse and 11.5% ($n$ = 3) of the sample experiencing sexual assault as an adult. The remaining sample experienced a diverse range of index trauma types, including childhood physical abuse, assault, combat, motor vehicle accident, stalking, or being threatened with death/serious harm. The sample was 77% female ($n$ = 20), and the average age was 38 ($SD$ = 13.54, range = 18-61). Participants were 92% Caucasian ($n$ = 24), 4% Hispanic or Latino ($n$ = 1), and 4% identified as "other" ($n$ = 1). Sixty-one percent were single ($n$ = 16), 15% ($n$ = 4) were married, 8% ($n$ = 2) were in a relationship and not living together, 8% ($n$ = 2) were in a cohabitating relationship, and 8% ($n$ = 2) were divorced. Participants had 15 years of education on average ($SD$ = 2.35, range = 9-21). The average monthly income per individual was $1,155.95 ($SD$ = $1,058.95, range = 0 - $4,770). Students comprised 35% of the sample ($n$ = 9). Fifty-four percent were unemployed ($n$ = 14), 35% ($n$ = 9) were employed part-time, and 11% ($n$ = 3) were employed full-time.

Five participants dropped out of the study following session one: One participant stopped individual weekly therapy (so was no longer eligible to participate), two participants withdrew based on increased distress, and two participants withdrew because they did not have the time. Given the low sample size of the dropout group, Mann-Whitney U-tests were used to compare participants who dropped out to those who did not drop out. Participants who dropped out did not significantly differ from those who did not drop out in terms of age ($U$ = 51.50, $p$ = .95, $d$ = -.02), gender ($U$ = 41.50, $p$ = .33, $d$ = -.39), race/ethnicity ($U$ = 47.50, $p$ = .48, $d$ = -.28), years of education completed ($U$ = 50.00, $p$ = .87, $d$ = -.06), employment status ($U$ = 51.50, $p$ = .94, $d$ = -.02), PTSD symptoms ($U$ = 39.00, $p$ = .38, $d$ = .14), or quality of life ($U$ = 41.50, $p$ = .47, $d$ = -.28). Although statistically nonsignificant, effect size estimates suggest that, compared to those who did not drop out, those who dropped out of the study were somewhat more likely to be students ($U$ = 36.00, $p$ = .19, $d$ = -.54), with a relatively higher income ($U$ = 13.00, $p$ = .16, $d$ = -.58), and fewer symptoms of depression ($U$ = 31.00, $p$ = .16, $d$ = -.56).

## Procedures

**Recruitment.** Recruitment materials, including contact information for the study, were posted in clinic waiting areas. Additionally, therapists were asked to approach their clients with current PTSD diagnoses (or if the therapist suspected a potential PTSD diagnosis) to give them some basic information about the study, as well as a study brochure.

*In-lab procedure.* Eligible participants attended three lab sessions, each three weeks apart. At the initial session, following informed consent procedures, participants completed several self-report measures. Participants then completed the in-lab avoidance task and they were administered a structured interview for PTSD by the principal investigator (an advanced graduate student in clinical psychology) in order to confirm PTSD diagnostic status and to assess for

symptom severity. If a participant did not meet diagnostic criteria for chronic PTSD during the initial session, s/he was paid $10 for the interview and was not eligible to continue in the study. Two potential participants did not meet this eligibility criterion.

Self-report measures (aside from demographics and the trauma history questionnaire), the structured PTSD interview, and the avoidance task were repeated at sessions two and three. Participants returned for the second session, on average, 1.10 days later than the scheduled three week mark (*SD* = 3.42, range = -7-10), and 4.29 days later than scheduled for the six week mark (*SD* = 8.89, range = -6-35). Each interview focused on PTSD symptoms in the previous three weeks. All interviews were video-recorded for diagnostic reliability coding. All participants who did not drop out of the study completed three in-lab sessions.

**Weekly Self-Report Measures.** Participants were asked to complete weekly self-report measures of PTSD symptoms and experiential avoidance for six weeks. Participants were instructed to complete the questionnaires immediately before each therapy session. Research assistants made a reminder call or sent a reminder e-mail to each participant on the day before their therapy session to ensure the questionnaires were completed. Participants were also given extra forms to have at home in the incidence of a therapy session cancellation. Of the participants who did not drop out of the study, 95% (*n* = 20) completed the weekly self-report measures at each time point.

**Therapist Self-Report Measures.** In order to determine whether PTSD-specific treatment techniques were used by therapists during participants' individual therapy, therapists were asked to complete a measure assessing these various techniques (i.e., Therapist Rating Measure, see below). Therapists were asked to complete this measure at weeks two, four, and six, in order to get a representative sampling of session content throughout the study. Of the 21

participants who completed the study, Therapist Rating Measure data were collected for 12 participants at time one, 10 participants at time two, and nine participants at time three. Twelve therapists completed the Therapist Rating Measure at least once. Most participants agreed to have the principal investigator contact his/her therapist, though several therapists were unresponsive to repeated requests from the principal investigator to complete the Therapist Rating Measure. Additionally, some therapists who initially agreed to complete the measure did not follow through, despite repeated contact from the principal investigator.

**Compensation.** Participants were compensated $10 for each in-lab session (i.e., $30 total), and $5 for each of the six weeks' worth of self-report questionnaires, for a maximum total of $30. A bonus of $20 was given for each individual who completed all six weeks of questionnaires and all three lab sessions, for a possible total of $80 per person.

## Measures

**Demographic Information.** Participants reported on their age, gender, race/ethnicity, marital status, educational history, employment status, and average income level.

**Clinician Administered PTSD Scale for DSM-5 (CAPS-5, Weathers, Blake, Schnurr, Marx, & Keane, 2013).** The CAPS-5 is a 30-item interview measure that assesses DSM-5 Criterion A status, PTSD symptom severity, and PTSD diagnosis. The presence of current PTSD symptoms is assessed using 20 items that correspond to DSM-5 symptoms for PTSD (i.e., five reexperiencing, two behavioral avoidance, seven alterations in cognitions/mood, and six hyperarousal symptoms). Symptoms are typically assessed for the previous month (though in the current study the past three weeks were assessed), and are rated by the clinician on five-point Likert scales for frequency and intensity. Onset and duration of symptoms are assessed, as well as subjective distress and impairment in areas such as relationships and occupation. Total

symptom severity is obtained by summing the first 20 items reflecting the DSM-5 criteria, with higher scores reflecting greater symptom severity. In the current study, for scoring purposes, a symptom was considered present if the item is rated a two or higher. In order to meet diagnostic criteria for PTSD, participants had to meet criteria for three reexperiencing symptoms, one behavioral avoidance symptom, two alterations in cognitions/mood symptoms, and two hyperarousal symptoms. The CAPS for DSM-IV (Blake et al., 1995) has demonstrated high interrater reliability (.92-.99), internal consistency (.73-.85) and convergent validity with other PTSD measures (Blake et al., 1990; for a review, see Weathers, Keane, & Davidson, 2001), and is considered to be the "gold standard" for assessing PTSD, though these psychometrics have not yet been released for the CAPS-5. In the current study, the internal consistency for the CAPS-5 total score ranged from .77-.86 across the three lab sessions. For the subscales, internal consistency was generally poor. The internal consistency for reexperiencing was .57, .38, and .79 for Sessions 1, 2, and 3, respectively. The internal consistency for behavioral avoidance was .40, -.65, and .04 for Sessions 1, 2, and 3, respectively. The internal consistency for alterations in cognitions/mood was .74, .67, and .78 for Sessions 1, 2, and 3, respectively. The internal consistency for hyperarousal was .12, .26, and .55 for Sessions 1, 2, and 3, respectively. To determine interrater reliability, 13% of all recorded interviews were randomly selected. Other raters were advanced clinical psychology graduate students with prior CAPS training. The kappa was 1.0 (100% agreement) for PTSD diagnosis. The intra-class correlation for total PTSD symptoms was 0.86, indicating good agreement among raters.

**PTSD Checklist for DSM-5, Specific Version (PCL-5; Weathers et al., 2013).** The PCL-5 measures the twenty PTSD symptoms that correspond to the PTSD diagnostic criteria set forth in the DSM-5 (APA, 2013) and ties each item to a specific identified Criterion A trauma.

Example items include “Repeated, disturbing, and unwanted memories of the stressful experience,” and “Avoiding memories, thoughts, or feelings related to the stressful experience.” Items are assessed on a five point Likert scale ranging from zero (not at all) to four (extremely). The PCL-S for DSM-IV (Weathers, Litz, Huska, & Keane, 1994) has demonstrated good convergent validity (kappa = .64 with PTSD diagnosis from a structured clinical interview; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996) and good internal consistency (.82–.94; Blanchard et al., 1996), though these psychometrics have not yet been released for the PCL-5. In the current study, the internal consistency of the PCL-5 ranged from .83-.95 across the six weeks of data collection. For the subscales, internal consistency was generally acceptable, though values ranged from poor to excellent. The internal consistency for reexperiencing was .69, .83, and .91 for weeks 1, 3, and 6, respectively. The internal consistency for behavioral avoidance was .60, 11, and .17 for weeks 1, 3, and 6, respectively. The internal consistency for alterations in cognitions/mood was .82, .73, and .88 for weeks 1, 3, and 6, respectively. The internal consistency for hyperarousal was .55, .71, and .81 for weeks 1, 3, and 6, respectively. While the PCL-S for DSM-IV has performed at a lower rate of diagnostic efficiency for women than men (Parker-Guilbert, Leifker, Sippel, & Marshall, 2014; Yeager, Magruder, Knapp, Nicholas, & Frueh, 2007), other PTSD screening measures have not indicated better diagnostic efficiency among women. This is thought to be a product of women reporting higher levels of general distress as opposed to solely reporting PTSD symptoms (Parker-Guilbert et al., 2014). In order to maximize the PCL-5’s ability to capture self-reported PTSD symptoms and to minimize women’s tendencies to potentially report general distress symptoms instead of PTSD symptoms, I created a sheet of instructions unique to each participant to assist in completing the PCL-5 each

week. The sheet contained the 20 DSM-5 symptoms of PTSD with personal examples illustrating each symptom based on each participant's individual CAPS-5 (See Appendix for an example).

**Modified Approach-Avoidance Task (AAT, Rinck & Becker, 2007).** The AAT is a computer-based task that has been used in the context of anxiety to measure avoidance of spiders (Rinck & Becker, 2007) social threat (Heuer et al., 2007), and trauma-related stimuli (Fleurkens, et al., 2014). The task typically uses pictures of threatening stimuli (i.e., pictures of spiders among individuals with spider phobia; pictures of faces making threatening expressions among individuals with social phobia; an assault scene among individuals with sexual-assault related PTSD) interspersed with non-threatening stimuli (e.g., pictures of puzzles, neutral landscapes). The AAT adapted for spider phobia (Rinck & Becker, 2007) has demonstrated a strong correlation with behavioral assessment tasks (BATs) designed to measure avoidance behavior in spider phobia (Klein, Becker, & Rinck, 2011. The AAT has largely been used with images, but similar tasks have also been used successfully with positive or negative words (e.g., De Houwer, Crombez, Baeyens, & Hermans, 2001). In the current study, I used trauma-related and neutral words, as this was the only feasible way to obtain idiographic stimuli in a mixed-trauma sample. I asked participants to write down the eight words related to the trauma that they found the most distressing. Research assistants helped participants choose appropriate, trauma-relevant words. I used those eight words as the threatening stimuli, and used eight neutral words after verifying with each participant that the words were truly neutral.

Each participant was given a joystick, sat in front of the computer screen, and completed an approach condition in which s/he was instructed to pull the joystick towards her/himself as quickly as possible when a threatening picture came on the screen, thereby increasing the size of the threatening stimulus. The participant was also instructed to push the joystick away as quickly

as possible when a neutral picture came on the screen, thereby decreasing the size of the stimulus. Each participant also completed an avoidance condition in which the participant was instructed to push the joystick away as quickly as possible when a threatening picture came on the screen and pull the joystick towards her/himself as quickly as possible when a neutral picture came on the screen. The image did not disappear until the joystick was moved approximately 30 degrees in the correct direction. Each condition (i.e., approach and avoidance) consisted of 54 experimental trials with eight threatening images and eight neutral images, with 18 practice trials using different stimuli for each condition. The order of the conditions was randomized across participants and across sessions, and the task took approximately 12 minutes to complete.

In the original scoring of the task, for threatening stimuli, participants' average reaction time for the approach condition was subtracted from their average reaction time for the avoidance condition (i.e., threatening push/avoid - threatening pull/approach). For neutral stimuli, participants' average reaction time for the avoidance condition was subtracted from the average time for the approach condition (neutral pull/approach - neutral push/avoid). The resulting scores reflect the direction of the response tendency such that, for threatening stimuli, positive values reflect stronger overall approach tendencies and negative values reflect stronger overall avoidance tendencies, while for neutral stimuli, positive values reflect stronger overall avoidance tendencies and negative values reflect stronger overall approach tendencies. In the current study, this scoring method was used, but once the two scores were obtained (i.e., a trauma score and a neutral score), scores were standardized and the standardized neutral score was subtracted from the standardized trauma score to obtain an overall AAT score that represents specific responses to trauma stimuli compared to responses to neutral stimuli, thus accounting for generalized tendencies to approach or avoid.

**Acceptance and Action Questionnaire-II (AAQ-II, Bond et al., 2011).** The AAQ-II is a 10-item self-report questionnaire that measures experiential avoidance. Items are assessed on a seven point Likert scale ranging from 1 (never true) to 7 (always true). Example items include "I worry about not being able to control my worries and feelings," and "Emotions cause problems in my life." The prompt for the AAQ is: "Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice." The AAQ is scored such that higher scores indicate greater psychological flexibility, or lower experiential avoidance. The AAQ-II has demonstrated good test-retest reliability (.79-.81) and good internal consistency (.78-.88; Bond et al., 2011). The AAQ-II has also demonstrated good construct validity as compared to the AAQ-I ($r$ = .97; Bond et al., 2011). In the current study, the internal consistency ranged from .81-.92 across the six weeks of data collection.

**Beck Depression Inventory (BDI-II, Beck, Steer & Brown, 1996).** The BDI-II is a 21-item self-report measure of depressive symptoms. Items are rated on a four-point Likert scale, from zero to three (e.g., "I do not feel sad (*0*)" to "I am so sad or unhappy that I can't stand it (*3*)"). Total scores range from zero to 63, with higher scores indicating more severe depressive symptoms. The BDI-II has demonstrated good convergent validity (Dozois, Dobson & Ahnberg, 1998). The internal consistency of the BDI-II in the current study ranged from .88-.95 across the three lab sessions.

**Quality of Life Inventory (QOLI, Frisch, 1994).** The QOLI is a 32-item self-report measure of life satisfaction. The QOLI assesses aspects of life importance and satisfaction including work, friends, relationships, and community. Items are rated for importance on a three-point Likert scale, ranging from zero (not important) to three (very important), and on a six-point

Likert scale for satisfaction, ranging from negative three (very dissatisfied) to positive three (very satisfied). The QOLI has demonstrated good test-retest reliability and internal consistency (Frisch, Cornell, Villanueva, & Retzlaff, 1992). The internal consistency in the current study ranged from .81-.89 across the three lab sessions.

**Therapist Rating Measure.** As participants' therapy did not have to specifically treat PTSD, I created a measure for therapists to complete to indicate whether they were using trauma-specific treatment techniques in their sessions. The measure contained eight items relevant to trauma-specific treatment. Items included "I educated my client about PTSD," "I discussed my client's trauma(s) with my client," "I used imaginal exposure techniques regarding a trauma with my client," "I used in vivo exposure techniques regarding a trauma with my client," "I discussed trauma-related thoughts or emotions with my client," "I helped my client process his/her trauma," "I assigned homework focusing on trauma/PTSD to my client," and "I discussed trauma-related coping skills with my client." Items were rated on a five-point Likert scale ranging from one (did not happen this session) to five (happened very frequently this session/more than 75% of the time). The internal consistency of the Therapist Rating Measure ranged from .75-.94 across the six weeks of data collection.

## Data Analyses

Longitudinal modeling was used in four sets of cross-lagged panel models examining change in PTSD symptom clusters over time. The four sets of cross-lagged panel models were: (1) using CAPS-5 data, where past three-week PTSD symptom clusters (i.e., reexperiencing, behavioral avoidance, alterations in cognitions/mood, and hyperarousal) were assessed over three time points (i.e., at each of the three lab sessions), (2) using PCL-5 data, where past week PTSD symptom clusters were assessed over three time points (i.e., weeks 1, 3, and 6 of data collection),

(3) using CAPS-5 data with AAT data substituted for the behavioral avoidance and alterations in cognitions/mood symptom clusters over three time points, and (4) using PCL-5 data with AAQ data substituted for behavioral avoidance and alterations in cognitions/mood symptom clusters over three time points. AAT and AAQ data were substituted for both the behavioral avoidance and alterations in cognitions/mood clusters in the CAPS-5 and PCL-5 respectively, in order to avoid the issue of having avoidance predict itself. Though the alterations in cognitions/mood cluster has items not specific to emotional numbing, there are still several emotional numbing/avoidance items present in the DSM-5 symptom cluster. The analyses using the AAT and AAQ were conducted to examine avoidance more broadly. AAT data was paired with CAPS-5 data as both the AAT and CAPS-5 are more objective measures. AAQ-II data was paired with PCL-5 data as both the AAQ-II and PCL-5 are self-report measures. Additionally, both pairings were measured on the same time scale (i.e., AAT and CAPS-5 were measured at Sessions 1, 2, and 3, while AAQ-II and PCL-5 were measured weekly). Initially, all six weeks of PCL-5 data were used in the analyses; however, the alternative covariance matrix could not reach a stable solution, likely due to the limited sample size. Given the multiple additional parameters introduced into the model with each additional time point, the PCL-5 analyses were thus completed with beginning, middle, and end time points (i.e., weeks 1, 3, and 6).

Structural equation modeling was carried out using Mplus (7th edition; Muthén & Muthén, 2012). Model fit was assessed with indices recommended by Hu and Bentler (1999), including the root mean squared error of approximation (RMSEA, recommended value $\leq .06$; Thompson, 2004), the Comparative Fit Index (CFI, recommended value $\geq .95$; Thompson, 2004), the Tucker-Lewis Index (TLI; recommended value $\geq .95$) and the standardized root mean squared residual (SRMR, recommended value $\leq .08$). The chi square goodness of fit test was also

used to compare models, with smaller chi square values indicating better model fit. Missing data were accounted for using full information maximum likelihood (FIML), which uses available data to estimate missing parameters.

For each of the four sets of cross-lagged analyses, a cross-lagged panel model was fit to the covariance matrix. Unnecessary paths were pruned from the model one at a time until optimal fit was attained. This method produced a more parsimonious model, and additionally improved the reliability of parameter estimates. Paths were only removed if the removal of the path did not result in poorer overall model fit. Once optimal fit was attained in each model, I conducted path invariance testing using Wald tests among significant cross-lagged pathways to test the strength of each symptom cluster in predicting other clusters. Pathways were found to be significantly predictive over other pathways if the chi square test was significant. Once they were determined to be unequal, the two unstandardized estimates were examined to determined direction and magnitude. The stronger beta weight value was the path that predicted significantly better. The hypothesis would be supported if behavioral avoidance (or broader indicators of avoidance) predicted reexperiencing and hyperarousal at subsequent time points more strongly than reexperiencing and hyperarousal predicted the other symptom clusters.

Secondary analyses were conducted using the BDI and QOLI to examine the context of participants' lives more fully and to determine whether non-PTSD symptoms may be impacting participants' functioning over the course of the study. BDI scores were also correlated with PTSD symptoms. Therapist Rating Measure data was used to determine whether therapists were using PTSD-specific treatment techniques (via descriptive statistics), and was then correlated with PTSD symptoms.

# Chapter 3

# RESULTS

## Descriptive Statistics

Descriptive statistics for the main outcome measures used in the current study are presented in Table 1. PTSD symptoms were measured via the gold standard interview (i.e., CAPS-5) as well as self-report (i.e., PCL-5). At Session 1, all participants met diagnostic criteria for PTSD according to the CAPS-5, with an average score of 46.04. CAPS-5 scores declined slightly over the three time points, but the decline was not statistically significant ($F(2, 40) = .83$, *ns*, $\eta_p^2 = .04$). At time 3, 95% ($n = 20$) of participants still met diagnostic criteria for PTSD. There was a decline seen in PCL-5 scores over the six week period of the study, though this decline was not statistically significant ($F(5, 70) = 1.25$, *ns*, $\eta_p^2 = .08$).

AAQ scores indicated moderate to high levels of experiential avoidance. There were no significant differences in experiential avoidance across the six weeks of the study ($F(2, 36) = .54$, *ns*, $\eta_p^2 = .09$). AAQ scores were significantly negatively correlated across time points with the reexperiencing and hyperarousal symptom clusters of the PCL-5 (Table 7), indicating a consistent relationship between psychological inflexibility (i.e., higher experiential avoidance) and PTSD symptoms. AAQ scores were highly significantly correlated with themselves across the three time points (Table 7), indicating good test-retest reliability. Overall, the AAQ demonstrated good performance as an alternate measure of avoidance.

Participants endorsed high levels of depression on the BDI-II. A repeated measures ANOVA determined that BDI scores differed significantly between time points ($F(2, 40) = 3.36$, $p < .05$, $\eta_p^2 = .14$). Post hoc tests using the Bonferroni correction indicated that there was a statistically significant decline in depression symptoms from Session 1 to Session 2 ($p = .05$, $d = .83$), though the decline in BDI symptoms from Session 1 to Session 3 was nonsignificant ($p =$

.15, $d$ = .66), as was the decline in BDI symptoms from Session 2 to Session 3 ($p$ = 1.00, $d$ = .09). BDI scores at all three time points were significantly positively correlated with PCL-S total scores at all three time points. BDI scores were significantly positively correlated with CAPS-5 total scores at all time points except that the BDI at week 6 did not significantly correlate with the CAPS-5 in Session 1 ($r$ = .37, *ns*) or Session 2 ($r$ = .36, *ns*).

Participants reported overall qualities of life in the low range There were no significant differences in quality of life across lab sessions ($F(2, 40) = .12$, *ns*, $\eta_p^2 = .01$).

Results of the Therapist Rating Measure indicate that therapists were using PTSD-specific treatment techniques, on average, between never and infrequently during therapy sessions. Results should be evaluated in the context of having relatively few participants' data for the Therapist Rating Measure. The Therapist Rating Measure was not significantly correlated with total CAPS-5 scores at any of the three laboratory sessions, nor was it significantly correlated with the total PCL-5 score throughout the study (See Table 3). Despite lack of statistical significance, the Therapist Rating Measure at time three (i.e., week 6 of the study) demonstrated a robust inverse relationship with the CAPS-5 at Sessions 2 and 3 and the PCL-5 at time 1, time 2, and time 3 (i.e., weeks 1, 3, and 6). This indicates that greater PTSD symptomatology is longitudinally and cross-sectionally associated with therapist's lesser use of exposure techniques. The Therapist Rating Measure was not correlated significantly with any of the CAPS-5 symptom clusters or any of the PCL-5 symptom clusters at any time point. There were no significant differences in the amount of PTSD-specific treatment techniques therapists used across sessions ($F(2, 16) = .29$, *ns*, $\eta_p^2 = .03$).

AAT scores can be found in Table 2. There were no significant differences between those who completed the approach condition first vs. completing the avoidance condition first in

reaction times for trauma or neutral words in the approach or avoidance conditions, thus results are not separated by what condition participants completed first (i.e., approach vs. avoidance). Overall, participants tended to demonstrate more approach-oriented scores than avoidance-oriented, however, the magnitude of approach-orientation was small, and these scores were not significantly different from zero at any time point [$t(23) = .57$, $p = .58$, $d = .17$ for Session 1, $t(17) = .14$, $p = .89$, $d = .05$ for Session 2, and $t(17) = .25$, $p = .81$, $d = .09$ for Session 3]. There were no significant differences in reaction times for trauma words versus neutral words in any of the lab sessions [$t(23) = .57$, $p = .58$, $d = .17$ for Session 1, $t(17) = .14$, $p = .89$, $d = .05$ for Session 2, and $t(17) = .25$, $p = .81$, $d = .09$ for Session 3]. There were similarly no significant differences in reaction times when broken down by condition (i.e., approach vs. avoidance). Cohen's *d* effect sizes ranged from .02-.49. Standardized overall AAT scores can be found in Table 1.

The AAT intercorrelations with itself were relatively unstable (See Table 6), and AAT scores did not significantly correlate with the reexperiencing or hyperarousal symptom clusters of the CAPS-5 at any time point. Similarly, the AAT did not significantly correlate with the AAQ at any time point (see Table 2). Though lower correlations are expected given the different methodology, correlations between the AAT and other measures of avoidance, as well as with itself, were low.

**Cross-Lagged Analyses**

The final cross-lagged panel models for the CAPS-5, PCL-5, and PCL-5/AAQ fit excellently, while the model for the CAPS-5/AAT fit moderately well. For the final CAPS-5 model (including CAPS-5 reexperiencing, CAPS-5 behavioral avoidance, CAPS-5 alterations in cognitions/mood, and CAPS-5 hyperarousal clusters), $\chi^2(20) = 28.29$, $p = .10$, RMSEA = .00,

CFI = 1.00, TLI = 1.07, SRMR = .07. Standardized regression coefficients for the final CAPS-5 model can be found in Figure 1. In this model, there were no significant cross-lagged pathways, though autoregressive pathways were generally significant. As there were no significant cross-lagged pathways to compare in the CAPS-5 model, no Wald tests were conducted. The correlation/covariance matrix for the CAPS-5 symptom clusters can be found in Table 4.

For the final PCL-5 model (including PCL-5 reexperiencing, PCL-5 behavioral avoidance, PCL-5 alterations in cognitions/mood, and PCL-5 hyperarousal clusters), $\chi^2(23) = 21.74$, $p = .54$, RMSEA = .00, CFI = 1.00, TLI = 1.02, SRMR = .06. Standardized regression coefficients for the final PCL-5 model can be found in Figure 2. In this model, there were several significant cross-lagged pathways, though many autoregressive pathways were nonsignificant. Several comparisons using Wald tests for path invariance were made in the PCL model (Table 8). At week 1, reexperiencing emerged as a relatively strong predictor such that the link between reexperiencing at week 1 and hyperarousal at week 3 was significantly stronger than the links between hyperarousal at week 3 and reexperiencing at week 6, and hyperarousal at week 3 and alterations in cognitions/mood at week 6. Further, though it did not reach statistical significance, reexperiencing at week 1 predicted hyperarousal at week 3 more strongly than alterations in cognitions/mood at week 3 predicted behavioral avoidance at week 6. Given the large effect size of this comparison ($d = .82$), it is worth examining. At week 3 reexperiencing continued to be a relatively strong predictor, such that the link between reexperiencing at week 3 and alterations in cognitions/mood at week 6 was stronger than the links between alterations in cognitions/mood at week 3 and behavioral avoidance at week 6 and hyperarousal at week 3 and alterations in cognitions/mood at week 6. Again, though not statistically significant, there was a large effect for reexperiencing at week 3 predicting alterations in cognitions/mood at week 6 more strongly

than alterations in cognitions/mood at week 3 predicted hyperarousal at week 6 ($d$ = .80). Additionally, the link between reexperiencing at week 3 and hyperarousal at week 6 was stronger than the links between alterations in cognitions/mood at week 3 and behavioral avoidance at week 6 and hyperarousal at week 3 and alterations in cognitions/mood at week 6.

Though it did not significantly predict other symptom clusters at week 1, at week 3 behavioral avoidance emerged as a relatively strong predictor, such that the link between behavioral avoidance at week 3 and hyperarousal at week 6 was stronger than the links between hyperarousal at week 3 and reexperiencing at week 6, hyperarousal at week 3 and alterations in cognitions/mood at week 6, and alterations in cognitions/mood at week 3 and behavioral avoidance at week 6.

Alterations in cognitions/mood emerged as a differential predictor at both time points, though to a lesser degree than reexperiencing and behavioral avoidance. The link between alterations in cognitions/mood at week 1 and hyperarousal at week 3 was stronger than the links between hyperarousal at week 3 and reexperiencing at week 6 and hyperarousal at week 3 and alterations in cognitions/mood at week 6. The link between alterations in cognitions/mood at week 3 and hyperarousal at week 6 was stronger than the link between hyperarousal at week 3 and alterations in cognitions/mood at week 6.

Finally, the link between hyperarousal at week 3 and alterations in cognitions/mood at week 6 was stronger than the link between alterations in cognitions/mood at week 3 and behavioral avoidance at week 6. The correlation/covariance matrix for the PCL-5 symptom clusters can be found in Table 5.

For the final CAPS-5/AAT (including CAPS-5 reexperiencing, AAT approach/avoidance, and CAPS-5 hyperarousal clusters) model, $\chi^2(19) = 22.92$, $p$ = .92,

RMSEA = .09, CFI = .96, TLI = .93, SRMR = .10. Standardized regression coefficients for the final CAPS-5/AAT model can be found in Figure 3. Autoregressive pathways were all significant except AAT Session 1 to AAT Session 2. There was one significant cross-lagged pathway, from AAT at Session 2 to hyperarousal at Session 3.There were no significant cross-lagged pathways to compare in the CAPS/AAT model. The correlation/covariance matrix for the CAPS-5/AAT model can be found in Table 6.

For the final PCL-5/AAQ model (including PCL-5 reexperiencing, AAQ avoidance, and PCL-5 hyperarousal clusters), $\chi^2(11) = 7.40$, $p = .77$, RMSEA = .00, CFI = 1.00, TLI = 1.08, SRMR = .03. Standardized regression coefficients for the PCL-5/AAQ model can be found in Figure 4. In this model, all autoregressive pathways were significant except hyperarousal from week 3 to week 6, and there were three significant cross-lagged pathways. Three comparisons of significant pathways were made in the PCL-5/AAQ model (Table 9), though there were no significant differences in the strength of predictions between the compared pathways. The correlation and covariance matrices for the PCL-5/AAQ model can be found in Table 7.

Table 1

*Descriptive Statistics*

| Measure | Mean | *SD* | Range |
|---|---|---|---|
| CAPS-5 Total Session 1 | 46.04 | 10.24 | 25.00-64.00 |
| CAPS-5 Total Session 2 | 45.86 | 10.17 | 26.00-65.00 |
| CAPS-5 Total Session 3 | 45.00 | 13.57 | 17.00-75.00 |
| PCL-5 Total Week 1 | 45.54 | 13.32 | 14.74-67.00 |
| PCL-5 Total Week 2 | 41.67 | 13.76 | 14.00-64.00 |
| PCL-5 Total Week 3 | 41.35 | 12.47 | 23.00-65.00 |
| PCL-5 Total Week 4 | 40.17 | 14.65 | 14.00-65.00 |
| PCL-5 Total Week 5 | 37.99 | 18.76 | 5.00-69.00 |
| PCL-5 Total Week 6 | 40.27 | 17.69 | 7.00-68.42 |
| AAQ Week 1 | 29.91 | 9.24 | 18.00-57.00 |
| AAQ Week 2 | 28.12 | 8.87 | 14.44-50.00 |
| AAQ Week 3 | 30.30 | 10.99 | 13.00-50.00 |
| AAQ Week 4 | 29.28 | 11.71 | 13.00-58.00 |
| AAQ Week 5 | 31.78 | 13.74 | 16.00-67.00 |
| AAQ Week 6 | 29.20 | 13.17 | 13.00-60.00 |
| AAT Session 1 (*z* score) | .33 | 1.13 | -1.86-2.61 |
| AAT Session 2 (*z* score) | -.31 | .93 | -2.29-1.76 |
| AAT Session 3 (*z* score) | -.25 | 1.04 | -2.37-1.45 |
| BDI Session 1 | 33.45 | 11.09 | 8.00-58.00 |
| BDI Session 2 | 31.45 | 11.66 | 4.67-49.00 |

| | | | |
|---|---|---|---|
| BDI Session 3 | 30.95 | 13.90 | 6.00-56.00 |
| QOLI Session 1 | 17.31 | 17.75 | -17.00-42.00 |
| QOLI Session 2 | 18.28 | 19.90 | -11.00-57.00 |
| QOLI Session 3 | 19.52 | 23.52 | -12.00-54.00 |
| Therapist Rating Measure Week 2 | 12.33 | 4.54 | 8.00-23.00 |
| Therapist Rating Measure Week 4 | 11.96 | 3.88 | 8.00-21.00 |
| Therapist Rating Measure Week 6 | 12.56 | 6.84 | 8.00-30.00 |

*Notes.* Standardized AAT scores were calculated by subtracting standardized neutral scores from standardized trauma scores. Negative values indicate an avoidance tendency, while positive values indicate an approach tendency. CAPS-5 = Clinician Administered PTSD Scale for DSM-5, PCL-5 = PTSD Checklist for DSM-5, AAQ = Acceptance and Action Questionnaire-II, AAT = Approach Avoidance Task, BDI = Beck Depression Inventory, QOLI = Quality of Life Inventory.

Table 2

*Mean Non-Standardized Approach-Avoidance Task Reaction Times and Approach-Avoidance Scores by Condition, Session, and Word Type*

| Session | Word Type | Avoidance (*ms*) | (*SD*) | Approach (*ms*) | (*SD*) | AAT Score | (*SD*) |
|---|---|---|---|---|---|---|---|
| Session 1 | Trauma | 1260.93 | (564.13) | 1190.37 | (485.10) | 70.56 | (332.83) |
| | Neutral | 1308.33 | (477.79) | 1315.94 | (472.50) | 7.60 | (404.06) |
| Session 2 | Trauma | 975.35 | (173.57) | 926.20 | (145.39) | 49.15 | (112.97) |
| | Neutral | 1041.09 | (223.30) | 1081.45 | (228.82) | 40.39 | (227.33) |
| Session 3 | Trauma | 966.16 | (132.61) | 887.26 | (141.40) | 78.91 | (85.03) |
| | Neutral | 968.14 | (127.86) | 1039.57 | (158.17) | 71.43 | (105.38) |

*Notes.* For trauma words, AAT scores were calculated by subtracting approach scores from avoidance scores. Positive values indicate an approach tendency, while negative values indicate an avoidance tendency. For neutral words, AAT scores were calculated by subtracting avoidance scores from approach scores. Positive values indicate an avoidance tendency, while negative values indicate an approach tendency.

Table 3

*Correlation/Covariance Matrix Among CAPS-5 Total Scores, PCL-5 Total Scores, AAT, AAQ, and the Therapist Rating Measure Over Time*

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. CAPS1 | -- | 83.67 | 113.15 | 91.86 | 84.34 | 130.29 | -.28 | -1.87 | -1.83 | -60.70 | -49.25 | -82.83 | 10.18 | 5.40 | -15.9 |
| 2. CAPS2 | .81** | -- | 106.50 | 117.62 | 97.18 | 130.45 | -.83 | -2.76 | -2.56 | -54.91 | -56.83 | -87.57 | -7.55 | -5.50 | -37.15 |
| 3. CAPS3 | .82** | .77** | -- | 139.37 | 130.38 | 193.61 | -3.03 | -.40 | -3.81 | -73.20 | -97.03 | -133.57 | 1.85 | -7.81 | -39.01 |
| 4. PCL1 | .63** | .83** | .74** | -- | 151.74 | 213.55 | . 61 | -3.57 | -3.73 | -93.91 | -116.70 | -158.94 | -15.50 | -10.93 | -74.50 |
| 5. PCL2 | .68** | .75** | .75** | .84** | -- | 209.01 | -.40 | -.03 | -2.48 | -66.82 | -95.32 | -136.83 | -1.76 | -10.17 | -55.93 |
| 6. PCL3 | .71** | .71** | .83** | .84** | .93** | -- | -2.00 | -.31 | -4.63 | -125.30 | -157.92 | -203.15 | 3.76 | -9.08 | -54.58 |
| 7. AAT1 | -.02 | -.08 | -.22 | .04 | -.03 | -.11 | -- | .06 | .15 | 2.29 | 1.30 | 2.50 | -3.31 | -2.54 | -4.74 |
| 8. AAT2 | -.19 | -.26 | -.03 | -.25 | .00 | -.02 | .06 | -- | .36 | 1.30 | -.91 | .06 | .40 | -.67 | -1.33 |
| 9. AAT3 | -.17 | -.21 | -.23 | -.24 | -.16 | -.21 | .13 | .43* | -- | 4.46 | 4.19 | 4.30 | .89 | 1.35 | .71 |
| 10. AAQ1 | -.60** | -.58** | -.58** | -.75** | -.59** | -.77** | .22 | .14 | .42 | -- | 80.81 | 95.08 | .09 | -.41 | 3.47 |
| 11. AAQ2 | -.45* | -.50* | -.63** | -.76** | -.70** | -.80** | .12 | -.09 | .32 | .81** | -- | 135.22 | 9.99 | 9.44 | 18.98 |
| 12. AAQ3 | -.61** | -.64** | -.77** | -.84** | -.79** | -.87** | .19 | .00 | .27 | .78** | .90** | -- | 7.12 | 8.52 | 35.46 |
| 13. TRM1 | .23 | -.18 | .03 | -.22 | -.03 | .05 | -.74** | .10- | .15 | .00 | .22 | .15 | -- | 17.26 | 27.11 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14. TRM2 | .14 | -.14 | -.17 | -.17 | -.18 | -.13 | -.62* | -.20 | .26 | -.01 | .24 | .22 | .91** | -- | 23.07 |
| 15. TRM3 | -.27 | -.62 | -.53 | -.70 | -.59 | -.45 | -.67* | -.22 | .08 | .06 | .28 | .59 | .88** | .88** | -- |

*Notes.* Covariances are in the upper portion of the table and correlations are in the lower portion. CAPS = Clinician Administered PTSD Scale for DSM-5, PCL = PTSD Checklist for DSM-5, AAT = Approach Avoidance Task (standardized scores), AAQ = Acceptance and Action Questionnaire-II, TRM = Therapist Rating Measure. Numbers following each measure indicate the time point the measure was administered. For the Therapist rating measure 1 = Week 2, 2 = Week 4, and 3 = Week 6. For the CAPS-5 and AAT 1 = Session 1; 2 = Session 2, and 3 = Session 3. For the PCL-5 and AAQ 1 = Week 1, 2 = Week 3, and 3 = Week 6. AAQ scoring is such that higher scores indicate less experiential avoidance. AAT scoring reflects trauma word total scores minus neutral word total scores. * $p < .05$ ** $p < .0$

Table 4

*Correlation/Covariance Matrix of CAPS-5 Symptom Clusters Over Time*

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Session 1 | | | | | | | | | | | | |
| 1. Reexperiencing | -- | 1.40 | 9.58 | 3.35 | 6.60 | 1.29 | 7.18 | 5.46 | 12.35 | 2.33 | 10.71 | 7.12 |
| 2. Behavioral Avoidance | .48* | -- | 3.53 | 0.78 | 1.08 | 0.38 | 1.27 | 0.88 | 2.45 | 1.00 | 2.14 | 1.55 |
| 3. Cognitions/Mood | .42* | .48* | -- | 6.10 | 8.44 | 2.48 | 18.06 | 7.90 | 13.86 | 5.32 | 21.84 | 5.49 |
| 4. Hyperarousal | .31 | .35 | .41* | -- | 3.04 | 1.14 | 5.68 | 8.82 | 4.45 | 1.78 | 6.16 | 9.18 |
| Session 2 | | | | | | | | | | | | |
| 5. Reexperiencing | .74** | .37 | .59** | .35 | -- | 1.19 | 6.59 | 4.67 | 8.76 | 2.05 | 6.14 | 3.82 |
| 6. Behavioral Avoidance | .38 | .35 | .46* | .35 | .43 | -- | 1.86 | 1.95 | 1.81 | 0.95 | 1.43 | 1.71 |
| 7. Cognitions/Mood | .44* | .23 | .68** | .35 | .48* | .36 | -- | 10.08 | 10.23 | 3.02 | 25.73 | 6.12 |
| 8. Hyperarousal | .48* | .24 | .44* | .80** | .50* | .55** | .58** | -- | 7.36 | 1.89 | 9.89 | 10.53 |
| Session 3 | | | | | | | | | | | | |
| 9. Reexperiencing | .89** | .54* | .62** | .33 | .76** | .42 | .48* | .50* | -- | 3.37 | 15.84 | 9.42 |
| 10. Behavioral Avoidance | .53* | .69** | .75** | .41 | .56** | .69** | .44* | .40 | .58** | -- | 3.70 | 2.19 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11. Cognitions/Mood | .50* | .31 | .64** | .30 | .35 | .21 | .78** | .44* | .57** | .42 | -- | 12.86 |
| 12. Hyperarousal | .51* | .34 | .25 | .68** | .33 | .39 | .28 | .71** | .52* | .38 | .46* | -- |

*Notes.* Cognitions/Mood = Alterations in cognitions/mood. Covariances are in the upper portion of the table and correlations are in the lower portion. * $p < .05$ ** $p < .01$

Table 5

*Correlation/Covariance Matrix of PCL-5 Symptom Clusters Over Time*

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Week 1 | | | | | | | | | | | | |
| 1. Reexperiencing | -- | 3.79 | 6.36 | 7.65 | 8.24 | 3.66 | 3.39 | 8.50 | 11.69 | 2.22 | 8.23 | 11.44 |
| 2. Behavioral Avoidance | .65** | -- | 5.54 | 2.03 | 2.28 | 1.65 | 2.57 | 5.37 | 3.36 | 1.69 | 6.42 | 4.29 |
| 3. Cognitions/Mood | .33 | .45* | -- | 21.87 | 5.14 | 3.99 | 26.19 | 22.54 | 11.70 | 6.24 | 39.69 | 22.98 |
| 4. Hyperarousal | .50* | .23 | .72** | -- | 8.36 | 4.07 | 14.75 | 13.36 | 11.74 | 4.92 | 22.78 | 19.99 |
| Week 3 | | | | | | | | | | | | |
| 5. Reexperiencing | .77** | .47* | .29 | .40 | -- | 3.61 | 12.18 | 3.80 | 19.76 | 3.70 | 15.77 | 18.73 |
| 6. Behavioral Avoidance | .71** | .54* | .37 | .54 | .51* | -- | 3.81 | 3.79 | 5.97 | 1.06 | 4.97 | 6.99 |
| 7. Cognitions/Mood | .28 | .38 | .82** | .56 | .41 | .50* | -- | 13.30 | 18.40 | 5.36 | 32.23 | 24.71 |
| 8. Hyperarousal | .43 | .43 | .70** | .68** | .37 | .37 | .59** | -- | 7.15 | 3.80 | 18.05 | 14.48 |
| Week 6 | | | | | | | | | | | | |
| 9. Reexperiencing | .65** | .42 | .45 | .47* | .83** | .59** | .58** | .51 | -- | 3.68 | 21.88 | 25.97 |
| 10. Behavioral Avoidance | .50* | .53* | .59* | .67** | .57* | .50* | .61** | .51* | .49* | -- | 8.10 | 5.82 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11. Cognitions/Mood | .45* | .46* | .89** | .72** | .54* | .58* | .89** | .54* | .65** | .73** | -- | 31.15 |
| 12. Hyperarousal | .59** | .43 | .69** | .74** | .68** | .69** | .75** | .74** | .82** | .64** | .80** | -- |

*Notes.* Cognitions/Mood = Alterations in cognitions/mood. Covariances are in the upper portion of the table and correlations are in the lower portion. * $p < .05$ ** $p < .01$

Table 6

*Correlation/Covariance Matrix of CAPS-5/AAT Symptom Clusters Over Time*

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Session 1 | | | | | | | | | |
| 1. Reexperiencing | -- | .69 | 3.66 | 7.67 | -.48 | 6.41 | 13.84 | -.95 | 10.15 |
| 2. AAT | .18 | -- | .39 | .62 | .07 | 1.35 | .23 | .08 | 2.14 |
| 3. Hyperarousal | .31 | .11 | -- | 3.05 | -.59 | 8.60 | 4.38 | .31 | 8.73 |
| Session 2 | | | | | | | | | |
| 4. Reexperiencing | .74** | -.08 | .35 | -- | -.89 | 4.93 | 9.72 | -.59 | 5.72 |
| 5. AAT | -.17 | .06 | -.03 | -.22 | -- | -1.14 | -.99 | .57 | .67 |
| 6. Hyperarousal | .48* | .16 | .80** | .50* | -.17 | -- | 7.90 | -.56 | 11.89 |
| Session 3 | | | | | | | | | |
| 7. Reexperiencing | .89** | -.25 | .33 | .76** | -.15 | .50* | -- | -1.51 | 12.08 |
| 8. AAT | -.16 | .13 | .15 | -.05 | .43* | .03 | -.22 | -- | .28 |
| 9. Hyperarousal | .51* | .22 | .68** | .33 | .28 | .71** | .52* | .14 | -- |

*Notes.* AAT = Approach Avoidance Task. Covariances are in the upper portion of the table and correlations are in the lower portion. * $p < .05$ ** $p < .01$

Table 7

*Correlation/Covariance Matrix of PCL-5/AAQ Symptom Clusters Over Time*

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Week 1 | | | | | | | | | |
| 1. Reexperiencing | -- | -8.89 | 7.65 | 9.33 | -16.37 | 7.12 | 11.17 | -25.30 | 10.89 |
| 2. AAQ | -.36 | -- | -29.97 | -11.46 | 78.61 | -19.12 | -24.89 | 98.20 | -38.63 |
| 3. Hyperarousal | .50* | -.68** | -- | 6.98 | -32.13 | 15.07 | 11.73 | -44.75 | 19.98 |
| Week 3 | | | | | | | | | |
| 4. Reexperiencing | .77** | -.27 | .40 | -- | -24.72 | 7.86 | 16.15 | -31.16 | 14.66 |
| 5. AAQ | -.54* | .81** | -.63** | -.51* | -- | -23.94 | -40.62 | 130.27 | -47.86 |
| 6. Hyperarousal | .43 | -.38 | .68** | .37 | -.42 | -- | 12.00 | -37.40 | 19.92 |
| Week 6 | | | | | | | | | |
| 7. Reexperiencing | .65** | -.50* | .47* | .83** | -.68** | .51* | -- | -52.50 | 24.84 |
| 8. AAQ | -.63** | .78** | -.72* | -.64** | .90** | -.56* | -.76** | -- | -64.22 |
| 9. Hyperarousal | .59** | -.69** | .74** | .68** | -.73** | .74** | .82** | -.82** | -- |

*Notes.* AAQ = Acceptance and Action Questionnaire II. Covariances are in the upper portion of the table and correlations are in the lower portion. AAQ scoring is such that higher scores indicate less experiential avoidance, hence the negative relationship with PTSD symptoms. * $p < .05$ ** $p < .01$

Table 8

*Comparisons of Significant Pathways in the PCL-5 Cross-Lagged Panel Model*

| Pathway 1 | Pathway 2 | Stronger Predicting Pathway | Results |
|---|---|---|---|
| Re1 to Hy3 (.54) | BA3 to Hy6 (.88) | Neither | $\chi^2(1) = .64$, $p = .42$, $d = .37$ |
| Re1 to Hy3 (.54) | CM3 to Re6 (.53) | Neither | $\chi^2(1) = .00$, $p = .99$, $d = .00$ |
| Re1 to Hy3 (.54) | CM3 to BA6 (.12) | Neither | $\chi^2(1) = 2.71$, $p = .10$, $d = .82$ |
| Re1 to Hy3 (.54) | CM3 to Hy6 (.35) | Neither | $\chi^2(1) = .48$, $p = .49$, $d = .32$ |
| Re1 to Hy3 (.54) | Hy3 to Re6 (-.36) | Reexperiencing | $\chi^2(1) = 10.40$, $p = .00$, $d = 2.20$ |
| Re1 to Hy3 (.54) | Hy3 to CM6 (-.33) | Reexperiencing | $\chi^2(1) = 11.16$, $p = .00$, $d = 2.39$ |
| Re1 to Hy3 (.54) | CM1 to Hy3 (.46) | Neither | $\chi^2(1) = .07$, $p = .79$, $d = .12$ |
| Re3 to CM6 (.58) | BA3 to Hy6 (.88) | Neither | $\chi^2(1) = .69$, $p = .41$, $d = .39$ |
| Re3 to CM6 (.58) | CM3 to BA6 (.12) | Reexperiencing | $\chi^2(1) = 17.66$, $p = .00$, $d = 7.26$ |
| Re3 to CM6 (.58) | CM3 to Hy6 (.35) | Neither | $\chi^2(1) = 2.60$, $p = .11$, $d = .80$ |
| Re3 to CM6 (.58) | Hy3 to CM6 (-.33) | Reexperiencing | $\chi^2(1) = 43.55$, $p = .00$, $d = \infty$ |
| Re3 to Hy6 (.44) | BA3 to Hy6 (.88) | Neither | $\chi^2(1) = 1.02$, $p = .31$, $d = .48$ |
| Re3 to Hy6 (.44) | CM3 to BA6 (.12) | Reexperiencing | $\chi^2(1) = 4.38$, $p = .04$, $d = 1.09$ |

| | | | |
|---|---|---|---|
| Re3 to Hy6 (.44) | CM3 to Hy6 (.35) | Neither | $\chi^2(1) = .18$, $p = .67$, $d = .20$ |
| Re3 to Hy6 (.44) | Hy3 to CM6 (-.33) | Reexperiencing | $\chi^2(1) = 20.08$, $p = .00$, $d = \infty$ |
| CM1 to Hy3 (.46) | BA3 to Hy6 (.88) | Neither | $\chi^2(1) = 1.28$, $p = .26$, $d = .54$ |
| Hy3 to Re6 (-.36) | BA3 to Hy6 (.88) | Behavioral Avoidance | $\chi^2(1) = 10.50$, $p = .00$, $d = 2.22$ |
| Hy3 to CM6 (-.33) | BA3 to Hy6 (.88) | Behavioral Avoidance | $\chi^2(1) = 10.81$, $p = .00$, $d = 2.30$ |
| CM3 to BA6 (.12) | BA3 to Hy6 (.88) | Behavioral Avoidance | $\chi^2(1) = 4.38$, $p = .04$, $d = 1.09$ |
| CM3 to Re6 (.53) | BA3 to Hy6 (.88) | Neither | $\chi^2(1) = .87$, $p = .35$, $d = .44$ |
| CM3 to Hy6 (.35) | BA3 to Hy6 (.88) | Neither | $\chi^2(1) = 2.01$, $p = .16$, $d = .69$ |
| CM1 to Hy3 (.46) | Re3 to CM6 (.58) | Neither | $\chi^2(1) = .66$, $p = .42$, $d = .38$ |
| CM1 to Hy3 (.46) | Re3 to Hy6 (.44) | Neither | $\chi^2(1) = .01$, $p = .93$, $d = .05$ |
| CM1 to Hy3 (.46) | Hy3 to Re6 (-.36) | Alterations in Cognitions/Mood | $\chi^2(1) = 21.17$, $p = .00$, $d = \infty$ |
| CM1 to Hy3 (.46) | Hy3 to CM6 (-.33) | Alterations in Cognitions/Mood | $\chi^2(1) = 29.36$, $p = .00$, $d = \infty$ |
| CM3 to Hy6 (.35) | Hy3 to CM6 (-.33) | Alterations in Cognitions/Mood | $\chi^2(1) = 24.42$, $p = .00$, $d = \infty$ |
| CM3 to BA6 (.12) | Hy3 to CM6 (-.33) | Hyperarousal | $\chi^2(1) = 21.22$, $p = .00$, $d = \infty$ |

*Notes.* Re = PCL-5 reexperiencing cluster, BA = PCL-5 behavioral avoidance cluster, CM = PCL-5 alterations in cognitions/mood cluster, Hy = PCL-5 hyperarousal cluster, AAQ = Acceptance and Action Questionnaire-II. Numbers following symptom clusters indicate the time point the questionnaire was administered (e.g., Re1 = PCL-5 reexperiencing cluster at week 1).

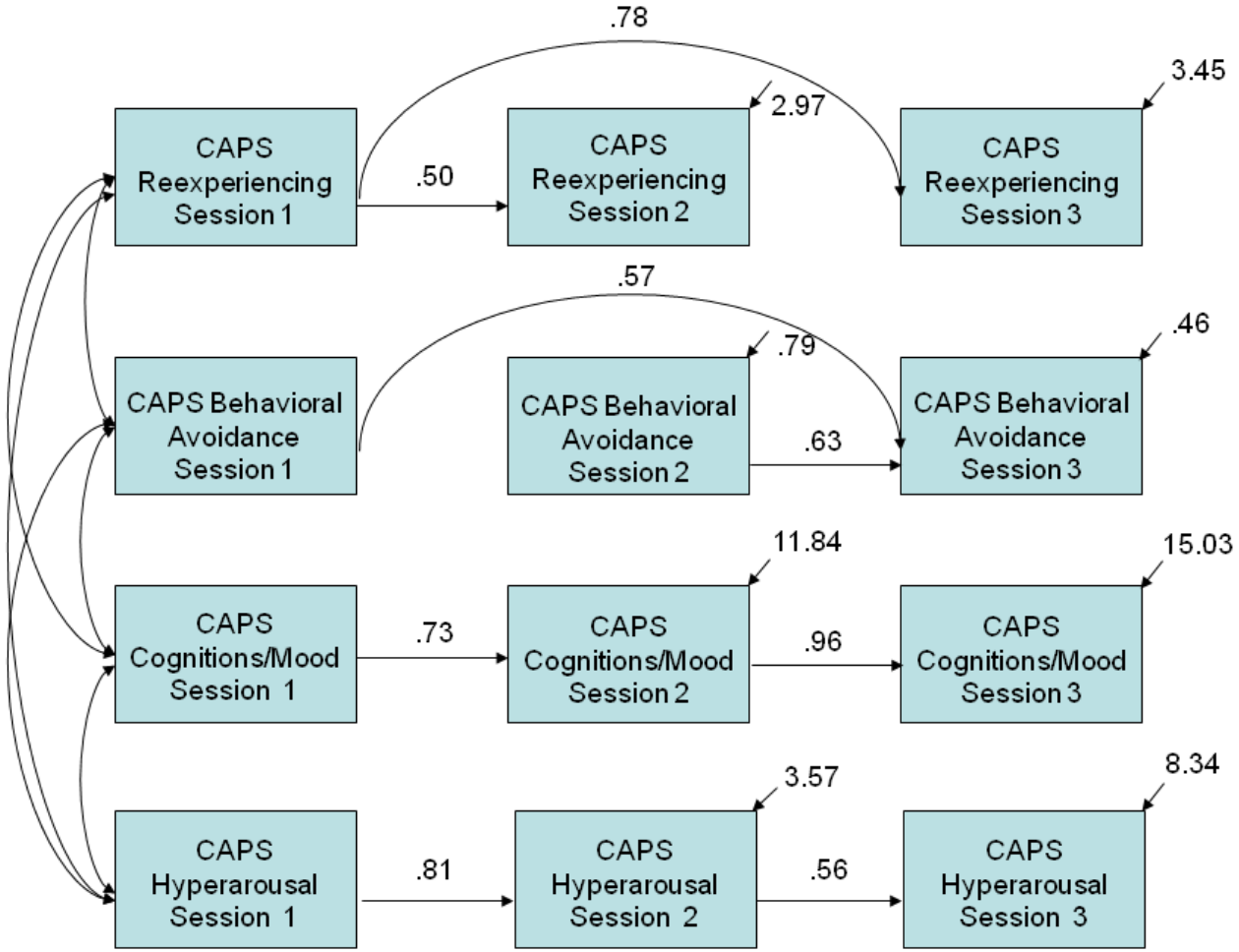
Table 9

*Comparisons of Significant Pathways in the PCL-5/AAQ Cross-Lagged Panel Model*

| Pathway 1 | Pathway 2 | Stronger Predicting Pathway | Results |
|---|---|---|---|
| Re1 to AAQ3 (-.93) | AAQ3 to Re6 (-.18) | Neither | $\chi^2(1) = 2.46$, $p = .12$, $d = .77$ |
| Re1 to AAQ3 (-.93) | Hy3 to AAQ6 (-.58) | Neither | $\chi^2(1) = .40$, $p = .53$, $d = .29$ |
| Hy3 to AAQ6 (-.58) | AAQ3 to Re6 (-.18) | Neither | $\chi^2(1) = 1.93$, $p = .16$, $d = .67$ |
| Re1 to AAQ3 (-.93) | AAQ3 to Re6 (-.18) | Neither | $\chi^2(1) = 2.46$, $p = .12$, $d = .77$ |
| Re1 to AAQ3 (-.93) | Hy3 to AAQ6 (-.58) | Neither | $\chi^2(1) = .40$, $p = .53$, $d = .29$ |
| Hy3 to AAQ6 (-.58) | AAQ3 to Re6 (-.18) | Neither | $\chi^2(1) = 1.93$, $p = .16$, $d = .67$ |

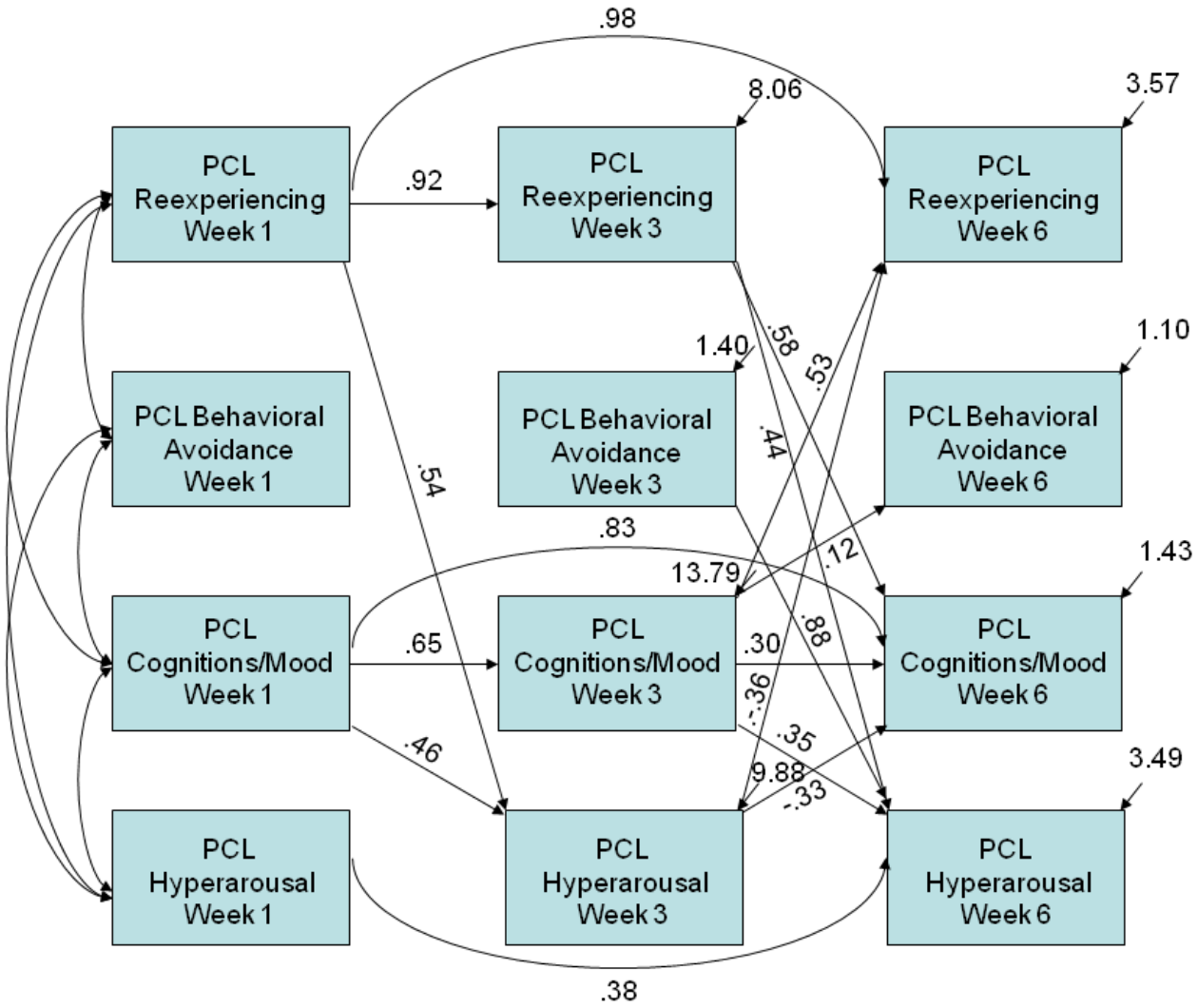
*Notes.* Re = PCL-5 reexperiencing cluster, Hy = PCL-5 hyperarousal cluster, AAQ = Acceptance and Action Questionnaire-II. Numbers following symptom clusters indicate the time point the questionnaire was administered (e.g., Re1 = PCL-5 reexperiencing cluster at week 1). AAQ scoring is such that higher scores indicate less experiential avoidance, hence the negative relationship with PTSD symptoms.

Figure 1. CAPS-5 Final Cross-Lagged Model



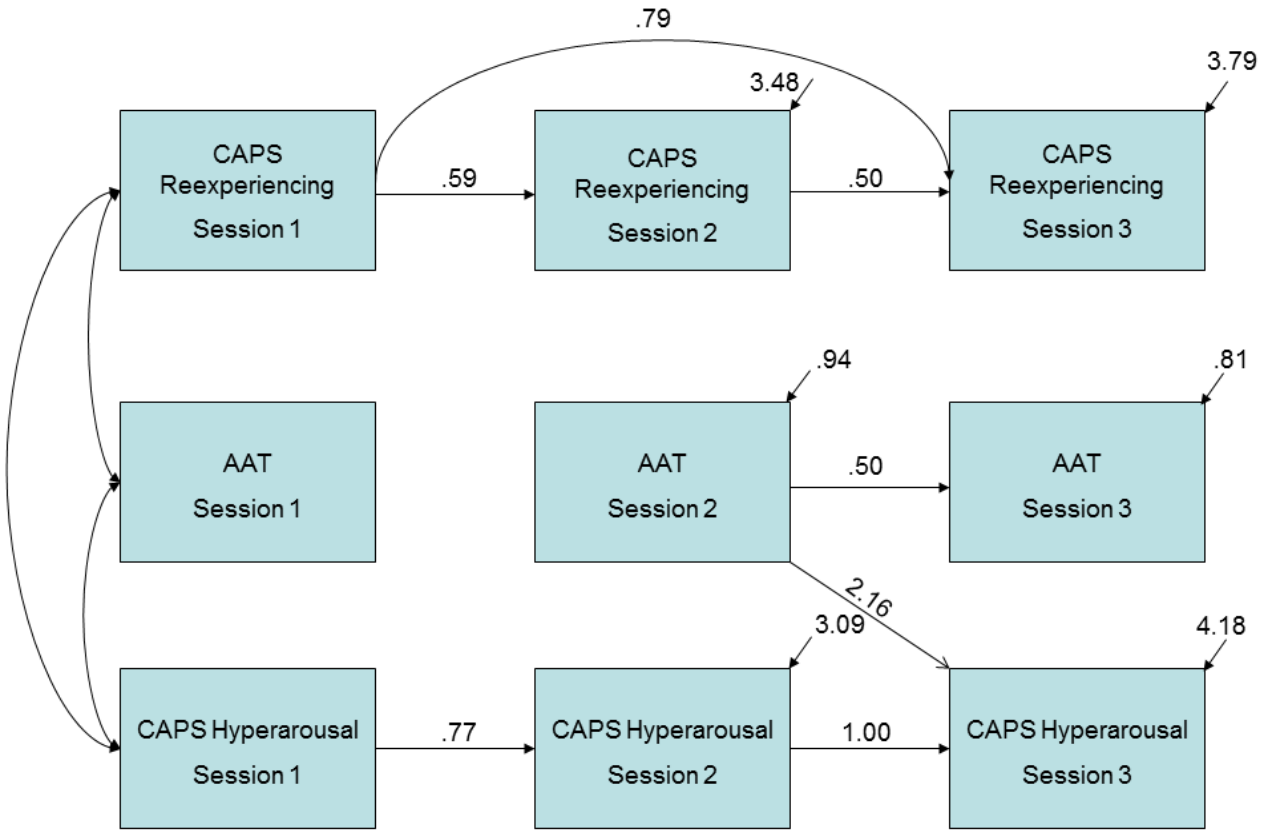
*Notes*. Only significant pathways are included in the model. Residuals are correlated at both Session 2 and Session 3. Cognitions/Mood = Alterations in cognitions/mood.

Figure 2. PCL-5 Final Cross-Lagged Model



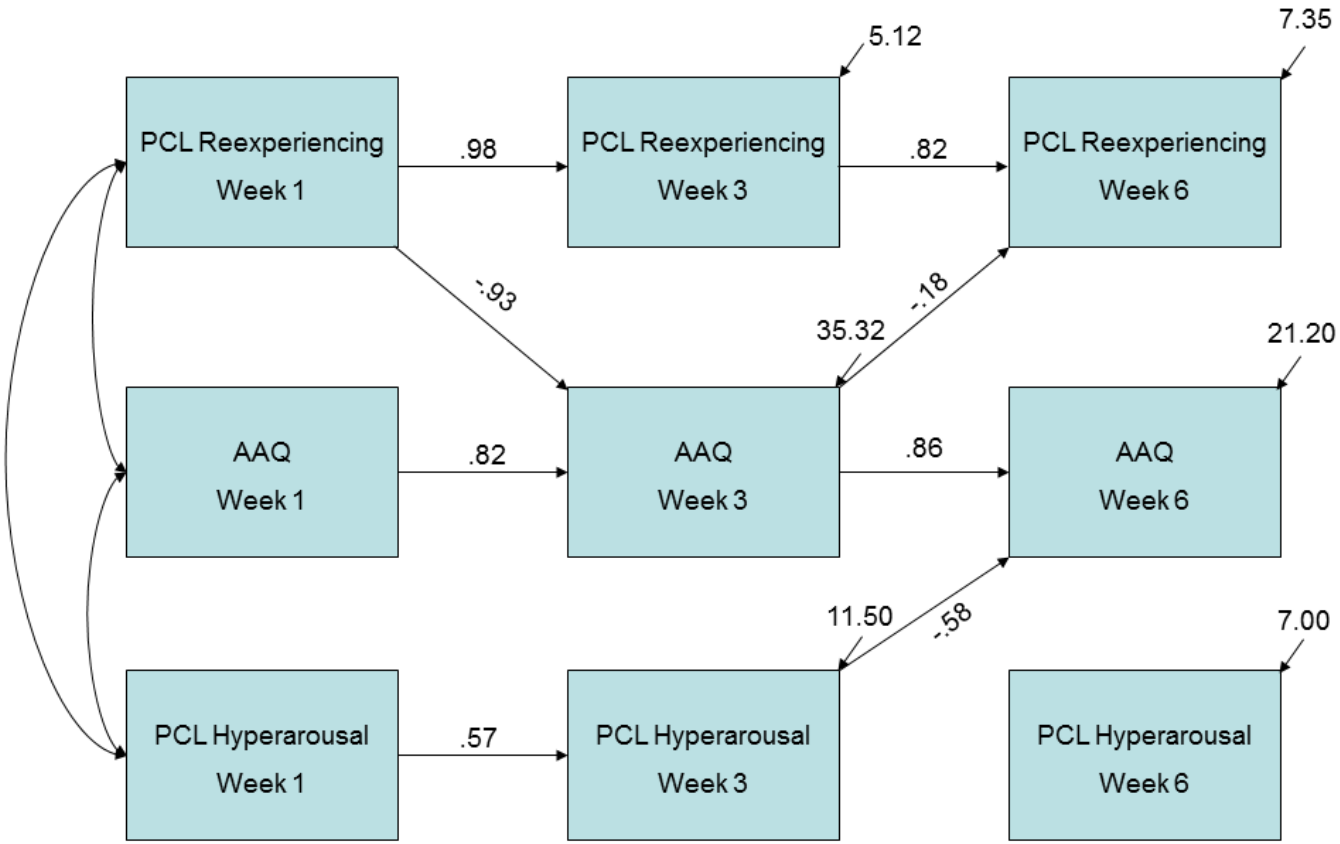
*Notes*. Only significant pathways are included in the model. Residuals are correlated at both Week 3 and Week 6. Cognitions/Mood = Alterations in cognitions/mood.

Figure 3. CAPS-5/AAT Final Cross-Lagged Model




*Notes.* Only significant pathways are included in the model. Residuals are correlated at both Session 2 and Session 3. AAT scoring reflects standardized trauma word total scores minus standardized neutral word total scores. Positive AAT values indicate an approach orientation, while negative AAT values indicate an avoidance orientation.

Figure 4. PCL-5/AAQ Final Cross-Lagged Model




*Notes.* Only significant pathways are included in the model. Residuals are correlated at both Session 2 and Session 3. AAQ scoring is such that higher scores indicate less experiential avoidance, hence the negative relationship with PTSD symptoms.

# Chapter 4

## DISCUSSION

In the current study, I set out to clarify which symptom cluster most strongly contributes to the longitudinal maintenance of PTSD. Overall, results challenge the notion of behavioral avoidance as the primary driving symptom cluster, and support the idea that both avoidance and reexperiencing drive PTSD maintenance. Compared to other symptom clusters, reexperiencing most frequently predicted other symptom clusters, indicating that it may have more of a maintenance role in PTSD than previously thought. That is, when examining the four DSM-5 PTSD symptom clusters across a six-week period using the PCL-5 self-report measure of past-week symptoms (i.e., "the PCL-5 model"), reexperiencing significantly predicted hyperarousal and alterations in cognitions/mood. To note is that reexperiencing consistently predicted hyperarousal across time points. Wald tests indicate that reexperiencing consistently predicted hyperarousal and alterations in cognitions/mood significantly more strongly than hyperarousal predicted reexperiencing and alterations in cognitions/mood, and significantly more strongly than alterations in cognitions/mood predicted behavioral avoidance and hyperarousal. Further, when replacing the PCL-5-measured behavioral avoidance and alterations in cognitions/mood clusters with AAQ-measured experiential avoidance, reexperiencing predicted experiential avoidance more strongly than experiential avoidance predicted reexperiencing (as represented by a large effect size, though the comparison did not quite reach statistical significance).

At the same time, avoidance also predicted other symptom clusters in a cross-lagged fashion, indicating that both reexperiencing and avoidance are critical to PTSD maintenance. In the PCL-5 model, behavioral avoidance significantly predicted hyperarousal and the beta weight was stronger than all other cross-lagged pathways. Similarly, when CAPS-measured behavioral

avoidance and alterations in cognitions/mood were replaced with task-based (AAT-measured) behavioral avoidance, AAT scores significantly predicted hyperarousal. Furthermore, as mentioned, experiential avoidance significantly predicted PCL-5-measured reexperiencing.

Together, these results indicate that Horowitz' biphasic model of alternating reexperiencing and avoidance may be more accurate than previously considered. Classical conditioning theory and closely aligned theories based on it currently dominate the field, and most PTSD treatments are based on such theoretical models. The current study results are not incompatible with these avoidance-based models, but reexperiencing may play more of a central role than these theories have posited. Creamer and colleagues' cognitive processing model (1990) posits a more central role of reexperiencing such that, in the etiology of PTSD, reexperiencing leads directly to avoidance, which then follows a reexperiencing-avoidance cycle, as described by Horowitz (1976, 1986). Both Creamer and colleagues' (1992) research and McFarlane's (1992) research support this theory, though both of these groups failed to measure hyperarousal symptoms or use interview-based measurement of PTSD symptoms. These limitations were addressed in the current study and results were generally consistent with the prior studies. Thus, given the absence, across studies, of data showing that avoidance predicts better than other symptom clusters, the role of reexperiencing needs to be taken more seriously and given greater emphasis as a PTSD maintenance factor.

Although the effects of behavioral avoidance were less robust than anticipated, alterations in cognitions/mood functioned somewhat as behavioral avoidance is expected to. In the PCL-5 model, alterations in cognitions/mood consistently predicted hyperarousal over time, though these pathways were generally less robust than the reexperiencing and behavioral avoidance pathways. Notable is the fact that alterations in cognitions/mood consistently predicted

hyperarousal significantly more strongly than hyperarousal predicted alterations in cognitions/mood. As the alterations in cognitions/mood cluster had lower predictive strength, as well as the fact that reexperiencing predicted alterations in cognitions/mood and hyperarousal significantly better than alterations in cognitions/mood predicted behavioral avoidance, I conclude that the alterations in cognitions/mood symptom cluster is less central to PTSD maintenance. This is consistent with theories that discuss DSM-IV conceptualized emotional numbing (which is now part of the alterations in cognitions/mood cluster) as part of the avoidance phase, but secondary to the more active avoidance of cognitions and behaviors [e.g., Horowitz (1976, 1986), Creamer and colleagues (1990)].

Currently, given the newness of DSM-5, the alterations in cognitions/mood symptom cluster has not been fully incorporated into theoretical conceptualizations of PTSD maintenance. DSM-5 moved to a four cluster model to address the findings of factor analytic studies indicating that four clusters were a better fit than three clusters, as well as empirical advances following Ehlers and Clark's (2000) cognitive theory of PTSD. The additional cluster in the context of DSM-IV was colloquially referred to as emotional numbing, though DSM-5 added two new items and modified some existing items to reflect the chronic negative moods and appraisals present in PTSD. This increased focus on cognitions may have diluted the effects of traditional "emotional numbing," as persistent negative moods and appraisals are typically associated with intense negative emotion, rather than dulled emotions (e.g., Beck et al., 2013). Although the alterations in cognitions/mood cluster exhibited good internal consistency, it may be that some items predict other clusters the way behavioral avoidance does, while other items may largely be predicted by reexperiencing and avoidance. Additionally, the emotional numbing items may vary

more by week, whereas the more cognitive items are likely less prone to such variability over time.

In the current study, hyperarousal emerged as an apparent byproduct of reexperiencing and behavioral avoidance, rather than a predictor. That is, hyperarousal rarely predicted other symptom clusters, but was predicted by other clusters several times. It significantly predicted three other symptom cluster (i.e., reexperiencing and alterations in cognitions/mood in the PCL-5 model and experiential avoidance in the PCL-5/AAQ model), though it only differentially significantly predicted more strongly than other clusters once (i.e., hyperarousal predicted alterations in cognitions/mood significantly more strongly than alterations cognitions/mood predicted behavioral avoidance in the PCL-5 model), and this pathway was not robust. Additionally, in the PCL-5 model, the significant cross-lagged pathways were negative, indicating that lower hyperarousal symptoms lead to higher reexperiencing and alterations in cognitions/mood symptoms. A potential explanation for this finding is that participants may have been engaging in more emotional processing in therapy, thereby decreasing hyperarousal symptoms, but increasing other symptom clusters. Hyperarousal was most consistently predicted by reexperiencing, though it was also repeatedly predicted by both behavioral avoidance and alterations in cognitions/mood to a lesser extent than reexperiencing. Conceptualizing hyperarousal as a byproduct of reexperiencing and behavioral avoidance is consistent with other theoretical models, such as classical conditioning (Keane et al., 1985) and models based on classical conditioning. However, contrary to this view are the findings of Schell and colleagues (2004), who concluded that hyperarousal is the primary driving cluster in PTSD maintenance. In the Schell study, all participants were victims of community violence, and most were Hispanic males. It is possible that hyperarousal symptoms were exacerbated in this sample and yielded

more statistical variability compared to reexperiencing and avoidance symptoms. Though Schell and colleagues (2004) did not report descriptive statistics for each symptom cluster, they did report that participants were most bothered by hyperarousal symptoms as compared to the other symptom clusters. Additionally, it has been found that Hispanic individuals report more somatic symptoms than Caucasians (e.g., Shetterly, Baxter, Mason, & Hamman, 1996; Varela, Sanchez-Sosa, Biggs, & Luis, 2007). Another potential explanation for their conclusions is that gender or other sample characteristics may influence how the maintenance of PTSD functions. For example, attending psychotherapy sessions may decrease hyperarousal symptoms, however, Schell and colleagues did not report whether participants were or were not in therapy over the course of the study. Future research would benefit from exploring such possibilities, as the current study did not have the appropriate sample size to do so.

**Measurement of Avoidance**

The limited cross-lagged predictive strength of avoidance should also be considered in light of the fact that the construct of avoidance was measured in four different ways in the current study. Significant results emerged for behavioral avoidance in the PCL-5 model but not in other models. The PCL-5 is designed to capture PTSD-specific avoidance, while the AAQ is designed to measure the more global construct of experiential avoidance and, although the AAT was designed to measure behavioral avoidance of trauma stimuli, it may not have functioned as intended (as discussed below). Further, although both the PCL-5 and the CAPS-5 measure PTSD-specific avoidance, the differential time frame of measurement may have impacted results. While the PCL-S was administered weekly in the current study (i.e., participants reported on the previous seven days), the CAPS-5 assessed the previous three weeks. Part of the issue could be due to measurement error in that people are better at reporting on the past week instead

of the past three weeks. However, it also may be that PTSD symptoms influence each other over a shorter time span that is better captured by one week intervals than three week intervals. Other studies of PTSD maintenance have examined a broader time scale (i.e., months), and have discussed the lack of more fine grained temporal analysis as limiting. Future research would benefit from symptom measurement on an even smaller time scale than used in the current study, such as daily self-reports or ecological momentary assessment (EMA). In fact, researchers have started using EMA to measure PTSD symptomatology with positive results (e.g., Kleim, Graham, Bryant, & Ehlers, 2013; Pfaltz, Michael, Meyer, & Wilhelm, 2013).

Related, results for the reliability and validity of avoidance measurement in the current study were mixed. The AAQ, which measured experiential avoidance, appears to be a reliable and valid measure given its good internal consistency and stability over time, as well as its documented reliability and validity in prior literature. However, task measurement of behavioral avoidance using the AAT was not effective in the current study. The AAT has been used effectively in previous studies, but in the current study it lacked stability over time and lacked robust correlations with other avoidance measures. A potential issue is the use of words as stimuli instead of pictures. Pictures may be harder to approach, as they may be more salient than words, thus providing more accurate measure of avoidance. However, words have been successfully used as stimuli in the AAT previously (De Houwer et al., 2001), but not in a PTSD population. Though participants were asked to identify their most trauma-salient words, it may be that they avoided giving words that would be truly effective. Additionally, lexical characteristics were not matched between trauma and neutral words, and length of words could potentially impact reaction time. Reaction times were consistently faster for trauma words than neutral words, regardless of approach or avoidance condition assignment (i.e., participants both

approached trauma words by pulling the joystick towards themselves and avoided trauma words by pushing the joystick away from themselves faster than neutral words). This may indicate that participants were more motivated to get trauma words off the screen than neutral words. Overall, either participants did not avoid the trauma stimuli or the task did not adequately capture behavioral avoidance. Since participants reported behavioral avoidance on the CAPS-5 and PCL-5, the latter is more likely. Future research would benefit from validating a task-based measure of PTSD-based avoidance.

**Clinical Implications**

The finding that PTSD maintenance may be shared between reexperiencing and avoidance indicates that we may need to think about treating PTSD differently. Though it is challenging to separate avoidance from reexperiencing in PTSD treatment, increasing focus on reexperiencing symptoms could be beneficial. Psychoeducation is already a crucial part of all PTSD treatments, but an added emphasis on emotion labeling to facilitate understanding and awareness of reexperiencing symptoms could be helpful. Techniques such as cognitive processing of nightmares and flashbacks in session, or evoking reexperiencing symptoms in session and practicing adaptive coping would facilitate addressing reexperiencing in conjunction with avoidance. Specifically, in regard to adaptive coping, mindfulness techniques could be incorporated in-session and for homework to help shift memories back to the present. In fact, mindfulness-based stress reduction (MBSR) is showing promising initial results with alleviating PTSD symptoms (Kearney, McDermott, Malte, Martinez, & Simpson, 2012; Owens, Walter, Chard, & Davis, 2012).

Though the results of the current study indicate we may need to think about treating reexperiencing differently, they are in line with how most PTSD focused treatments address

hyperarousal symptoms. That is, hyperarousal should diminish without targeted intervention when behavioral avoidance and reexperiencing are the focus of treatment. One caveat to this approach is that hyperarousal symptoms that interfere with therapy or are a danger to others (e.g., extreme anger that leads to aggression) may need targeted intervention, as exposure-based techniques could increase such hyperarousal behaviors, particularly in the early phase of treatment. Additionally, because hyperarousal symptoms are very distressing to clients, having data demonstrating that they will reduce on their own if reexperiencing and avoidance decrease may be helpful for motivating clients to engage in treatment.

**Limitations**

The findings from the current study need to be interpreted in the context of the study's limitations. A major limitation is the low internal consistency of the main PTSD assessment measures. The PCL-5 demonstrated better subscale internal consistency than the CAPS-5, which may have contributed to the PCL-5 demonstrating more robust cross-lagged findings. Additionally, the internal consistencies of the PCL-5 and CAPS-5 behavioral avoidance clusters were particularly poor. This could be an important contributing factor to behavioral avoidance significantly predicting other symptom clusters to a lesser degree than expected. Additionally, in the PCL-5 model, reexperiencing and alterations in cognitions/mood may have significantly predicted other clusters more frequently because they were more reliable. The behavioral avoidance cluster is particularly prone to low internal consistency values because it consists of only two items. The negative internal consistency for the behavioral avoidance subscale of the CAPS-5 at Session 2 is especially concerning. As the two items in the cluster should not negatively covary, it is most likely that the covariance between the items is in fact positive, and the value is due to sampling error given the small sample size and the small number of items

(Lord & Novick, 1968). Though the PCL-S and CAPS for DSM-IV have good established reliability and validity, the PCL-5 and CAPS-5 are relatively new, and do not have such a solid background of established reliability and validity. More research is needed to determine whether this is a broader limitation of the DSM-5 PTSD criteria, as that could negatively impact all future cluster-based PTSD research. It may be that task-based measurement of PTSD behavioral avoidance will be needed to supplement questionnaire and interview-based measurement of behavioral avoidance, but further work will be needed to construct strong measurement given that AAT-based measurement of avoidance was problematic in the current study.

The effects observed in the current study cannot be separated from the context of treatment, and results must be interpreted within this framework. Most importantly, the observed changes in symptoms may be a function of treatment rather than natural symptom maintenance. However, this interpretation is unlikely because, although all participants were in outpatient therapy, their treatment was not standardized and they each began treatment at a different point in time. The Therapist Rating Measure was included to measure if PTSD-specific treatment techniques systematically impacted symptom change; however, there was a high amount of missing data in an already small sample, and the measure is unvalidated. Further, other aspects of treatment that are not part of empirically validated cognitive-behavioral PTSD treatments may have impacted symptom change. Unfortunately, it is now known the degree to which this issue is unique to the current study. The researchers who conducted the three prior studies that utilized a cross-lagged design (i.e., Creamer et al., 1992; McFarlane 1992; and Schell et al., 2004) did not report on the proportion of participants who were in treatment, so comparability is not known. These prior studies gave an even less clear picture of the relationship between PTSD symptom maintenance and the role of treatment, and therefore, though the fact that participants were in

treatment acts as a confounding variable in the current study, it still improved upon prior literature in this area.

Lack of generalizeability of the current study sample impacts the conclusions that can be drawn in two broad ways. First, the small sample size, combined with the low reliability of some measures, was problematic in that there was insufficient power to detect effects in the cross-lagged analyses. However, several results that did not reach statistical significance demonstrated large effect sizes, indicating that these are robust effects. Although these large effect sizes may not be replicated in the future, it may be worthwhile to consider such effects in a cautious manner. Second, the demographics of the sample may impact generalizability of study results. There was limited demographic diversity among participants; however, the sample was consistent with the general demographic makeup of a semi-rural Pennsylvania community, suggesting that there were not systematic biases in participant recruitment.

Additionally, participants did not show the expected degree of symptom change over the course of six weeks, despite being in individual weekly psychotherapy. Even the PCL-5, which captured the most symptom variability of all avoidance measures used, stayed relatively stable over time. However, no participants were in PTSD-specific treatment, and future research would likely benefit from using participants who are in PTSD-specific treatment in order to see more symptom reduction or variability over time. Further, most significant cross-lagged pathways were in the PCL-5 model, where results were not consistent over time, indicating a lack of consistency in both measures and time course. By measuring a different time course than has been measured in prior literature I attempted to improve upon past designs, however, better theory is needed to guide research aimed at identifying the time course by which symptoms vary.

**Conclusions**

Overall, results of the current study indicate that both reexperiencing and avoidance are essential to PTSD maintenance. The current study does not provide strong evidence for a robust sole driving effect of behavioral avoidance, which is consistent with prior literature, but inconsistent with much of the theory. Based on the current study, avoidance still seems important; however, it seems as though reexperiencing is at least equally important. At the same time, this pattern of results may be partly a function of systematic measurement limitations.

Though there were limitations, the current study also had several strengths. It improved upon previous work by using a clinical mixed-trauma PTSD sample in a longitudinal design. Further, the use of multi-method measurement of avoidance was beneficial in working to best capture the problematic phenomenon present in PTSD and thoroughly examine how different facets of avoidance may function in PTSD maintenance. Future work would benefit from further exploring the ways reexperiencing and behavioral avoidance function to maintain PTSD, particularly using varied time courses.

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Appendix. Sample Instruction Sheet of PTSD Symptoms for a Motor Vehicle Accident Survivor When Completing the PCL-5

## PCL-5 Completion Instructions

Please use this template when considering how you fill out the PCL-5 each week. Keep in mind that there may be many ways you experience each of the 20 items listed, so **do not limit yourself to reporting only symptoms specifically covered in the examples on this list.**

1. Repeated, disturbing memories, thoughts, or images of the stressful experience?

   For example, like the time you described when you were spending time with your daughter and the memory of the accident popped into your head unexpectedly.

2. Repeated, disturbing dreams of the stressful experience?

   For example, nightmares like the ones you described where you are driving and about to crash. These can also be less distressing or intense dreams.

3. Suddenly acting or feeling as if the stressful experience were happening again (as if you were actually back there reliving it)?

   For example, feeling like the accident is happening again, like the time you described 6 months ago when you felt as if you were back in the car experiencing the accident again.

4. Feeling very upset when something reminded you of the stressful experience?

   For example, becoming anxious or sad seeing news coverage of car accidents or seeing cars that are similar to the one you were driving at the time of the accident.

5. Having physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?

   For example, when your palms get sweaty and your heart races when reminded of the accident.

6. Avoiding memories, thoughts, or feelings related to the stressful experience?

   For example, pushing accident-related thoughts out of your mind or trying to distract yourself by doing something else or avoiding talking about the accident.

7. Avoiding external reminders because they reminded you of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?

   For example, not driving down the road where you had the accident, avoiding seeing your friend who was in the car with you during the accident.

8. Trouble remembering important parts of the stressful experience?

   For example, not remembering the time leading up to the crash when you lost control of the car, but before you lost consciousness.

9. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?

   For example, thinking the world is totally dangerous and no one else can be trusted.

10. Blaming yourself or someone else for the stressful experience or what happened after it?

    For example, blaming yourself for the drunk driver hitting your car because you think you should have been able to prevent it from happening.

11. Having strong negative feelings, such as fear, horror, anger, guilt, or shame?

    For example, feeling a lot of fear when thinking about driving.

12. Loss of interest in activities that you used to enjoy?

    For example, running, fishing, scrapbooking.

13. Feeling distant or cut off from other people?

    For example, not feeling like you can talk to your husband or your friends.

14. Having trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?

    Feeling as if your emotions are blunted. For example, not feeling as happy as you thought you should have during your daughter's birthday party.

15. Feeling irritable or angry or acting aggressively?

    For example, becoming irritated by smaller things (e.g., your daughter not cleaning her room).

16. Taking too many risks or doing things that could cause you harm?

    For example, drinking and blacking out.

17. Being "super alert" or watchful or on guard?

    For example, not wanting to let your daughter ride in the car with anyone but yourself driving, or constantly expecting that the car's brakes will malfunction.

18. Feeling jumpy or easily startled?

    For example, little noises making you jump.

19. Having difficulty concentrating?

    For example, having trouble focusing at work or remembering what you were trying to do.

20. Trouble falling or staying asleep?

    For example, waking up in the middle of the night and having trouble getting back to sleep.

# Kelly S. Parker-Guilbert

## CURRICULUM VITAE

## EDUCATION

| | |
|---|---|
| 2014-2015 | **Predoctoral Clinical Internship**<br>University of Wisconsin, Department of Psychiatry and Behavioral Sciences, APA accredited, Madison, WI |
| 2008-2015 | **Ph.D., Clinical Psychology (anticipated August 2015)**<br>The Pennsylvania State University, University Park, PA |
| 2008-2011 | **M.S., Clinical Psychology**<br>The Pennsylvania State University, University Park, PA |
| 2001-2005 | **B.A., Psychology and Spanish Language and Literature**<br>Brandeis University, Waltham, MA |

## SELECTED PUBLICATIONS AND PRESENTATIONS

**Parker-Guilbert, K. S.,** Leifker, F. R., Sippel, L. M., & Marshall, A. D. (2014). The differential diagnostic accuracy of the PTSD checklist among men versus women in a community sample. *Psychiatry Research, 220,* 679-686.

Jaeger, J., Lindblom, K. M., **Parker-Guilbert, K.**, & Zoellner, L. A. (2014). Trauma narratives: It's what you say, not how you say it. *Psychological Trauma: Theory, Research, Practice, & Policy, 6,* 473-481.

**Parker-Guilbert, K.,** Leifker, F., Sippel, L., & Marshall, A. (2013, May). *Posttraumatic stress disorder and intimate relationships: Sex and gender considerations*. Symposium presented at the 25th annual meeting of the Association for Psychological Science (APS), Washington, DC.

**Parker-Guilbert, K.**, Hanley, K., & Soto, J. (2013, May). *Emotion regulation and emotional reactivity in response to negatively valenced affective stimuli.* Symposium presented at the 25th Annual meeting of the Association for Psychological Science (APS), Washington, DC.

**Parker-Maloney, K.,** & Marshall, A. (2009, November). *The role of emotion regulation in the differentiation of PTSD and depression symptoms.* Poster presented at the 43rd annual meeting of the Association for Behavioral and Cognitive Therapies (ABCT), New York City, NY.

**Parker-Maloney, K.,** Slagle, D., Bittinger, J., Stines Doane L., McDavid, J., Jaeger. J., Eftekhari, A., Feeny, N., & Zoellner, L. (2008, November). *Diagnostic complexity: Current and lifetime comorbidity in a treatment-seeking PTSD sample.* Poster Presented at the 42nd annual meeting of the Association for Behavioral and Cognitive Therapies (ABCT), Orlando, FL.

## MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Psychological Association
Association for Behavioral and Cognitive Therapies
Association for Psychological Science
International Society for Traumatic Stress Studies