

**EVALUATING AVOIDANCE BEHAVIORS AS MAINTENANCE
FACTORS FOR PTSD IN EVERYDAY LIFE**

An Undergraduate Research Scholars Thesis

by

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Submitted to the LAUNCH: Undergraduate Research office at
Texas A&M University
in partial fulfillment of requirements for the designation as an

UNDERGRADUATE RESEARCH SCHOLAR

Approved by
Faculty Research Advisor:

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May 2024

Major:

Psychology

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This project required approval from the Florida State University Institutional Review Board. FSU IRB #: 2018.25052, Approval Date: 07/12/2018, Expiration Date: 07/12/2020

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ABSTRACT

Evaluating Avoidance Behaviors as Maintenance Factors for PTSD in Everyday Life

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Avoidance is a key component of Post-Traumatic Stress Disorder (PTSD) in which individuals escape or distract themselves from perceived threats by becoming physically or psychologically distant from uncomfortable thoughts, feelings, or situations. Safety behaviors are a form of avoidance, where individuals engage in preventative behaviors to avoid threatening consequences. Behaviors such as these are believed to maintain aspects of PTSD symptomatology. While studies have shown that some individuals with PTSD engage in safety behaviors, little work has been done on examining how safety behaviors contribute to post-traumatic stress in everyday life. To understand how individuals with post-traumatic stress engage in safety behaviors, this study takes place in a naturalistic setting which offers insight into the everyday lives of those with PTSD symptoms in a nonclinical adult sample. Participants with trauma exposure and who have experienced avoidance symptoms in the past month will undergo a 14-day self-report period in which their safety behavior usage and feelings of post-traumatic stress will be collected at 3 time points throughout the week. It is hypothesized that higher levels of safety behaviors at baseline will predict greater PTSD symptom levels during the

self-report period. It is also hypothesized that safety behavior usage will amplify the effect of daily stressors on PTSD symptoms. Understanding how safety behavior usage can maintain post-traumatic stress symptoms in naturalistic settings is essential for improving psychological assessments, treatment planning, and outcomes.

DEDICATION

To our friends, families, instructors, and peers who supported us throughout the research process.

ACKNOWLEDGEMENTS

Contributors

I would like to thank my faculty advisor, Dr. Brian Albanese, and his graduate student, David Johnson, for their guidance and support throughout this research.

Thanks also go to my friends and colleagues and the department faculty and staff for making my time at Texas A&M University a great experience.

Funding Sources

This undergraduate research received no specific financial support for data collection.

1. INTRODUCTION

1.1 Post-Traumatic Stress Disorder

Post-traumatic stress disorder (PTSD) consists of four components (Horwitz, 2018). Firstly, PTSD results from environmental trauma affecting an individual's ability to cope with that experience (Horwitz, 2018). Some examples of external trauma include combat, sexual assault, interpersonal violence, car accidents, terrorism, and natural disasters, such as hurricanes and earthquakes. Although PTSD is a result of experiencing environmental trauma, individual and cultural factors determine whether an individual will be affected by the experience (Horwitz, 2018). People have different perspectives on what they view as traumatic, which is highly influenced by culture and normative history-graded influences (e.g. war). Therefore, the extremity of the traumatic event does not determine the severity and maintenance of PTSD symptoms (Horwitz, 2018). The onset and maintenance of PTSD is influenced by both environmental and genetic factors (Horwitz, 2018).

The second component of PTSD involves two ways of experiencing psychological effects from recollecting memories of a past traumatic event (Horwitz, 2018). Firstly, daily activities trigger vivid recollections of the traumatic event, making an individual feel that they are reliving it (Horwitz, 2018). Despite efforts to not think about the past, repetitive intrusive thoughts about the traumatic event disrupt everyday life affecting their ability to feel connected to others and themselves (Horwitz, 2018). Secondly, the distress caused by severely traumatic events can be so profound that victims struggle to consciously remember it (Horwitz, 2018). Individuals with this response will repress their memories and be unable to consciously recall them (Horwitz, 2018). With psychotherapy, medications and hypnosis, victims can work towards recalling memories of

traumatic events (Horwitz, 2018). Altogether, conscious and unconscious memories of past trauma underlie PTSD symptomatology (Horwitz, 2018). The third component of PTSD relates to the stressful symptoms resulting from reliving traumatic events including uncomfortable somatic sensations and increased arousal, feeling unhappy, and engaging in experiential avoidance (Horwitz, 2018). Horwitz (2018) explains that individuals with PTSD also struggle with adjustments to the present, such as grief, and social reintegration. Lastly, the fourth component of PTSD is the assumption that PTSD symptoms are pathological and not natural (Horwitz, 2018). Additionally, individuals with PTSD are not responsible for the distress they experience. All four components of PTSD are important factors affecting the onset and maintenance of PTSD.

PTSD affects thousands of people worldwide, and it is one of the leading causes of disability (LeBouthillier et al., 2015). Approximately 80% of the general population have experienced a traumatic event, and around 8% of them developed PTSD from it (Schein et al., 2021). PTSD is also highly associated with suicide and suicidal ideation (Schein et al., 2021). Schein et al. (2021) found that 56.7% of patients with a history of suicide attempt have PTSD, and individuals with PTSD are 2 to 5 times more likely to attempt suicide (LeBouthillier et al., 2015). Additionally, women who experienced a traumatic event are more likely to develop PTSD than men (Breslau, 2009), and the one-year prevalence of PTSD is almost twice as high in women than men (Schein et al., 2021). Schein et al. (2021) also found that the military population has a high prevalence of PTSD. 69.8% to 87.5% of veterans and active-duty service members with dependence on substances have PTSD (Schein et al., 2021). Given that PTSD is ranked as among the most diagnosed mental disorders (LeBouthillier et al., 2015), it is essential for us to understand the cognitive and behavioral factors maintaining the disorder.

1.2 Maintenance Factors for PTSD

Cognitive-behavioral therapy (CBT) is an empirically tested psychological treatment used to effectively treat PTSD (Paunovic, 1998). However, a study found that 25% to 45% of patients who underwent psychological treatment still met criteria for PTSD after treatment (Paunovic, 1998). Current PTSD symptoms were being exacerbated by certain factors which further prolonged the symptoms. Paunovic (1998) created a list of cognitive factors that contribute to the maintenance of PTSD symptoms after receiving treatment.

1.2.1 Anger and Rage

Firstly, anger and rage may result from blaming others for a traumatic experience which can prolong PTSD symptoms (Paunovic, 1998). Individuals with PTSD who had higher levels of anger before receiving exposure treatment showed reduced expressions of fear during the treatment and derived fewer benefits from the treatment (Paunovic, 1998). The expression of fear may be hindered by anger due to the substantial overlap in stimuli, response patterns, and meaning cues between the two emotions (Paunovic, 1998). Anger may influence unrealistic thoughts about who to blame for their symptoms (Paunovic, 1998). Anger can also increase the number of intrusive thoughts and affect individuals' rational reasoning, which maintains their PTSD symptoms (Paunovic, 1998).

1.2.2 Guilt and Shame

Additionally, guilt and shame are another set of maintenance factors for PTSD (Paunovic, 1998). Individuals with PTSD might feel responsible for the cause of the traumatic event, resulting in guilt and shame (Paunovic, 1998). Excessive guilt and self-blame may increase intrusive memories of the traumatic event, maintain depressive symptoms, and decrease the success rate of exposure therapy (Paunovic, 1998). Moreover, guilt and shame lead individuals to

engage in avoidance behaviors such as withdrawing from emotional support systems (Paunovic, 1998). Guilt and shame are experienced due to the belief that they failed to prevent the traumatic event, which further maintains PTSD symptoms (Paunovic, 1998).

1.2.3 Attentional and Memory Bias

Furthermore, research has shown that implicit memory bias maintains PTSD symptoms (Paunovic, 1998). Previous studies found that individuals with PTSD have an attentional bias toward words related to a traumatic event they experienced (Paunovic, 1998). The words symbolize reminders of a traumatic event such as “bombs” (Paunovic, 1998). For example, veterans of the Vietnam war with PTSD had an implicit bias for threatening words related to combat (Paunovic, 1998). This shows that victims are drawn to reminders of the event that can involuntarily trigger similar responses caused by the traumatic event. Additionally, attention towards threat reduces attention to other stimuli, including positive experiences (Paunovic, 1998). As a result, individuals with PTSD have trouble remembering those memories (Paunovic, 1998). For example, Vietnam veterans with PTSD struggled to remember positive memories unrelated to war (Paunovic, 1998).

1.2.4 Self-efficacy

In addition, self-efficacy refers to an individual’s internal beliefs about their ability to successfully overcome the traumatic event (Paunovic, 1998). Low self-efficacy is associated with more intrusive memories and avoidance behaviors which maintain PTSD symptoms (Paunovic, 1998). However, PTSD patients with a higher self-efficacy can feel a sense of control which improves their reactions to stress and alleviates their PTSD symptoms (Paunovic, 1998). Patients who feel confident in their ability to manage difficult situations feel more in control of their intrusive thoughts and experience less intrusive thoughts and avoidance behaviors

(Paunovic, 1998). Over time, higher self-efficacy can improve PTSD symptoms (Paunovic, 1998). On the other hand, individuals with PTSD who have low self-efficacy may avoid and suppress their intrusive thoughts, which reduces their ability to control them (Paunovic, 1998).

1.2.5 Dysfunctional Schemas

PTSD patients with dysfunctional schemas about themselves and the world can experience maintenance of their intrusion symptoms and prolonged PTSD symptoms (Paunovic, 1998). Majority of people perceive themselves as good people worthy of love and have positive beliefs of the world (e.g. believing that most people have good intentions and the good outweighs the bad in the world) (Paunovic, 1998). Additionally, people tend to believe that events happen for a specific reason that ends on a positive note (Paunovic, 1998). However, people with PTSD are now more aware that traumatic events can happen to them (Paunovic, 1998). They may experience changes in their self-worth and begin to believe the world is a bad place (Paunovic, 1998). If their core beliefs are altered after experiencing a traumatic event, their previous schemas will be contradicting their new ones leading to more emotional distress (Paunovic, 1998).

1.2.6 Avoidance Behaviors

Avoidance learning is another major learning process in anxiety disorders and PTSD (Sheynin et al., 2017), and cognitive avoidance of perceived threats can contribute to the maintenance of PTSD (Paunovic, 1998) through negative reinforcement learning (Ahrendt et al., 2015). As a part of adaptation, people learn to associate certain stimuli with outcomes using their memories and life experiences. This is known as associative learning, which helps distinguish what is dangerous versus what is safe and when to avoid unpleasant situations versus when to approach them. Moreover, aversive associative learning consists of learning to associate a

stimulus or response to an aversive outcome (Pittig et al., 2018). People engage in avoidance behaviors as a response to perceived threats, where they become physically or psychologically distant from the threat. Individuals with PTSD symptoms are likely to avoid negative stimuli to obtain a sense of relief following their avoidance (Pittig et al., 2018).

Furthermore, previous research has found that individuals with anxiety disorders tend to experience disruptions in the learning processes involved in avoidance (Pittig et al., 2018). For example, an individual living with Social Anxiety Disorder may avoid crowded areas such as grocery stores due to the uncomfortable thoughts and feelings that may arise when being around large groups of strangers. Other examples of avoidance include pretending to be somewhere else when remembering the traumatic event and becoming distant from people to avoid being hurt (Pittig et al., 2018). When individuals with PTSD experience trauma-related intrusive thoughts that were previously avoided, they may experience more emotional distress (Paunovic, 1998). Individuals with PTSD might also engage in avoidance behaviors due to automatic associations to a stimulus, where responses are no longer dependent on the outcome (Pittig et al., 2018). As a result, elevated avoidance becomes more harmful because it prolongs the symptoms in individuals with PTSD and anxiety disorders and affects their personal lives (Pittig et al., 2018).

1.2.7 Safety Behavior Usage

Individuals with stress-related conditions also engage in safety behaviors, a preventative type of avoidance (Goodson & Haeffel, 2018). The goal of safety behaviors is to prevent anxiety by focusing on preventing a feared consequence (Goodson & Haeffel, 2018). For example, an individual with PTSD and physical danger exposure may frequently check their home security systems for intruders (Goodson & Haeffel, 2018). While safety behaviors may provide temporary relief, they give a false sense of safety from perceived threats (Albanese et al., 2024).

Goodson and Haeffel (2018) conducted a study on veterans receiving prolonged exposure therapy and experiencing PTSD symptoms and safety behavior usage. Results showed that safety behavior usage was correlated with worse outcomes in PTSD treatment (Goodson & Haeffel, 2018). A possible explanation for this is that safety behaviors elevate expectations of threat and lead individuals to worry about other aspects of their lives. Over time, safety behaviors have been found to be harmful and maintain PTSD symptomology (Albanese et al., 2024). Despite the important role of safety behaviors usage in individuals with PTSD, they are understudied. The underlying mechanisms that determine whether an individual will engage in safety behaviors remain unknown to our knowledge.

1.3 Electronic Diaries

Electronic diaries are a self-report measure that repeatedly collects real-time data on the behavior and experiences of participants in their natural environments (Piasecki & Hufford, 2007). Since data is collected in a natural setting, it is generalizable to participants' lives outside of a laboratory and it provides ecological validity (Shiffman et al., 2008). Additionally, the self-report assessments ask participants about their current feelings, focusing on their current state (Shiffman et al., 2008). Electronic diaries also ask participants to report important events and behaviors that they experience in between assessments (Piasecki & Hufford, 2007). Previous research has shown that people's memory is unreliable and susceptible to bias, which poses a problem for recall assessments in clinical visits (Shiffman et al., 2008). Retrospective questions involve multiple cognitive processes that can mistakenly report inaccurate information which is an important limitation of research (Piasecki & Hufford, 2007). For example, Piasecki and Hufford (2007) found that individuals are more likely to recall an event as happening sooner than it actually happened. However, the electronic diaries' focus on the present helps reduce recall

bias and error. This also provides insight into changes in behavior and emotions across different situations and times (Shiffman et al., 2008).

Self-report assessments prompt participants to self-monitor the frequency, intensity, and duration of PTSD symptoms, such as flashbacks, nightmares, and unwanted thoughts (Dewey et al., 2015). Dewey and colleagues (2015) found that ecological momentary assessments (EMA), such as electronic diaries, can have therapeutic benefits to participants, as those who completed them showed a reduction in PTSD symptoms. Self-monitoring allows individuals to be exposed to the symptoms they previously avoided, further encouraging them to reflect and increase emotional self-awareness (Dewey et al., 2015). Follow-up studies also showed that participants who exhibited improvement in their PTSD symptoms through self-monitoring were able to sustain those therapeutic benefits over time (Dewey et al., 2015). A common concern of self-report assessments is the worsening of symptoms due to continuous self-reflection. However, Dewey and colleagues (2015) found that completing the EMA assessments did not increase or worsen PTSD symptoms.

Short et al. (2017) conducted a study utilizing EMA assessments to analyze the effects of negative affect on the relationship between sleep and PTSD symptoms. Participants from a community sample with a PTSD diagnosis completed four EMAs per day for eight days (Short et al., 2017). Short et al. (2017) found that poor sleep quality the night before was linked to higher PTSD symptoms the next day. Therefore, self-report assessment offers insight into the effects of daily changes, such as sleep quality, on symptomology. In a similar study, DeViva et al. (2020) used EMA to explore the relationship between PTSD symptoms during the day and sleep quality that night. American veterans were recruited and asked to complete three EMAs a day for 28 days (DeViva et al., 2020). DeViva et al. (2020) found that poor sleep the previous night was

associated with worse PTSD symptoms the day after. Additionally, high PTSD symptoms during the day were not linked to poor sleep that night (DeViva et al., 2020). In this study, the use of self-report assessments was able to predict future PTSD symptoms based on previous sleep quality.

Furthermore, Black et al. (2016) conducted a study on United States veterans using the EMA methodology. Some participants were receiving PTSD-related treatment and were registering for service benefits for PTSD (Black et al., 2016). The study focused on the relationship between daily PTSD symptoms and risky sexual behavior (Black et al., 2016). Black et al. (2016) came up with two interpretations of the results: unstable PTSD symptoms make veterans inclined to engage in risky sexual behavior or unstable PTSD symptoms are associated with impulsivity which is also linked with risky sexual behavior. By using EMAs, Black et al. (2016) were able to find the antecedents of high-risk sexual behaviors, which were high PTSD symptoms.

Pineles et al. (2011) conducted a longitudinal study on the effects of avoidant coping strategies, such as safety behavior usage, on the recovery from PTSD symptoms. Pineles et al. (2011) led clinician interviews and collected physiological data a month after their participants experienced sexual or physical assault. The results showed that high physiological responses and avoidant behaviors disrupted cognitive processes of memories, resulting in the worsening of PTSD symptoms within the span of 3 months (Pineles et al., 2011). While these findings are significant, this study has some limitations. For example, the study took place in a controlled environment, therefore, it lacks insight into how participants respond to natural stressors in their everyday lives.

1.4 Present Study

Avoidance of stressful stimuli may lead to the maintenance of PTSD, as the resulting reduction of fear acts as a reinforcer (Brewin and Holmes, 2003). The present study measured avoidance behaviors and safety behavior usage, as they are believed to influence negative reinforcement learning. This study offered the advantage of taking place in a naturalistic setting and captured participants' thoughts and behaviors in real time over a two-week period using electronic diaries. This study helped us understand how individuals learn to avoid aversive stimuli, like daily stressors, in their everyday lives. The present study also allowed us to compare changes in PTSD symptoms within a two-week period. Additionally, this study analyzed the correlation between safety behavior usage at baseline and PTSD symptom levels during the self-report section. The present study further analyzed the effects of safety behavior on daily stress and its relationship to PTSD, anxiety, and depressive symptoms. It was hypothesized that higher safety behaviors at baseline would predict greater PTSD symptom levels during the follow-up self-report period. It was also hypothesized that higher safety behavior use is correlated to increased effects of daily stress on anxious, depressive, and PTSD symptomology.

2. METHODS

2.1 Participants

Trauma exposed participants ($N = 96$) from the community and the undergraduate psychology subject pool to participate in the current study. Inclusion criteria were as follows: At least 18 years of age, no report of psychotic spectrum symptoms, the endorsement of at least 1 Criterion A traumatic event. Participants were required to endorse at least one of the Criterion B (intrusive re-experiencing) or Criterion C (avoidance) symptoms to ensure that they were experiencing at least minimal PTSS. Fourteen subjects were removed from the present analyses for declining to participate in the follow-up period ($n = 4$) or completing fewer than two valid follow-up timepoints ($n = 10$). This yielded a final sample consisting of 81 participants and 380 total surveys available for analysis ($M_{surveys\ per\ participant} = 4.63$, $SD = 1.12$)

The final sample ($n = 81$) was predominantly young ($M_{age} = 24.35$, $SD = 10.80$, $range = 18-63$ years old) and female ($n = 59$, 72.0%). Racial demographics were as follows: White or Caucasian ($n = 53$, 64.6%), Black or African American ($n = 18$, 22.0%), Other (e.g., biracial; $n = 9$, 11.0%), and Asian or Asian-American ($n = 2$, 2.4%). Further, 30 individuals identified as Hispanic or Latinx (36.6%).

2.2 Baseline Survey

At the beginning of the study, those who were recruited from the community completed a pre-screen through Qualtrics that determined participant eligibility. The PTSD section of the SCID-5-RV was administered to ensure eligibility. A full diagnosis of PTSD was not required, and participants that met the criteria were eligible to participate. Once eligibility was verified, participants completed baseline self-report measures and a series of neurobehavioral tasks while

electrocortical data were collected, to be reported elsewhere. After the initial lab appointment, subjects were asked about their willingness to participate in longitudinal self-report section of the study using Qualtrics on their smartphones. After agreeing, eligible participants went through consent processes. They reviewed a consent form that covered the purpose of the study, what is expected of them, the potential benefits and harm of the study, data use, and possible compensation. The participant was enrolled in the study after consenting. Data collected in the baseline survey analyzed PTSD symptomology, affect, safety behavior usage and avoidance behaviors.

2.3 Electronic Diaries

A two-week electronic diary period was utilized to obtain participant self-report data in naturalistic settings. Participants then completed three surveys per week for two weeks ($n = 6$ surveys total). Surveys were collected using Qualtrics on their smartphones. The estimated time of completion per survey was 3-5 minutes. Participants received text messages notifying them when to complete the electronic diaries via Boomerang for Gmail. The text message contained a link that sent participants directly to the survey. The electronic diaries were based on a momentary schedule, where participants received randomized text messages within a time frame (9:00 AM to 7:00 PM). Participants were given 2 hours to complete the survey. If the survey was not completed after 2 hours, participants were unable to complete it. Data collected during the electronic diary period assessed fluctuations of PTSD symptomology across different times and situations, coping mechanisms, affect, safety behavior usage and avoidance behaviors.

2.4 Baseline Measures

2.4.1 Safety Behavior Assessment Form (SBAF)

The SBAF (Goodson et al., 2016) is a 41-item self-report measure designed to determine the extent to which an individual typically engages in common safety behaviors often used among those with PTSD or other anxiety-related conditions (e.g., “scope places out before entering”; “sit with back to wall”). Items are rated using a 4-point Likert scale ranging from 0 (*never*) to 3 (*always*). In the current sample, the SBAF demonstrated excellent internal consistency ($\alpha = .94$).

2.4.2 Life Events Checklist for DSM-5 (LEC-5)

The LEC-5 (Weathers et al., 2013) is a self-report checklist of the experience of 17 different types of traumas across an individual’s lifetime. Participants indicate whether they directly experienced, witnessed, or learned about each trauma type (e.g., combat, sexual assault, physical assault). In the current sample, participants reported experiencing or witnessing an average of 6.02 lifetime traumatic event types ($SD = 4.25$, $range = 1-24$).

2.4.3 Posttraumatic Checklist for DSM-5 (PCL-5)

The PCL-5 (Weathers et al., 2013) is a 20-item self-report measure used to index perceived PTSD symptom severity over the preceding month. The PCL-5 is composed of four subscales representing each of the PTSD symptom clusters: Intrusive memories, avoidance, hyperarousal, and changes in negative cognitions or mood. In the current study, the PCL-5 was administered at baseline and used in the present analyses to account for individual differences in PTSD symptom severity. The PCL-5 total score demonstrated excellent internal consistency ($\alpha = .95$).

2.5 Follow-up Self-report Measures

2.5.1 *Daily Inventory of Stressful Events (DISE)*

Participants completed a self-report version of the DISE (Almeida et al., 2002) to assess the occurrence of specific types of stressors that had occurred since the last assessment, similar to past work (Macatee et al., 2016). The DISE self-report measure uses seven items to reflect broad categories of stressor types. In the original study utilizing an interview version of the DISE (Almeida et al., 2002), interrater agreement on stressor classification was high ($\kappa = .66 - .95$). In line with past work (e.g., Macatee et al., 2015, Macatee et al., 2016), the current study used the DISE to index the total number of stressors experienced since the last survey. Number of stressors experienced at each time point ranged from 0-7 ($M = 1.57, SD = 1.67$) and stressors were rated as moderately stressful on a 4-point Likert scale ($M = 1.57, SD = 1.05, range = 0-4$), suggesting that the DISE events in the current study were perceived as stressful. Further, the DISE demonstrated poor-to-adequate reliability ($\alpha = .69$).

2.5.2 *Posttraumatic Checklist for DSM-5 (PCL-5)*

Ten items from the PCL-5 (described above) were used to assess PTSD symptoms at each timepoint, with the instructions modified to assess the degree to which each symptom was experienced since the last survey. Items were selected in line with past research (Short et al., 2017) and based on loadings of each item onto respective PTSD symptom clusters in past factor analytic work (Weathers et al., 2013). Items included the following symptoms: intrusions, being upset when reminded of the trauma, physical reactions when reminded of the trauma, avoiding internal reminders, avoiding external reminders, feeling distance, or cut off from others, anhedonia, difficulty concentrating, hypervigilance, and being easily startled. Internal consistency for the abbreviated PCL-5 was excellent ($\alpha = .91$).

2.5.3 *Depression, Anxiety, and Stress Scale-21 (DASS-21)*

A modified version of the DASS-21 (Antony et al., 1998; Lovibond and Lovibond, 1995) depression and anxiety subscales was used to evaluate daily symptoms during the follow-up period, similar to past work (Albanese et al., 2021). Participants rated the extent to which each statement applied to them using a 4-point Likert scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much or most of the time*). In line with past work (Albanese et al., 2021) the modified follow-up DASS depression ($\alpha = .87$) and anxiety ($\alpha = .87$) subscales showed good reliability.

2.6 **Clinician Administered Interview**

2.6.1 *Structured Clinical Interview for DSM-V, Research Version (SCID-5-RV)*

Lifetime trauma exposure and PTSD diagnoses were determined using the SCID-5-RV (First et al., 2015), which were administered by highly trained doctoral level therapists with extensive training in SCID-5-RV administration and scoring, including reviewing training tapes, observing live administrations, and conducting practice interviews with other trained therapists. In addition, all SCID-5-RV results were reviewed by a licensed clinical psychologist to ensure accurate diagnoses. Prior studies in our lab using the same procedures have demonstrated excellent interrater reliability ($\kappa = .77-.86$; Keough & Schmidt, 2012; Schmidt et al., 2014; Schmidt et al., 2017). In the present study, a majority of participants met criteria for PTSD ($n = 39, 47.6\%$), or Other Specified Trauma-related disorder ($n = 18, 22.0\%$).

2.7 **Data Analytic Plan**

Data were first examined for normality and zero-order correlations were examined. *Dplyr* (Wickham et al., 2023), *EMAtools* (Kleiman et al., 2017), and *psych* (Revelle, 2024) packages in *R Studio* version 4.3.2 (R Core Team, 2021) were used to manage the longitudinal data,

including creating person-centered and lagged variables. Multi-level models were fit using the *lme4* (Bates et al., 2007) package and *p*-values generated using *lmerTest* (Kuznetsova et al., 2017). Optimal data fit was determined using model comparisons, and the resulting model was used to evaluate cross-level effects of level 2 (baseline safety behaviors) predicting level 1 daily PTSD symptoms on average across the two-week period. We then investigated the cross-level interaction to examine whether baseline safety behavior usage amplified the effects of person-centered concurrent and lagged daily stress predicted PTSD symptom changes.

3. RESULTS

3.1 Descriptives and Correlations

Descriptive statistics and correlations can be found in Table 1. Mean PCL-5 total scores were comparable to clinical cutoffs for PTSD ($M = 33.57$, $SD = 19.31$; Weathers et al., 2013).

3.2 Model Building

Model comparisons were conducted to assess whether a model allowing for individual differences in the starting point (i.e., random intercepts) and rate of change (i.e., random slopes) improved model fit compared to restraining these parameters. Results indicated that the random intercept random slope (RIRS) provided better model fit relative to random intercepts fixed slope (RIFS), $\chi^2(2) = 36.43$, $p < .001$. Therefore, subsequent analyses used RIRS with daily PTSD and stress nested within participants.

3.3 Safety Behavior Usage Predicting Subsequent PTSD Symptoms

Baseline reports of habitual safety behavior usage predicted greater PTSD symptom severity during the 2-week follow-up period ($B = 1.72$, $p = .020$, $d = 0.53$) even when accounting for baseline PTSD symptom severity, trauma load, timepoint, and person-centered daily stressors (see Table 2). A non-significant interaction between level 2 safety behavior use and timepoint indicated that safety behavior usage did not alter the trajectory of symptomology during the follow-up ($B = -.05$, $p = .736$, $d = -0.08$; see Table 2).

3.4 Moderation of Concurrent Naturalistic Stress on PTSD, Anxiety, and Depression Symptoms

3.4.1 PTSD

A significant cross-level interaction emerged between level 2 safety behavior use and person-centered number of stressors since the last assessment ($B = .41, p = .025, d = 0.26$). Probing the interaction revealed that increases in stressors from a participant's own average predicted worse PTSD symptom severity for those who reported high safety behavior usage ($B = 1.03, p = .006, d = 0.32$) but not low safety behavior usage ($B = -.19, p = .533, d = -0.07$; see Table 3).

3.4.2 Anxiety

A significant cross-level interaction emerged between level 2 safety behavior use and person-centered number of stressors since the last assessment ($B = .26, p < .001, d = 0.41$). Probing the interaction revealed that increases in stressors from a participant's own average predicted worse anxiety symptom severity for those who reported high safety behavior usage ($B = 0.79, p < .001, d = 0.41$) but not low safety behavior usage ($B = -.01, p = .964, d = -0.01$; see Table 4).¹

3.4.3 Depression

A significant cross-level interaction emerged between level 2 safety behavior use and person-centered number of stressors since the last assessment ($B = .17, p = .013, d = 0.29$). Probing the interaction revealed that increases in stressors from a participant's own average predicted worse depression symptom severity for those who reported high safety behavior usage

¹ Additional analyses were conducted to evaluate the specificity to anxiety symptoms. SBAF remained a significant moderator of daily stress fluctuations on anxiety symptomology when follow-up PTSD symptoms were included in the model ($B_{interaction} = .20, t = 2.95, p = .003, d = 0.35$).

($B = 0.61, p < .001, d = 0.51$) but not low safety behavior usage ($B = .10, p = .358, d = 0.11$; see Table 5).²

² Additional analyses were conducted to evaluate the specificity to depression symptoms. SBAF was a marginally significant moderator of daily stress fluctuations on depression symptomology when follow-up PTSD symptoms were included in the model ($B_{interaction} = .18, t = 1.81, p = .070, d = 0.21$).

Table 1: Descriptive Statistics and Correlations.

	<i>M (SD)</i>	SBAF	LEC-5	PCL-5
SBAF total	44.89 (21.27)	--		
LEC-5	6.02 (4.25)	.24*	--	
PCL-5	33.57 (19.03)	.66***	.22**	--

Note: SBAF = Safety Behavior Assessment Form. LEC-5 = Life Events Checklist for DSM-5. PCL-5 = Posttraumatic Checklist for DSM-5.

Table 2: Baseline Safety Behavior Usage Predicting Subsequent PTSD Symptoms.

A. Direct Effects	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Cohen's d</i>
(Intercept)	-0.29	1.67	-0.17	.861	
SBAF Total	1.72	0.73	2.36	.020	0.53
Person-centered DISE Stressors	0.32	0.19	1.67	.095	0.21
LEC-5 Trauma Load	0.27	0.14	2.01	.048	0.45
PCL-5 Total	0.22	0.04	5.71	<.001	1.28
Timepoint	-0.92	0.17	-5.36	<.001	-1.21
B. Growth Curve Model	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Cohen's d</i>
(Intercept)	-0.28	1.67	-0.17	0.867	
SBAF*Timepoint	-0.05	0.16	-0.34	.736	-0.08
SBAF Total	1.55	0.89	1.73	.086	0.36
Person-centered DISE Stressors	0.33	0.19	1.69	.092	0.20
LEC-5 Trauma Load	0.27	0.14	2.00	.048	0.43
PCL-5 Total	0.22	0.04	5.71	<.001	1.28
Timepoint	-0.91	0.17	-5.35	<.001	-1.21

Note: SBAF = Safety Behavior Assessment Form. LEC-5 = Life Events Checklist for DSM-5. PCL-5 = Posttraumatic Checklist for DSM-5. DISE = Daily Inventory of Stressful Events. Timepoint centered at the end of the follow period.

Table 3: Baseline Safety Behavior Moderating the Effects of Stress on PTSD Symptoms.

Moderation of Person-Centered Stressors on PTSD symptoms	B	SE	t	p	Cohen's d
(Intercept)	-0.18	1.66	-0.11	.913	
SBAF*Person-centered DISE Stressors	0.41	0.19	2.20	.025	0.26
SBAF Total	1.66	0.73	2.28	.025	0.51
Person-centered DISE Stressors	0.42	0.2	2.18	.030	0.25
LEC-5 Trauma Load	0.27	0.14	1.99	.049	0.44
PCL-5 Total	0.22	0.04	5.74	<.001	1.28
Timepoint	-0.93	0.17	-5.39	<.001	-1.22

Table 4: Baseline Safety Behavior Moderating the Effects of Stress on Anxiety.

Moderation of Person-Centered Stressors on Anxiety Symptoms	B	SE	t	p	Cohen's d
(Intercept)	0.92	0.66	1.4	.165	
SBAF*Person-centered DISE Stressors	0.26	0.08	3.51	<.001	0.41
SBAF Total	0.81	0.3	2.72	.008	0.62
Person-centered DISE Stressors	0.39	0.08	4.87	<.001	0.57
LEC-5 Trauma Load	0.04	0.06	0.67	.505	0.15
PCL-5 Total	0.05	0.02	2.99	.003	0.67
Timepoint	0.10	0.06	1.61	.112	0.37

Table 5: Baseline Safety Behavior Moderating the Effects of Stress on Depression.

Moderation of Person-Centered Stressors on Depression Symptoms	B	SE	t	p	Cohen's d
(Intercept)	0.1	0.74	0.13	.896	
SBAF*Person-centered DISE Stressors	0.17	0.07	2.48	.013	0.29
SBAF Total	0.36	0.34	1.06	.293	0.24
Person-centered DISE Stressors	0.35	0.07	4.87	<.001	0.57
LEC-5 Trauma Load	0.05	0.06	0.85	.396	0.19
PCL-5 Total	0.07	0.02	3.71	<.001	0.83
Timepoint	0.03	0.06	0.51	.611	0.11

3.5 Figures

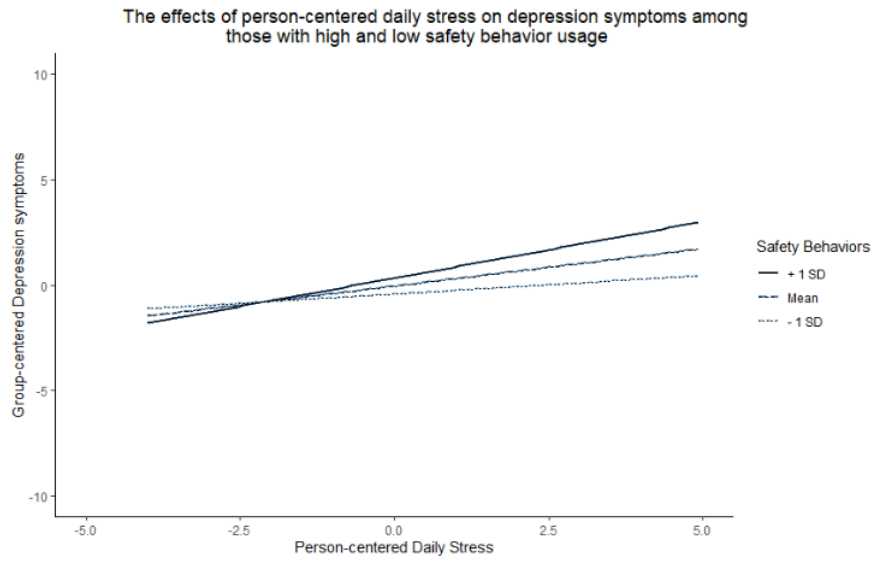


Figure 1: Depression. An analysis was conducted to evaluate the specificity of depression symptoms. SBAF was a marginally significant moderator of daily stress fluctuations on depression symptomology.

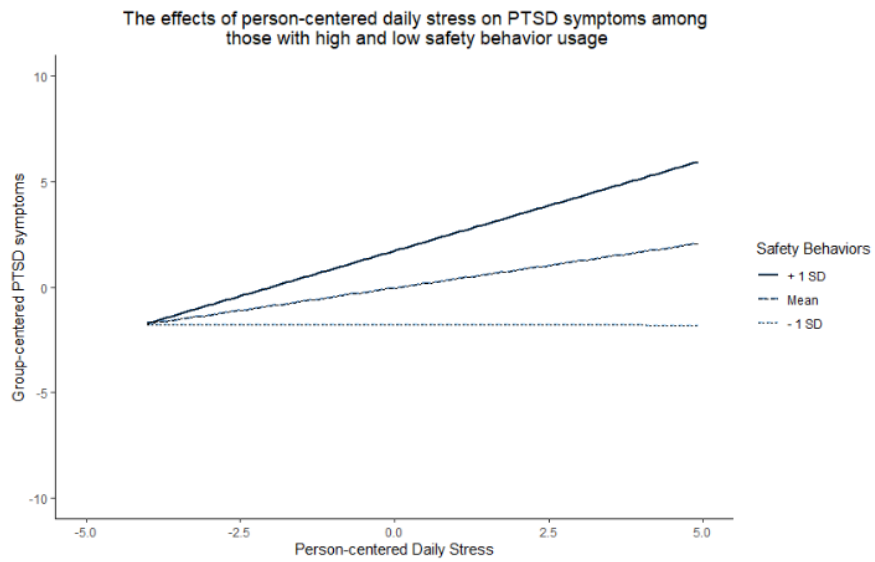


Figure 2: PTSD. An analysis was conducted to evaluate the specificity of PTSD symptoms. SBAF remained a significant moderator of daily stress fluctuations in PTSD symptomology.

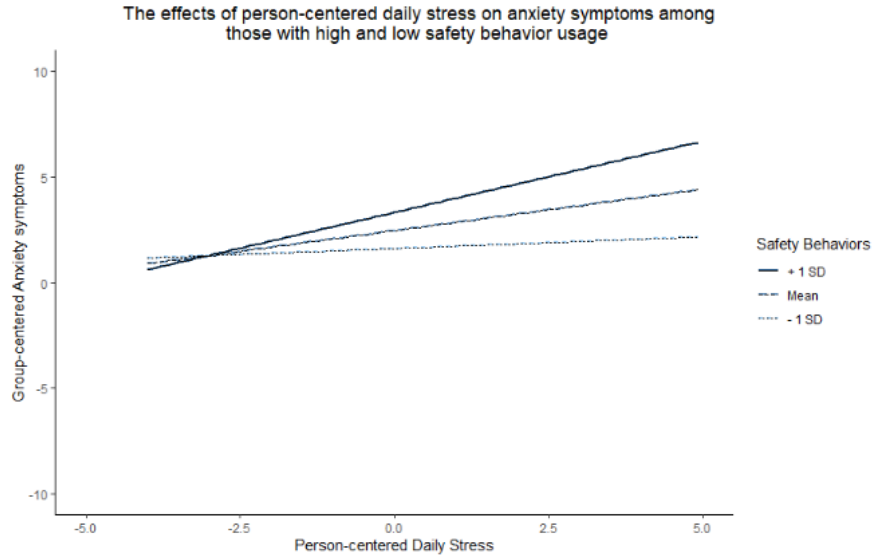


Figure 3: Anxiety. An analysis was conducted to evaluate the specificity of anxiety symptoms. SBAF remained a significant moderator of daily stress fluctuations in anxiety symptomology.

4. CONCLUSION

4.1 Discussion

The present study was designed to analyze safety behavior usage in individuals with elevated PTSD symptoms. We investigated the levels of safety behavior usage at baseline, and during the two-week self-report period, while measuring PTSD symptoms levels. We hypothesized that higher levels of safety behaviors at baseline would predict worse PTSD symptoms during the two-week self-report period. To test our hypothesis, we conducted a study that examined safety behaviors and PTSD symptoms 3 times per week for 2 weeks (6 possible surveys total). Results showed that greater safety behavior usage reported at baseline predicted greater PTSD symptoms throughout the two-week period. Higher use of safety behaviors was positively correlated with PTSD symptoms. These results align with previous research showing that safety behaviors were related to maintenance of PTSD symptoms over time (Albanese et al., 2024). We further found that routine safety behavior usage at baseline amplified the effects of daily stress on concurrent daily PTSD symptoms. Stressors had a larger effect on concurrent PTSD symptomology among those who reported more safety behavior usage at baseline.

Previous research shows that individuals with heightened safety concerns experience higher levels of PTSD and depressive symptoms (Fullerton et al., 2015). Consequently, these individuals experience distress related to their everyday activities such as driving, further worsening their PTSD and depressive symptoms (Fullerton et al., 2015). Indeed, the present study found that safety behavior usage moderates the effects of stress on PTSD, anxiety, and depression symptoms. Participants that used higher levels of safety behaviors experienced more distress throughout the day when completing daily tasks. Therefore, participants with higher

safety behavior usage reported more PTSD, anxiety, and depression symptoms than those that engaged in safety behaviors less.

4.1.1 Clinical implications

The present study emphasizes the role of transdiagnostic mechanisms as the precursor for PTSD symptoms and how the treatment for transdiagnostic factors can be more effective at treating PTSD. Safety behavior usage exacerbates PTSD symptoms, therefore, reducing safety behaviors is an important target for PTSD treatment. Previous research has found that engaging in safety behaviors during exposure therapy results in poorer outcomes (Helbig-Lang & Petermann, 2010). Helbig-Lang & Petermann (2010) suggest that treatments should aim to promote disengaging and eliminating safety behaviors. Additionally, Bedford & Schmidt (2023) found individuals with fear disorders that undergo cognitive-behavioral therapy aimed to decrease safety behaviors showed improvement in their distress. This study highlights the correlation between safety behaviors and the worsening of PTSD symptoms, a step into improving current PTSD treatments. Future research should focus on improving PTSD treatments by targeting avoidance behaviors and safety behavior usage, a known maintenance factor.

4.1.2 Limitations and Future Directions

The present study analyzed the correlation between safety behaviors and the worsening of PTSD symptoms, an important aspect of PTSD interventions. However, the current study has some limitations. First, the sample size was small, consisting of 81 participants. Future studies should aim to recruit more participants to improve generalizability to clinical populations. Secondly, participants in the study were predominantly White or Caucasian (64.6%). Future studies would benefit from recruiting participants of diverse backgrounds to enhance the

representativeness of findings to the community. Thirdly, future research should add socioeconomic status as a confounding variable. It would be helpful to investigate the effects of financial stress on safety behavior usage and PTSD symptoms. Furthermore, the number of surveys (6 total per week) might not successfully capture fluctuations in PTSD symptoms and changes in safety behavior usage throughout the day. Future research should add more surveys per day while expanding the self-report period to longer than 2 weeks. This will better access changes in PTSD symptoms and uses of safety behaviors during the day over a longer time. Lastly, future research is needed in naturalistic settings to investigate the impact of everyday stressors on safety behavior usage and PTSD symptomology.

The present study investigated the correlation between safety behavior usage and PTSD symptoms in individuals with heightened PTSD symptoms. We found that higher use of safety behaviors at baseline was associated with higher levels of PTSD symptoms over the two-week self-report period. Additionally, safety behavior usage increased the effects of everyday stress on PTSD symptoms. Moreover, the study found that safety behaviors influenced the effects of daily stress on depression and anxiety symptoms. Higher safety behavior usage was correlated with increased distress and symptom severity. The study suggests that addressing transdiagnostic mechanisms, such as avoidance behaviors and safety behavior usage, is crucial in effectively treating PTSD. Prior research indicates that clinical interventions focusing on reducing safety behaviors are more successful at improving PTSD symptoms. Therefore, safety behavior usage is an important target of PTSD interventions. The study also had some limitations including small sample size and the duration of the self-report period. Future directions include aiming for larger samples, longer self-report periods, and frequent self-report assessments. A longer self-report period would offer insight into the changes of PTSD symptoms over time. Additionally, frequent

self-report assessments show fluctuations in PTSD symptoms throughout the day across different situations and stressors.

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