

**NON-SUICIDAL SELF-INJURY IN POST 9/11 VETERANS: EXAMINING THE  
INFLUENCE OF PTSD, MDD, THEIR COMORBIDITY  
AND PSYCHOLOGICAL INFLEXIBILITY**

by

JOANNA FAGAN, B.A.

THESIS  
Presented to the Graduate Faculty of  
The University of Texas at San Antonio  
in Fulfillment of the Requirements  
for the Degree of

MASTER OF SCIENCE IN PSYCHOLOGY

COMMITTEE MEMBERS:  
Sandra B. Morissette, Ph.D, Chair  
Willie Hale, Ph.D.  
Mary McNaughton-Cassill, Ph.D.

THE UNIVERSITY OF TEXAS AT SAN ANTONIO  
College of Liberal and Fine Arts  
Department of Psychology  
May 2020

## **ACKNOWLEDGEMENTS**

This work would not have been possible without the help, guidance, and input from Dr. Sandra Morissette, Dr. Willie Hale, and Dr. Mary McNaughton-Cassill. I would like to thank Dr. Morissette especially for her continued dedication throughout the idea, conception, re-drafts, and word specificity phases of this project; I have learned so much from you. Thank you.

May 2020

**NON-SUICIDAL SELF-INJURY IN POST 9/11 VETERANS: EXAMINING THE  
INFLUENCE OF PTSD, MDD, THEIR COMORBIDITY  
AND PSYCHOLOGICAL INFLEXIBILITY**

Joanna Fagan, M.S.  
The University of Texas at San Antonio, 2020

Supervising Professor: Sandra B. Morissette, Ph.D.

Non-suicidal self-injury (NSSI) refers to the destruction of one's body without intent to die. NSSI may be used as a means of managing negative affect brought about by psychopathology (e.g. post-traumatic stress disorder (PTSD), major depressive disorder (MDD)) that may result from traumatic experiences (e.g. childhood trauma, abuse, neglect). PTSD and MDD both involve feelings of worthlessness, guilt, diminished interest, among others which may influence use of NSSI. For veterans who have killed in combat, symptoms of PTSD and depressive symptoms are associated with an increased desire for self-harm (Maguen et al., 2011). Moreover, these disorders often co-occur. A study by Brown et al. (2001) found that 69% of individuals with PTSD also met criteria for MDD, making it important to study NSSI in the context of both conditions. Further, one process that may influence the effect of PTSD-MDD comorbidity on engagement in NSSI is psychological inflexibility (PI), which involves an individual's inability to overcome psychological reactions to painful events. It is plausible that PI could play a role in the development and maintenance of NSSI. This study is a cross-sectional, secondary data analysis of a longitudinal parent study, Project SERVE: Studies Evaluating Returning Veterans' Experiences. The sample consisted of (N=545) male and female post-9/11 veterans enrolled in a healthcare facility. The study participants were diagnosed with PTSD, MDD, and comorbid

PTSD-MDD, and assessed with respect to lifetime engagement in NSSI. It was hypothesized that individuals with PTSD-MDD comorbidity would show higher frequency of NSSI symptoms than those with PTSD only or MDD only; that PI would be associated with NSSI symptoms, and that PI would moderate the relationship between PTSD, MDD, PTSD-MDD comorbidity and NSSI respectively. Chi square tests, hierarchical logistic and linear regressions, as well as moderation analysis were used to examine the relationships between variables. The aim of this study was to examine the relationships between PTSD, MDD, PTSD-MDD comorbidity and NSSI and to understand the role PI may play between psychopathology and engagement in NSSI.

## TABLE OF CONTENTS

Acknowledgments.....	ii
Abstract.....	iii
List of Tables .....	vi
Introduction.....	1
Non-Suicidal Self-Injury (NSSI) .....	6
PTSD and NSSI.....	8
MDD and NSSI.....	10
PTSD-MDD Comorbidity and NSSI .....	12
Psychological Inflexibility and NSSI.....	15
Psychological Inflexibility as a Moderator .....	15
Aims and Hypothesis .....	20
Methods.....	22
Participants .....	22
Procedures.....	23
Measures .....	24
Data Analysis Plan.....	30
Results.....	33
Discussion.....	38
Limitations and Strengths .....	42
Conclusion and Future Directions .....	43
References.....	45
Vita	

## LIST OF TABLES

Table 1	Hierarchical Linear Regression to test PI's contribution to NSSI engagement.....	35
Table 2	Types of NSSI significant across groups.....	37

## INTRODUCTION

What are the private events - thoughts, feelings, memories, physical bodily sensations – that sway individuals into harming themselves? Answers to this question are critical to securing the safety and well-being of our nation’s veterans. Non-suicidal self-injury (NSSI) refers to direct and deliberate destruction of body tissue in the absence of any intent to die (Nock, 2010). Long term effects of engagement in NSSI can involve social isolation, poor interpersonal relationships, increased negative affect, broken bones, suicidal thoughts and behaviors, and accidental death. According to Nock (2010), the risk of engaging in NSSI increases when stressful life events exacerbate physiological hyper-arousal and maladaptive emotional regulation. Notably, not only do aspects of post-traumatic stress disorder (PTSD) and major depressive disorder (MDD) involve avoidance behaviors, emotional dysfunction, and hyper-arousal, but they are also often a result of stressful life events. Although PTSD, by itself, causes functional impairment (Magruder et al, 2004), MDD and PTSD commonly co-occur. Bryan and Bryan (2014) examined a diverse sample of military personnel and veterans and found that participants with a history of NSSI reported significantly more severe depressive and PTSD symptoms, and were significantly more likely to report a history of suicide ideation (86.7% vs. 32.1%), suicide planning (52.2% vs. 10.0%), and suicide attempt (27.7% vs. 5.1%). In a study by Blanchard et al. (1998), victims of a traumatic experience, who met the criteria for comorbid PTSD and MDD, were more distressed and experienced more impairment than those who developed PTSD only.

Engagement in NSSI has important implications in the context of prospective research; individuals who engage in NSSI are at a sevenfold increased risk for later suicide attempts (Guan et al. 2012). This finding is in keeping with Joiner’s (2005) Interpersonal Theory of Suicide

(IPT), which underscores the positive relationship between NSSI and suicidal ideation (SI) through acquired capability for suicide; acquired capability comprises the habituation to painful and aversive stimuli in providing the capability to perform lethal self-injury. Those who die by suicide work up to the act over a long period of time, by getting used to pain. In regard to NSSI, IPT may explain the ability to push against natural urges of self-preservation (avoiding pain, injury, death) in the presence of certain conditions, namely, disconnection from others (thwarted belongingness) and feeling like a burden to others (perceived burdensomeness). Thus, when people get used to dangerous behavior (e.g. NSSI), “the groundwork for catastrophe is laid down; suicidal people lose the danger signals and alarm bells that should accompany self-injury” (Joiner, 2005, p. 48).

Additionally, the Fluid Vulnerability Theory (FVT; Rudd, 2006) may explain PTSD, MDD, and NSSI’s relationship to suicide risk. With FVT, suicide risk is dynamic, with fluctuations that reflect interactions occurring among multiple risk and protective factors (Bryan & Rudd, 2016). FVT may help explain why people become suicidal and how long they will stay suicidal (Rudd 2006). Factors are static (e.g. gender, race, and trauma) and dynamic (e.g. mood, life stressors, social support; Bryan & Rudd, 2016). Individuals with many static risk factors (and/or few static protective factors) have a greater vulnerability to experiencing suicidal crises and transitioning from suicide ideation to attempts in response to acute risk factors. The FVT indicates that risk and protective factors influence each other so that a change in one affect change in the other. Thus, the transition from suicidal thoughts to suicidal behaviors occur as a result of coordinated change processes among multiple domains of risk.

Vulnerability to suicide risk can be understood within activation of “suicide mode” that involves several areas: cognitive susceptibility (e.g. impaired problem solving, cognitive



rigidity), biological susceptibility (physiological and affective symptoms), and behavioral susceptibility (e.g., self-soothing and general emotion regulation; Rudd, 2006). This suicide mode is triggered by the interaction between an individual's vulnerabilities, precipitating stressors, and aggravating risk factors across the cognitive, affective, behavioral, and physiological domains. Therefore, when looking at the advent of suicidal behavior from suicidal ideation, the changes of risk factors relative to one another may be the most important indicator. According to FVT, the aspects of an individual's suicidal mode (i.e., suicidal belief system, physiological-affective symptoms, and associated behaviors and motivations) provide information on their susceptibility to an episode of suicide risk, likely precipitants, duration of an episode, and potential for future episodes. In this case, NSSI may function within an individual's suicidal mode by creating behavioral susceptibility to suicide risk. NSSI may not only help to remove natural barriers (self-preservation) to the desire for suicide but may create vulnerabilities to suicide by engagement in behaviors that "prepare for" or facilitate a suicidal act. FVT's supposition regarding the interaction between risk factors supports the effect of PTSD and MDD on suicide risk. A large-scale literature review by Panagoiti et al. (2009) found that depressed individuals with comorbid PTSD were more likely to attempt and think about suicide. Further, Kimbrel et al. (2016) showed that veterans with comorbid PTSD-MDD exhibited higher rates of suicidal ideation at 12-month follow-up in comparison to veterans with either no diagnosis, PTSD only, or MDD only, after controlling for history of suicide attempts. The Kimbrel study is integral to the conception of this study and will be discussed in detail later. While the relationship between PTSD-MDD comorbidity and SI has been documented, there is a lack of research pertaining to PTSD-MDD comorbidity regarding NSSI.

A growing body of literature has focused on identifying risk factors and correlates of NSSI: pathological family relationships, childhood trauma and/or neglect, and physical and sexual abuse (Gratz et al., 2002; van der Kolk, 1996). These factors may contribute to high levels of emotional arousal, which may increase the likelihood of emotion dysregulation, which in turn increases the risk for NSSI (to be used as a strategy to regulate painful emotions; Gratz, 2003; Linehan 1993). If NSSI is used as a maladaptive avoidance strategy, other variables with avoidance mechanisms, namely psychological inflexibility (PI), may play a major role in the function of NSSI. According to Hayes et al. (2006), psychological problems can emerge when language and cognition interact with contingencies to produce an inability to persist or change behavior in the service of long-term valued ends. PI entails the “rigid dominance of psychological reactions over chosen values and contingencies in guiding action” (Bond et al., 2011, p. 678). Reciprocally, psychological *flexibility* entails the “process of contacting the present moment fully as a conscious human being and persisting or changing behavior in the service of chosen values” (Hayes et al., 2006, p. 9). Essentially, when individuals are high in PI, they actively avoid thoughts and feelings they do not wish to engage. Higher levels of PI are related to greater levels of PTSD, depressive symptoms, anxiety, stress, overall psychological distress (Bond et al, 2011; Meyer et al, 2019). In a study of 309 U.S. veterans, 27.5% met criteria for military related PTSD, 19.4% for current MDD, and 9.9% endorsed suicidal ideation; PI was associated with SI severity after accounting for age, gender, education level, suicide attempt history, PTSD, MDD, and drug and alcohol use (DeBeer et al., 2018). DeBeer et al. (2018) also noted that PI was a marker of motivation to escape from psychological pain; those with greater PI may be more likely to experience SI as a means of distancing or escaping from psychological pain. It is therefore plausible that PI could likewise play a role in the development and

maintenance of NSSI in certain individuals. In a sample of undergraduates, Anderson and Crowther (2012) indicated that individuals with a current or history of NSSI reported more limited access to emotion regulation strategies and greater cognitive avoidance, among others, than those individuals who had never engaged in NSSI. Moreover, PI may influence PTSD, MDD, and PTSD-MDD comorbidity as risk factors for NSSI. That is, individuals who exhibit PI attempt to control/avoid their negative thoughts; this controlled behavior merged with PTSD symptoms (e.g., intrusive recollection, avoidance of trauma-related thoughts and situations) and MDD could influence the use of NSSI as a means of escaping, managing, and regulating emotions, resulting in a temporary emotional relief but leading to long-term impairments (Chapman et al. 2006). While plenty of research has studied the relationship between PTSD and avoidance mechanisms, little research has been conducted towards examining the dynamics between PTSD-MDD comorbidity and the broader rigidity associated with PI. Developing an understanding of the influence of PTSD-MDD comorbidity on NSSI and identifying PI, as a possible moderator that affects this relationship, is important to guiding treatment efforts and reflects the main focus of this study. Thus, the central aims of this thesis were to examine the relationship between PTSD, MDD, PTSD-MDD comorbidity and NSSI, PI's relationship with NSSI, and to examine if PI moderated the relationship between PTSD, MDD, PTSD-MDD and NSSI.

## **NON-SUICIDAL SELF INJURY (NSSI)**

Rates of NSSI in the general population show a lifetime prevalence of 17.2%, 13.4%, and 5.5% in adolescents, young adults, and adults respectively (Swannell et al., 2014). Among military personnel, prevalence rates of NSSI are estimated to range from 4% to 14% (Klonsky, Oltmann, & Turkheimer, 2003; Bryan & Bryan, 2014). Approximately 25% of those who had engaged in NSSI have also made a suicide attempt (Bryan & Bryan, 2014). In a study of active duty soldiers, participants with a history of NSSI were more than twice as likely to make a suicide attempt during the 2-year follow-up period, compared to participants with no history of NSSI (Bryan et al., 2015). The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) states that a diagnosis of NSSI is established when an individual has in the last year, on 5 or more days, engaged in intentional self-inflicted damage to the surface of his or her body of a sort likely to induce bleeding, bruising, or pain with the expectation that the injury will lead to only minor or moderate physical harm (American Psychiatric Association (APA), 2013). Other criteria include engaging in the behavior with the expectation of getting relief from negative affect, resolving interpersonal difficulty, and inducing a positive feeling state. Behaviors indicative of NSSI include cutting, scratching wrists or arms, self-hitting, banging the head against the wall, punching self, or burning (Gratz, 2001). NSSI may also be referred to as self-mutilative behavior, deliberate self-harm, and non-suicidal self-directed violence (Nock & Prinstein, 2004; Klonsky et al., 2003; Crosby et al., 2011). Factors associated with risk of self-injury include age, gender, race, drug and alcohol abuse, psychopathology, and childhood trauma, among others (Hawton et al., 2002; Gratz et al., 2002; Skegg, 2005).

Within the literature, several models outline why individuals may engage in NSSI, including the affect regulation model and the dissociation model. The affect regulation model

(Linehan, 1993) suggests that self-harm functions to express and/or control overwhelming emotions; this happens when usual emotion regulation mechanisms have broken down or were never fully developed (Joiner, 2005). The dissociation model proposes that self-harm functions to regulate emotions but suggests that it does so through an interaction with dissociative behavior (van der Kolk, 1996). Nonetheless, the single most common reason reported for engaging in self-harm was to obtain emotional relief or regulate emotions (Brown et al., 2002). Indeed, NSSI can serve as a behavioral marker of the emotion regulation deficits associated with suicidal behavior; yet because it reduces emotional distress, engaging in such behavior can serve to reinforce this vulnerability and further escalate risk over time (Bryan et al, 2014). Along these lines, NSSI may reinforce itself as a maladaptive coping mechanism in order to deal with negative affect but provide the ease with which to engage in more lethal methods of emotional control. NSSI involves complicated mechanisms that are influenced and perpetuated by emotional and behavioral interactions; thus, models like the affect regulation and dissociation models convey the “why” aspect of NSSI, whilst the FVT and Joiner’s interpersonal theory underscore the relationships involved and aftermath of engagement in NSSI.

## PTSD AND NSSI

PTSD is a mental health disorder that can develop after experiencing or witnessing a traumatic or life-threatening event. DSM-5 definition of trauma requires exposure to “actual or threatened death, serious injury, or sexual violence” through direct exposure, witnessing the trauma, learning of a relative or friend experiencing trauma, and indirect exposure (APA, 2013). PTSD affects a substantial portion of the general and veteran population. According to Fulton et al. (2015), approximately 23% of Iraq/Afghanistan veterans develop clinically significant symptoms of PTSD. Key criteria for PTSD diagnosis include exposure to a traumatic event, having symptoms last more than a month, functional impairment because of symptoms and that symptoms are not due to medication, substance use or other illness. Moreover, four symptom clusters comprise PTSD (APA, 2013): (1) intrusive re-experiencing symptoms that involve unwanted upsetting memories, flashbacks, and emotional distress after exposure to traumatic reminders; (2) avoidance symptoms that include avoidance of trauma-related thoughts, situations, and trauma-related reminders; (3) negative cognitions and mood that incorporate negative thoughts or feelings that begin or worsened after the trauma; and (4) arousal symptoms that involve irritability or aggression, hypervigilance, risky or destructive behavior, heightened startle reaction, among others. The psychological aspects of PTSD might well play a role in the establishment and perpetuation of NSSI. PTSD symptoms, such as re-experiencing traumatic events and negative mood and cognitions (which also involve distorted sense of blame of others or self, estrangement from others), may stimulate negative affect. If NSSI is used as a mechanism for controlling negative affect, essentially avoidance, NSSI may also serve to maintain PTSD symptoms. The use of NSSI may inhibit an individual from addressing the thoughts and feelings behind negative affect, which possibly creates a cyclical relationship

between PTSD and NSSI. Notably, many psychiatric problems are connected to suicide risk, yet psychological disorders rarely occur alone, and disorders, like PTSD, more often occur with MDD than without it (Brown et al., 2001).

## MDD AND NSSI

Major depressive disorder can be caused by combinations of biological, environmental, and psychological factors; risk factors include family history of depression, trauma, stress, and illness. Estimates of MDD indicate that 16.6% of adults have been depressed at some point in their lifetime (Kessler, 2005); rates for veterans at 14.4% (NAMI, 2009). According to the DSM-5 (APA, 2013), MDD involves several symptoms (at least 5) present during the same 2-week period for classification: depressed mood, anhedonia, appetite or weight changes, sleep difficulties, psychomotor agitation or retardation, fatigue, difficulty concentrating, feelings of worthlessness, and guilt. Additionally, symptoms cause distress or impairment in areas of functioning, as well as, not being attributable to substance use or another medical condition. Although a precipitant is not required, situations precipitating depressive mood involve the presence of stressors (Felsten, 2002), for example: death, illness, relationship problems, separation, and economic strife.

As a major health issue, inquiry into whether MDD may influence the occurrence of other psychopathologies, like NSSI, is important. In a study of Air Force recruits, Klonsky, Oltmanns, and Turkheimer (2003) found that service members who reported a history of self-harm scored higher on depressive symptom scales. Similarly, Stanley et al. (2001) showed that between groups with and without major depressive disorder, those with a history of self-injury had more severe MDD. Thus, the dynamics that connect MDD and engagement in NSSI is, in all probability, inter-related; notably, negative affect is associated with both experiences. The depressive symptom, anhedonia, refers to loss of interest or pleasure and is associated with affective factors (feelings of worthlessness); depressed mood relates to both affective and somatic (fatigue, weight changes) factors (Tolentino & Schmidt, 2018). If these negative



affective states are intense enough, NSSI may be used to alleviate the experience. Thus, while MDD may or may not directly lead to NSSI, it may act as a precedent for engagement in NSSI.

## PTSD-MDD COMORBIDITY AND NSSI

Grappling with traumatic events may lead to the development of co-occurring PTSD and MDD (PTSD-MDD). Kessler et al. (1995) reported that 47.9% of men and 48.5% of women with PTSD also had major depressive episodes (MDE). The rate of comorbidity in the National Comorbidity Survey-Replication, which used DSM-IV diagnostic criteria for PTSD and MDD, was 42.8% (Rojas et al., 2014). Notably, overlap in symptoms between PTSD and MDD – anhedonia, sleep disturbance, trouble concentrating – may in part account for the high rate. However, these disorders do not always overlap in time. That is, in a meta-analytical study of PTSD comorbidity with depressive disorders among combat-exposed military personnel, studies indicated that PTSD may play a causal role in the development of comorbid depressive disorders (Stander et al., 2014). Hegel et al. (2005) indicated that patients with PTSD had more severe depressive symptoms, were more likely to have suicidal thoughts at baseline, and had greater functional impairment. Further, MDD patients with comorbid PTSD experienced a delayed response to effective primary care-based depression intervention. Indeed, PTSD-MDD comorbid patients – treated using depression clinical practice guidelines – may be less likely than those with MDD alone to experience full remission (Campbell, 2007). Thus, in the overlapping of certain symptoms, PTSD and MDD may influence each other in terms of exacerbating severity of symptoms and functional impairment.

Since PTSD-MDD comorbidity amplifies the negative impact on treatment outcomes, risk of suicide may also be impacted by the co-occurrence of the conditions. A prospective study by Kimbrel et al. (2016) examined the effects of PTSD, MDD, and PTSD-MDD diagnostic comorbidity on clinician-assessed suicidal behavior in a sample ( $n = 309$ ) of post-9/11 veterans. In the total sample model, veterans with comorbid PTSD-MDD were compared to veterans with

PTSD-only or MDD-only, and veterans with no PTSD or MDD. Results showed that baseline comorbid PTSD-MDD was associated with the highest overall rates of passive suicidal ideation, non-specific active ideation, active ideation with method, active ideation with intent, active ideation with specific plan and intent aborted attempts, interrupted attempts, and actual attempts at a 12-month follow-up. PTSD-MDD status was the only statistically significant predictor of suicide attempts at 12-month follow-up. Furthermore, veterans with comorbid PTSD-MDD exhibited higher rates of suicidal ideation at 12-month follow-up in comparison to veterans with either no diagnosis, PTSD-only, or MDD-only, after controlling for history of suicide attempts. In a second model, veterans with PTSD-MDD were compared with veterans with PTSD-only or MDD-only; age, race, sexual orientation, baseline history of suicide attempts were included as covariates. Results indicated that veterans with comorbid PTSD-MDD at baseline were significantly more likely than veterans who had PTSD-only or MDD-only to have made a suicide attempt during the 12-month follow up.

In a study of active duty service members, the combined presence of PTSD and depressive symptoms heightened the risk for suicidal ideation (Bryan & Corso, 2011). The re-experiencing symptoms of PTSD, especially for combat veterans, are particularly instrumental in IPT's conceptualization of acquired capability for suicide – soldiers are essentially encountering painful and/or provocative experiences repeatedly in their own minds (Bryan & Anestis, 2011). Any activity that allows individuals to get accustomed to pain and provocation can serve to reduce fear of injury in general and self-injury, in particular (Joiner, 2005, p. 56). According to Nock et al. (2009), recurrent exposure to painful or fear-inducing situations functions with PTSD symptoms to predict the transition from suicidal ideation to non-lethal attempts.

Noting how PTSD-MDD comorbidity impacts suicide risk, and that NSSI is a risk factor for suicide, then by extension, PTSD-MDD comorbidity may also impact the negative affect associated with NSSI. Namely, the intensity of negative affect that may be connected to PTSD-MDD comorbidity may play a role in NSSI engagement (Chapman, 2006). Additionally, it is possible that the PTSD-MDD symptoms that involve feelings of guilt and worthlessness may feed into the self-defeating, self-destructive, and essentially the self-punishing aspects of NSSI (Nock & Prinstein, 2004; Linehan, 1993).

## PSYCHOLOGICAL INFLEXIBILITY AND NSSI

Noting the characteristics and symptoms that surround engagement in NSSI, looking more closely at the underlying psychological mechanisms that influence risk is important. Proximal risk factors for NSSI include anxiety, impulsivity, and dissociation (Klonsky et al., 2003; Low et al., 2000; van der Kolk & Fisler, 1995) among others. Regarding PTSD, avoidance not only involves escaping thoughts, feelings, physical sensations that stir up traumatic memories, but also of people, places, activities or situations that do the same. Often, the function of NSSI is as an avoidance mechanism, avoiding dealing with negative thoughts, affect, and experiences. Thus, avoidance is an active mechanism in the experience and possible perpetuation of both PTSD and NSSI. According to Hayes et al. (1996), experiential avoidance occurs when an individual is unwilling or unable to remain in contact with any unwanted private experiences and takes steps to avoid, escape from, or alter the form, frequency, or context of the experience in which it occurs, even when doing so leads to actions that are inconsistent with one's values and goals. Experiential avoidance falls on the opposing end of psychological *acceptance*—the openness or willingness to experience private events fully, as they are, without struggle or defense (Hayes et al., 1999). The avoidance of internal stimuli (e.g. distressing emotions) becomes negatively reinforced due to symptom relief (e.g., NSSI) and can be positively associated with higher levels of psychopathology (Hayes et al., 2004). Though avoidance mechanisms may help to connect PTSD and NSSI, broader psychological mechanisms that involve avoidance may explain their perpetuation. Psychological inflexibility, though connected to experiential avoidance, goes one step further; it not only encompasses experiential avoidance but entails cognitive fusion as well. Cognitive fusion refers to preoccupation with the content of private events (Greco, 2008); it is excessive or improper regulation of behavior by verbal

processes, such as rules and derived relational networks (Hayes et al., 2006). Fusion is contrasted with cognitive *defusion*: attempting to change the way an individual relates to thoughts by creating contexts in which unhelpful functions are diminished. Within PI, cognitive fusion supports experiential avoidance; due to the temporal and comparative relations present in human language, so-called “negative” emotions are verbally predicted, evaluated, and avoided. Negative inner experiences become intolerable and unacceptable and lead to depressive "numbing" or splitting as a way of avoiding direct contact with them (Hayes et al., 1996). Inflexibility can take the form of “living in your head,” where it can become more important to be right about who is responsible for personal pain or to defend a verbal view of oneself (e.g., being a victim) rather than living with one’s life as it is and working against internal verbalizations (Hayes et al., 2006).

Essentially, PI occurs when individuals actively avoid thoughts and feelings, which they do not wish to deal with, via NSSI. Supportive of this relationship, a study of adolescents by Xavier et al. (2017) showed that the way individuals respond to stress through maladaptive processes (e.g. experiential avoidance, rumination, and dissociation) may be key psychological mechanisms in the relationship between risk factors, depressive symptoms, and NSSI. Identifying the relationship between trauma and subsequent negative affect, how affect is managed or mismanaged, is essential to clarify how PI may connect negative affect to NSSI. PI characterizes how people respond to unwanted internal experiences (negative emotions and thoughts) that may be tied to traumatic experiences and symptoms of PTSD, which may influence the role of PTSD-MDD comorbidity in relationship to NSSI as well.

Notably, PI may share some qualities with avoidant coping (e.g., experiential avoidance) however, PI’s experiential avoidance is an independent construct and has not been

conceptualized as a coping strategy (Karekla and Panayiotou, 2011). Aspects of avoidant coping involve focusing on, and venting of emotions, behavioral disengagement, and mental disengagement (Carver et al., 1989), behaviors oriented away from a stressor or one's reactions to it (e.g., denial, behavioral avoidance, and wishful thinking; Krause et al., 2008). PI symptoms may overlap with avoidant coping in the aspect of mental disengagement, which presents itself as distracting the self from thinking about the problem.

Treatments for management of negative internal process include cognitive behavioral therapy (CBT), which involves realizing that thoughts and perceptions influence behavior, and negative feelings may distort an individual's perception of reality. CBT aims to identify harmful thoughts, assess whether they are an accurate depiction of reality, and, if they are not, employ strategies to challenge and overcome them. An offshoot of CBT is Acceptance and Commitment Therapy (ACT; Hayes et al., 1999), which directly addresses PI. The desire to avoid one's psychological events is, to an important extent, a result from cognitive fusion, where thoughts about an event become merged with the actual event and evokes the same emotional reaction as the event itself. The impetus of ACT is to increase an individual's ability to notice that the psychological event and the situation are separate entities; in this way, they can pursue options of behavioral change (Wicksell et al., 2008) with more psychological flexibility.

## **PSYCHOLOGICAL INFLEXIBILITY AS A MODERATOR OF NSSI**

Examining the nuanced relationships among PTSD, MDD, PTSD-MDD comorbidity, PI, and NSSI is important to understanding the process of functional impairment and recovery in veterans. PI's relationship with PTSD-MDD comorbidity may be connected by their shared mechanisms of avoidance; furthermore, PI's cognitive fusion component may not only help in the perpetuation of comorbidity but facilitate engagement in NSSI as means of controlling negative affect. Meyer et al. (2013) found that higher PI scores were associated with greater PTSD symptom severity, over and above personality factors, even after controlling for PTSD's avoidance symptoms. In a prospective investigation among college women following a campus mass shooting, Kumpala et al. (2011) found that pre-shooting PI was predictive of symptoms of intrusion and dysphoria approximately one month after the shooting. PI was also predictive of dysphoria and hyper-arousal symptoms eight months after the shooting. Hence, avoidance may not only serve to maintain PTSD, but an overgeneralized fear associated with traumatic memories and emotions (Ehlers & Clark, 2000). If individuals used coping strategies aimed at avoiding or controlling negative affect (e.g. psychological inflexibility) as opposed to addressing them, maladaptive behaviors, such as NSSI, could be the result. In wanting to escape from an unpleasant state of arousal, NSSI is reinforced by engagement; repeated negative reinforcement strengthens the association between unpleasant emotional arousal and NSSI, such that NSSI can become an automatic escape response (Chapman, 2006).

In practicing NSSI, the behavior itself may be subversive in "helping" to manage negative affect. Some individuals report experiencing little to no pain during each NSSI incident, despite clear and sometimes severe tissue damage (Nock and Prinstein, 2005); thus, augmenting NSSI's reinforcing aspect by facilitating relief from negative affect. Considering FVT, a



combination of stressful life events, distress, and predisposing vulnerabilities may set the stage for NSSI engagement and suicide risk. The question could be asked then: is it possible that PI moderates the relationship between psychopathology (e.g. PTSD, MDD) resulting from traumatic events and how individuals manage (via NSSI) that psychopathology? PI's components of experiential avoidance and cognitive fusion may well lock in the negative affect associated with PTSD and MDD, leaving little room for effective management. Currently, there has been little to no research conducted in this area. Thus, examining whether the increase or decrease in psychological inflexibility, with PTSD, MDD, and PTSD-MDD comorbidity, impacts the use of NSSI behavior is crucial to research efforts. The main aim of this study was to investigate whether engagement and frequency of NSSI among military members is influenced by the relationship between PTSD, MDD, PTSD-MDD comorbidity, PI and NSSI.

## AIMS AND HYPOTHESIS

Purpose. Develop an understanding of the influence of PTSD-only, MDD-only, and PTSD-MDD comorbidity on NSSI, as well as examining PI, as a possible moderator that affects these relationships.

Aim 1: To examine the cross-sectional relationship between PTSD-only, MDD-only, PTSD-MDD comorbidity, no PTSD/MDD, and NSSI status (yes/no).

Hypothesis 1a: Participants with PTSD-MDD comorbidity would engage in NSSI at significantly higher rates than participants who have PTSD-only, MDD-only, and no PTSD/MDD.

Hypothesis 1b: PTSD-MDD comorbidity would be more strongly positively associated with NSSI engagement in comparison to those with PTSD-only, MDD-only, or no PTSD/MDD, after accounting for age, gender, and race. PTSD-only and MDD-only will still be positively associated with NSSI, albeit less so.

Aim 2: To examine the cross-sectional relationship between PI and NSSI symptoms (frequency, i.e. number of times engaging in NSSI behavior).

Hypothesis 2: PI would account for unique variance in NSSI symptoms, after accounting for age, gender, education level, alcohol and drug use, combat exposure, PTSD, and MDD.

Aim 3: To ascertain whether PI moderated the relationship between PTSD-only, MDD-only, PTSD-MDD comorbidity, no PTSD/MDD, and frequency of NSSI behavior.

Hypothesis 3: A significant interaction will be observed, such that participants with PTSD-MDD comorbidity and high PI will exhibit the highest frequency of NSSI behavior compared to those with high PI and PTSD-only [second-highest], MDD-only

[third-highest] and no PTSD/MDD [lowest], respectively. Similarly, participants with PTSD-MDD comorbidity and low PI will exhibit higher frequency of NSSI behavior in comparison to participants with low PI and PTSD-only [second-highest], MDD-only [third-highest] and no PTSD/MDD [lowest], respectively.

Aim 4: Exploratory analysis examined different types of NSSI (cutting, hitting, scratching, burning) and prevalence rates with respect to PTSD, MDD, PTSD-MDD comorbidity, and no PTSD/MDD conditions. This aim was exploratory in order to acquire more detailed descriptive information of the veteran sample as well as the types and combinations of NSSI engagement. Also, the aim was to discover how the presence PTSD, MDD, and PTSD-MDD mapped on to types of NSSI engagement (e.g. is a participant with PTSD more likely to engage in cutting as opposed to hitting?).

## METHODS

### Participants

This study was a secondary data analysis of cross-sectional data from a larger longitudinal program of research called Project SERVE (Studies Evaluating Returning Veterans' Experiences). The data was examined cross-sectionally because NSSI data were only available at one point in time; the value in examining these data cross-sectionally was to understand how diagnosis was affecting NSSI status and providing information regarding the prevalence of PTSD, MDD, and PTSD-MDD comorbidity in time. The overall purpose of Project SERVE is to better understand the functional impairment and recovery of post-9/11 veterans and to identify potentially malleable risk and resilience factors that predict level of functioning over time. The SERVE sample consisted of 545 male and female post-9/11 veterans enrolled for healthcare at the Central Texas Veterans Health Care System. Recruitment for the parent study was conducted through multiple channels including presentations to VA staff (e.g., providers in primary care and mental health clinics), advertisements at veterans' service organizations and enrollment sites, and letters mailed to a randomly selected group of post-9/11 veterans enrolled in the local VA health care system. Recruitment strategies were designed to over-sample women veterans and those with PTSD and other mental health diagnoses to ensure that these conditions were well represented.

Inclusion criteria. Veterans met study criteria if they were at least 18 years of age, able to provide informed consent, and deemed stable on psychotropic medication and in psychotherapy. The latter criterion was instated to ensure that symptoms assessed during the baseline assessment were due to underlying psychiatric conditions and not because of starting or stopping

medications and/or psychotherapy. Individuals with current and lifetime psychiatric diagnoses, except for psychotic disorders and bipolar disorder, were eligible to participate.

Exclusion criteria. Veterans were excluded if they planned to move out of the area within 4 months of baseline; met criteria for a psychotic disorder or bipolar diagnosis; reported current suicidal or homicidal risk warranting crisis intervention; reported symptoms consistent with severe traumatic brain injury (TBI) that interfered with their ability to complete the consent process or assessment (i.e., due to ethical concerns about obtaining informed consent and difficulties with completing the structured assessment); or reported current non-military related hallucinations or delusions that cause significant distress and/or impairment.

For the proposed analysis, the sample consisted of 501 eligible participants who were diagnosed with PTSD (9%,  $n = 46$ ), MDD (31%,  $n = 157$ ), comorbid PTSD-MDD (30%,  $n = 154$ ), no PTSD/MDD (29%,  $n = 147$ ). Furthermore, of the 501 participants, 21% ( $n = 107$ ) had engaged in NSSI behavior (e.g., burning, cutting, hitting self, and scratching) in their lifetime, 12% ( $n = 58$ ) of whom had engaged in the past 2 weeks. The majority of sample was (56%) Caucasian, (75%) male,  $M_{age} = 41$  ( $SD = 8.97$ ), (41%) some college w/ no degree.

## **Procedures**

All procedures were approved by the Institutional Review Board prior to data collection. Screenings to assess inclusion/exclusion criteria for initial eligibility were done by telephone, followed by in-person appointments for those who agreed to participate in the study. Informed consent was obtained at the start of the baseline assessment during which final eligibility was confirmed. Participants completed clinical interviews and multiple self-report measures for data collection at the baseline assessment.

## Measures

Demographics. A demographic questionnaire assessed participant characteristics including age, gender, race, and education.

Non-Suicidal Self-Injury (NSSI). Modified Habits Questionnaire (MHQ-4): This 4-item measure was created for the parent study to assess self-injurious behavior. The MHQ-4 was derived from the Habit Questionnaire (HQ; Resnick & Weaver, 1994), an 11-item self-report measure that assessed both deliberate self-harm (DSH) and body-focused repetitive behavior (Sacks et al., 2008), which are habitual nervous behaviors that are less destructive, such as grinding one's teeth and biting one's nails. On the HQ, DSH behaviors involved scratching at one's skin until it left a mark, cutting oneself, hitting oneself, burning oneself, and punching walls or objects. If participants endorsed any of those forms of DSH behavior during their lifetime, they were asked how often they had engaged in that behavior during the past 2 weeks using the following scale: not at all = 0; once = 1; 2–4 times = 2; 5 + times = 3. Participants endorsing a history of DSH were also asked to report the specific forms of DSH they had engaged in during their most recent episode.

Items from the DSH subscale of the HQ were used to create the MHQ-4; items were scored in the same way (e.g. not at all, once, 2-4 times, etc.). If participants indicated that they had engaged in a specific behavior (yes/no), follow-up questions regarding the frequency and reason behind the behavior were asked. Questions pulled from the larger HQ that were used for the MHQ-4 are as follows:

(1) Have you ever intentionally scratched, carved, or picked at your skin so that it left mark?

IF YES: How often in the past two weeks have you done this? What was the most common reason that you did this?

(2) Other than suicide attempts, have you ever intentionally cut yourself in any way?

IF YES: How often in the past two weeks have you done this? What was the most common reason that you did this?

(3) Have you ever intentionally hit or punched yourself?

IF YES: How often in the past two weeks have you done this? What was the most common reason that you did this?

(4) Have you ever intentionally burned yourself with a cigarette, match, or other way?

IF YES: How often in the past two weeks have you done this? What was the most common reason that you did this?

For this study, obtaining a dichotomous score for NSSI required a method for converting reasoning into yes/no ratings. The reasons behind engagement in NSSI were rated by four raters for reliability in indicating actual engagement; raters were masters-level assessors and licensed clinical psychologists. For instance, if a participant's reasoning for hitting themselves was "there was a fly on my arm," that behavior and reasoning did not meet the criteria to be considered NSSI. Thus, scoring rules restrict coding NSSI behavior as yes/no unless reasoning meets one of more of the following criteria associated with DSM-5 criterion B: (1) relief from negative emotional or cognitive state; (2) resolution of an interpersonal difficulty; or (3) to induce a positive feeling state. Between raters, when behaviors and reasons for engagement are rated concurrently, these behaviors were considered NSSI; otherwise, non-concurrent ratings necessitated further discussion to come to consensus. Consensus was reached when there was a majority vote regarding NSSI status on behavior and reasoning.

PTSD Diagnosis. The Clinician Administered PTSD Scale for DSM-5 (CAPS-5; Weathers et al., 2013) is a 30-item clinician-administered diagnostic interview that can be used to make diagnosis of PTSD; for this study, it was used for current (past month) diagnosis. Administration requires identification of an index traumatic event to serve as the basis for symptom inquiry. Clinicians first administered the Full Combat Exposure Scale (Hoge et al., 2004) and the Military Sexual Trauma questionnaire (Deployment Risk and Resilience Inventory: MST; King, King, and Vogt, 2003) and asked participants to identify the worst post-9/11 event that affected him/her or was the hardest to experience and may have caused intrusive memories, distressing dreams, etc., in response to reminders. Participants were asked to briefly describe the worst event in order for the clinician to determine if the event met Criterion A according to DSM-5. Participants were then administered the CAPS-5 diagnostic interview based on this Criterion A event.

A diagnosis of PTSD was given when the participant's traumatic event met DSM-5 requirements: one symptom from Criterion A (a traumatic event), one from Criterion B (re-experiencing symptoms), one from Criterion C (avoidance symptoms), at least two symptoms from Criterion D (negative alterations in cognitions and mood), and two symptoms from E (alterations in arousal and reactivity). Other criteria to be met included meeting F (disturbance that lasted at least a month), G (disturbance caused impairment), and H (disturbance was not attributable to the physiological effects of a substance). Each criterion had several questions, and scores for each criterion were summed at the end.

The CAPS-5 provides dichotomous data for individual symptoms and for the disorder, thus providing information about the presence or absence of PTSD, as well as the overall severity of symptoms. Frequency and intensity scores were assessed and rated separately.



Intensity was rated as *minimal, clearly present, pronounced, and extreme*, and frequency was recorded directly as reported by the respondent, either as a number of times or a percentage of time, depending on the symptom. A scoring system was developed for converting frequency and intensity information into a single 5-point (0 to 4) symptom severity scale. The anchor points for this severity scale are 0 = *absent*, 1 = *mild/subthreshold*, 2 = *moderate/threshold*, 3 = *severe/markedly elevated*, and 4 = *extreme/incapacitating*. A symptom was considered present and subsequently counted toward a PTSD diagnosis if its severity rating was 2 or higher.

MDD Diagnosis. MDD was diagnosed using the Structured Clinical Interview for the DSM-5 (SCID-5; First et al., 1994). The SCID-5 is a clinician-administered interview for the Axis I disorders of the DSM-5; it assesses mood disorders; both current and lifetime diagnoses of MDD were assessed. Notably, DSM-5 allows for both MDD and PTSD to be diagnosed if full criteria are met for both conditions. However, due to overlapping symptoms between MDD and PTSD criteria, the parent study was interested in more clearly delineating these conditions. To this end, deliberate efforts were made by clinicians to distinguish MDD only, PTSD only, and co-occurring PTSD-MDD. Specifically, clinicians were instructed to ensure that these conditions were not completely overlapping in both time and with respect to symptoms. For a diagnosis of MDD to be given over and above PTSD, participants needed to endorse full diagnostic criteria for MDD that either preceded PTSD onset or was a clear worsening after an extended period of stable symptoms. Participants also must have had at least one unique symptom from among the two “screening” symptoms (e.g. depressed mood, weight loss/gain, psychomotor retardation, suicidal ideation). Reciprocally, if participants endorsed MDD symptoms that were completely overlapping with PTSD, and which occurred exclusively within the context of PTSD, a diagnosis of MDD was not given.

Psychological Inflexibility. The Action and Acceptance Questionnaire (AAQ-II; Bond et al., 2011) is made up of 7 items that stemmed from the likely dominance (inflexibility) or non-dominance (flexibility) of internal events over contingencies in determining values-directed actions. This Likert-type scale runs from 1 (*never true*) to 7 (*always true*), with higher scores indicating greater levels of psychological inflexibility. Items reflected unwillingness to experience unwanted emotions, thoughts (e.g. “I am afraid of my feelings), the ability to be in the present moment (e.g., “I am in control of my life”), and commitment to flexible values-directed actions when experiencing psychological events that could undermine them (e.g., “My thoughts and feelings do not get in the way of how I want to live my life”). This scale has good internal consistency ( $\alpha = .83$ ).

Alcohol Use. The Alcohol Use Disorder Identification Test (AUDIT; Saunders, Aasland, Babor, Fuente, & Grant, 1993) is a 10-item measure adopted by the Veterans Health Administration as the gold-standard screening for alcohol use disorders in mental health and primary care clinics. The measure was developed to be a screening instrument to detect persons with hazardous or harmful alcohol consumption before dependence and permanent harm had developed. Items on the questionnaire included: “How often do you have a drink containing alcohol?” “How many drinks containing alcohol do you have on a typical day when you are drinking?” “How often during the last year have you had a feeling of guilt or remorse after drinking?” Each question was scored from 0 to 4, and the range of possible scores was from 0 to 40, with cut-off score of 8 for alcohol use disorder. Of this sample, 98 individuals met criteria for alcohol use disorder. The scale has good internal consistency ( $\alpha = .80 - .94$ ).

Drug Use. The Drug Abuse Screening Test (DAST-20; Skinner, 1982) measures problems related to drug abuse using 20 items scored dichotomously (i.e., yes or no; e.g., “Have

you lost friends because of your drug use?”). Prior research demonstrates that the DAST has good reliability and validity (Skinner, 1982), good internal consistency ( $\alpha = 0.92$ ). The DAST total score was computed by summing all items; it orders individuals along a continuum in accordance to their degree of problems. The maximum score is 20 and would indicate substantial problems. Scores can be broken down into 1-5 (*low*), 6-10 (*intermediate*), 11-15 (*substantial*), 16-20 (*severe*). High scores on the DAST were positively related to younger age, frequency of drug use over the past 12 months, and frequent use of cannabis, barbiturates, and opiates, providing concurrent evidence of validity (Skinner, 1982). Of this sample, 28 participants endorsed a drug abuse score that was intermediate or above.

Combat exposure. Full Combat Experiences Scale (FCES; Hoge et al., 2004) is a 25-item measure adapted from the Deployment Risk and Resilience Inventory (DRRI; King, King, and Vogt, 2003) to assess experiences and trauma exposure in land combat situations (Hoge et al., 2004). Items on the questionnaire included: “Being attacked or ambushed”, “Being wounded/injured”, “Being directly responsible for the death of an enemy combatant”, etc. Participants rated their frequency of exposure to each situation on a scale of  $0 = \textit{never}$ ,  $1 = \textit{one time}$ ,  $2 = \textit{two to four times}$ ,  $3 = \textit{five to nine times}$ ,  $4 = \textit{10 or more times}$ .

## DATA ANALYSIS PLAN

Between-groups differences on demographics were examined to confirm use of covariates; correlations between variables PTSD, MDD, PTSD-MDD comorbidity, no PTSD/MDD, PI and NSSI variables were examined.

For *Aim 1*, in keeping with Kimbrel et al. (2016), this study examined *hypotheses 1a-b* to see if there was a significant difference between specific variables (PTSD, MDD, PTSD-MDD comorbidity, etc.) and their relationship with NSSI status. This study was a partial replication and extension of the Kimbrel et al. (2016) study. Contrasts to the Kimbrel study included using a different data set, examining NSSI instead of suicidal ideation, and doing a cross-sectional analysis instead of a longitudinal analysis.

To test *hypothesis 1a*, chi-square tests were used to examine the relationships, and ascertain if there was a significant difference, between categorical variables and NSSI status, such that PTSD-MDD comorbidity would have the highest rates of NSSI. Cramer's V and odds ratios were used to measure effect sizes. A small effect for V was between 0.10 – 0.30, a medium effect was between 0.30 – 0.50, and a large effect would be any value above 0.50. To further examine results and the differences between groups, standardized residuals were analyzed in order to see which variables contributed the most to NSSI status, and which contributed the least.

To test *hypotheses 1b*, hierarchical logistic regression was used to assess the effect of PTSD-MDD comorbidity on NSSI status in individuals with PTSD-MDD comorbidity, PTSD-only, MDD-only, no PTSD/MDD. The use of hierarchical logistic regression was to show if the specified categorical variables explained a significant amount of variance in NSSI status after accounting for other covariates. In comparing models, the aim was to determine whether newly added variables showed a significant improvement in explained variance in NSSI status. This

hypothesis was evaluated using NSSI status as the dependent variable. Age, gender, race and individuals with no PTSD/MDD was entered in Step 1. PTSD-MDD comorbidity was entered in Step 2. PTSD-only was entered in Step 3. MDD-only was entered in Step 4. The order of the variables, adding the demographic controls and the main control group first, was to see if when predictors of interest (e.g. PTSD-MDD comorbidity) are added, did they improve the model at each step. Odds ratios were used to see if participants with PTSD-MDD comorbidity were more likely to engage in NSSI than participant groups.

*Aim 2* extended the DeBeer et al. (2018) study that examined whether psychological inflexibility would be associated with severity of suicidal ideation; for this study, it was to examine the relationship between PI and NSSI. Contrasts to DeBeer et al. (2018) included doing a cross-sectional analysis instead of a longitudinal one, using a different dataset, and including a moderation analysis in looking at the influence of PI.

To test *hypothesis 2*, a hierarchical linear regression was used to see whether PI accounted for unique variance in NSSI symptoms over and above age, gender, education level, alcohol and drug use, combat exposure, PTSD, and MDD. In the model, NSSI frequency was the dependent variable. Covariates – age, gender, race, AUDIT scores, DAST scores, combat exposure, PTSD, and MDD – were entered in Step 1. PI scores were entered in Step 2.

For *Aim 3*, t-tests and correlation analysis were calculated to determine if there were significant differences between the means of the categorical groups (i.e. PTSD-only/no PTSD-only) and to screen for overlapping variables. Moderation analysis was used to study the influence of PI as it interacted with specific variables and their influence on NSSI frequency.

In testing *hypotheses 3*, the moderation analysis was done using Hayes PROCESS macro (Hayes, 2017) in SPSS and was used to look at the relationship between PTSD-MDD

comorbidity, PTSD-only, MDD-only, no PTSD/MDD and frequency of NSSI. One variable was created to represent the diagnosis groups, with a category for each group [1-PTSD-only, 2-MDD-only, 3-PTSD/MDD comorbidity, 4-no PTSD/MDD], and used to run the moderation. The PROCESS macro automatically generates and tests interaction dummy codes. If the interaction of PTSD-MDD comorbidity, PTSD, MDD, no PTSD/MDD and PI was significant, the nature of the effects would be examined to indicate whether they reflected high or low relationships, as well as identifying intensities between the relationships through simple slopes analysis (Aiken & West, 1991; Rogosa, 1981). Simple slopes analysis would have been used to evaluate the relationship between the predictors (e.g., PTSD) and the outcome (NSSI) at different levels of the moderator (PI); for levels PROCESS macro (Hayes, 2017) uses one standard deviation above and below the mean value of the moderator.

For *Aim 4*, an exploratory analysis of the sample was done. Areas that were studied included examining types of NSSI, as well as identifying frequency of NSSI types compared to others (e.g. is frequency of cutting worse than scratching in the veteran sample?). An analysis of how many people engaged in each type (cutting, hitting, scratching, burning) of NSSI were examined. Finally, the exploratory analysis entailed studying which types of NSSI were more prevalent within each type of disorder (PTSD, MDD, PTSD-MDD comorbidity).

## RESULTS

Overall, findings related to *Aim 1*, examining the relationship between groups (PTSD-only, MDD-only, PTSD-MDD comorbidity, no PTSD/MDD) and NSSI status (yes/no) using logistic regression, showed that participants with PTSD-MDD comorbidity engaged in NSSI at significantly higher rates than participants who were not comorbid; this was after accounting for age, race, and gender. For *hypothesis 1a*, the chi squared tests showed that the observed presence of NSSI engagement in those with PTSD-only, MDD-only, and PTSD-MDD comorbidity were significantly higher than expected from those without any psychopathology within the groups. For those in the no PTSD/MDD group, the observed instances of NSSI engagement was significantly lower than expected. Looking at the association between those with PTSD-MDD comorbidity and NSSI status [ $\chi^2(1, N = 501) = 20.09, p < .001$ ], odds ratio showed that likelihood of NSSI “yes” status was 1.22, 1.19, and 7.40 times higher than if they were in the groups with PTSD-only, MDD-only, and no PTSD/MDD, respectively.

For *hypothesis 1b*, results of the hierarchical logistic regression showed that in step 1, age, gender, race, and no PTSD/MDD significantly predicted NSSI status  $F(4, 486) = 3.04, p = .02$ , accounting for 2% of the variance. In step 2, PTSD-MDD comorbidity was statistically significant [ $\Delta F(1, 485) = 11.59, p = .001$ ] and accounted for 2% incremental variance. In step 3 and 4, groups with PTSD-only and MDD-only were not significant [ $\Delta F(1, 484) = 0.00, p = .99$ ] and [ $\Delta F(1, 483) = 0.00, p = .99$ ], respectively. Examining the effect of psychopathology status on NSSI status, when PTSD-MDD comorbidity was added to the model, age ( $\beta = -.02, p = .67$ ), gender ( $\beta = -.02, p = .69$ ), race ( $\beta = -.08, p = .08$ ), and no PTSD/MDD ( $\beta = -.038, p = .47$ ) became non-significant. Notably, when the PTSD-only and MDD only groups were added, PTSD-MDD comorbidity stayed significant over and above the other variables.

To evaluate *hypothesis 2*, hierarchical linear regression was used to test PI's unique contribution to NSSI engagement at baseline where gender, age, education level, PTSD, MDD, combat exposure, alcohol and drug use scores comprised the first step of the model (Table 1). The only factor that was significantly associated with NSSI in step 1 of the model was drug use ( $\beta = .11, p = .02$ ). When PI was entered into the second step of the model, to determine whether it contributed to the prediction of NSSI over and above the other risk factors, PI was significantly associated with NSSI ( $\beta = .12, p = .03$ ). Furthermore, though PI was most strongly associated with NSSI, ( $r(484) = .17, p < .001$ ), it only accounted for 1% of unique variance in NSSI engagement. Drug use remained significant in the final step of the model ( $\beta = .11, p = .03$ ). The overall model only accounted for 6% of the variance in NSSI engagement at baseline.



Table 1.

*Hierarchical Linear Regression to test PI's contribution to NSSI engagement*

Steps and Variables	Unstd Coefficients		Std Coefficients		$R^2$	$\Delta R^2$	$F$	$p$
	$B$	$SE B$	$\beta$	$p$				
<b>Step 1</b>					0.23**	0.050	3.410	0.001
Gender	0.044	0.046	0.048	0.335				
Age	-0.003	0.002	-0.063	0.179				
Education Level	-0.003	0.010	-0.014	0.768				
PTSD	-0.001	0.045	-0.001	0.985				
MDD	0.068	0.042	0.081	0.105				
Alcohol use	0.004	0.003	0.065	0.169				
Drug use	0.019	0.008	0.111	0.018				
Combat exposure	0.002	0.001	0.081	0.119				
<b>Step 2</b>					0.25*	0.064	4.950	0.027
Gender	0.053	0.046	0.058	0.242				
Age	-0.003	0.002	-0.062	0.185				
Education Level	-0.001	0.010	-0.005	0.908				
PTSD	-0.030	0.047	-0.035	0.523				
MDD	0.036	0.044	0.043	0.412				
Alcohol use	0.004	0.003	0.057	0.225				
Drug use	0.018	0.008	0.107	0.023				
Combat exposure	0.002	0.001	0.070	0.176				
Psychological Inflexibility	0.004	0.002	0.121	0.027				

\* $p < .05$

\*\*  $p < .01$

\*\*\*  $p < .001$

For *hypothesis 3*, results of the t-tests showed levels of PI were influenced when participants were in the PTSD/MDD comorbidity group [ $r(489) = .47, t(489) = 11.77, p < .001$ ], MDD-only group [ $r(489) = .51, t(489) = 11.60, p < .001$ ] and PTSD-only group [ $r(489) = .49, t(489) = 12.43, p < .01$ ]; and influenced least when they were in the no PTSD/MDD group [ $r(423) = -.57, t(423) = -11.22, p < .01$ ]. Engagement in NSSI was influenced when participants were in the PTSD/MDD comorbidity group [ $r(499) = .12, t(499) = 2.63, p = .01$ ] and the PTSD-only group [ $r(499) = .10, t(499) = 2.25, p = .03$ ]; however, NSSI engagement was not influenced

with the MDD-only group [ $r(499) = .09$ ,  $t(499) = 1.93$ ,  $p = .054$ ] and the no PTSD/MDD group [ $r(499) = -.083$ ,  $t(499) = -1.86$ ,  $p = .064$ ]. Also, NSSI had a low positive association with PI [ $r(499) = .22$ ,  $p < .001$ ]. The evaluation of PI's effect on the relationship between diagnostic categories and the frequency of NSSI was calculated via Hayes PROCESS macro for PI's moderating effect. Subsequently, the results examining PI as a moderator of the relationship between the variable [that included PTSD-only, MDD-only, PTSD-MDD comorbidity, no PTSD/MDD], and frequency of NSSI behavior was non-significant ( $p = .11$ ); thus, simple slopes were not examined further.

With respect to the exploratory analyses, chi squared tests were used to examine the frequency of type of NSSI (scratching, cutting, hitting, burning) by diagnostic category. For type of NSSI that participants endorsed - 74 (14.8%) used scratching, 26 (5.2%) used cutting, 45 (9.0%) used hitting and 20 (4.0%) used burning. Hitting was the only form of NSSI significantly associated with all diagnostic groups [ $\chi^2(1, N = 501) = 10.04$ ,  $p < .05$ ]; however, there were differences (Table 2). The odds of hitting were 1.53, 1.79, and 5.59 times higher if participants had PTSD-MDD comorbidity than if they only had PTSD-only, MDD-only, and no PTSD/MDD, respectively. Specifically, the PTSD-only group was significantly associated with hitting [ $\chi^2(1, N = 501) = 7.70$ ,  $p = .01$ , odds ratio (OR) = 2.92] and scratching [ $\chi^2(1, N = 501) = 5.58$ ,  $p = .02$ , odds ratio (OR) = 1.95], but no other forms of NSSI. The MDD-only and PTSD-MDD comorbid groups were also individually significantly associated with hitting [ $\chi^2(1, N = 501) = 6.40$ ,  $p = .01$ , odds ratio (OR) = 2.57], [ $\chi^2(1, N = 501) = 7.69$ ,  $p = .01$ , odds ratio (OR) = 2.48] respectively, but not any other form of NSSI. The no PTSD/MDD group was associated with all NSSI types, except burning: scratching [ $\chi^2(1, N = 501) = 4.54$ ,  $p = .04$ ; odds ratio (OR) = .473], hitting [ $\chi^2(1, N = 501) = 7.72$ ,  $p = .01$ , odds ratio (OR) = .214], and cutting [ $\chi^2(1, N = 501) = 5.82$ ,  $p = .02$ ,

odds ratio (OR) = .124]. In fact, burning was not significantly associated with any group: PTSD-only ( $p = .639$ ), MDD-only ( $p = .346$ ), PTSD-MDD comorbid ( $p = .366$ ), and no PTSD/MDD ( $p = .434$ ).

Table 2.

*Types of NSSI significant across groups*

NSSI Types	Diagnostic Groups				$\chi^2$	Cramer's V
	PTSD n (%)	MDD n (%)	Comorbid n (%)	No PTSD/MDD n (%)		
Cutting	5 (11)	5 (3)	15 (10)	1 (.01)	6.07	0.11
Scratching	12 (26)	8 (5)	44 (29)	10 (6)	6.09	0.11
Hitting	6 (13)	5 (3)	31 (20)	3 (2)	10.0*	0.02
Burning	2 (4)	3 (2)	12 (8)	3 (2)	1.42	0.70

\* $p < .05$

\*\*  $p < .01$

\*\*\*  $p < .001$

## DISCUSSION

Obtaining a better understanding of the relationships between PTSD, MDD, PTSD-MDD comorbidity and factors that influence engagement in NSSI (i.e., PI) represents a challenging but critical research endeavor. Regarding the larger literature, and considering the influence of NSSI, those with comorbid mental health conditions seem to be more at risk for engagement in NSSI, which in turn has been demonstrated in other studies to increase suicide risk. The present study adds to the existing literature by showing that PTSD-MDD comorbidity predicted NSSI status, even after demographic variables, PTSD-only, and MDD-only groups were measured. Though cross-sectional in nature, the present findings are consistent with Kimbrel et al. (2016) associating psychopathologies with NSSI in military personnel.

As with previous research, studying the associations between psychopathology and NSSI (Magruder et al., 2004; Bryan & Bryan, 2014), this study found that PTSD, MDD, and PTSD-MDD were significantly associated with NSSI status (yes/no). Bearing in mind the fluid vulnerability theory (Rudd, 2012), where risk factors and vulnerabilities combine to create susceptibility to suicide risk, understanding the mechanisms connecting PTSD, MDD, and PTSD-MDD and NSSI is crucial to elucidating what drives certain individuals to suicide. In the first aim, results showed those with PTSD-MDD comorbidity were significantly more likely, than other groups to engage in NSSI. The categorical nature of how the groups were assessed may have reduced the predictive power, but NSSI was also a categorical variable (yes/no) and PTSD-MDD still demonstrated significant association after all other variables had been included in the model. Also, the findings are consistent with other studies demonstrating that PTSD and depression have independent (and additive) effects on negative outcomes (i.e. suicidal thoughts and behavior; Cogle et al., 2009). This may imply that rates of comorbidity in relation to

disorders can be problematic, since outcomes associated with one condition (i.e., PTSD) may, in actuality, be a result of its association with another condition (i.e., MDD). The comorbid pattern may strengthen the likelihood of NSSI engagement given PTSD's avoidance components coupled with MDD's negative affect components (anhedonia, feelings of guilt and worthlessness) which, put together, may feed off each other. Indeed, individuals may have one condition which puts them at greater risk for developing the other or vice versa. Alternatively, non-related vulnerabilities (i.e., gender, race) may predispose individuals to developing both and thus exacerbate outcomes.

The *second hypothesis* was to examine PI's influence on unique variance in NSSI engagement, after accounting for age, gender, education level, alcohol and drug use, combat exposure, PTSD, and MDD. PI and drug use were the only variables associated with risk for NSSI engagement after accounting for other variables; indeed, none of the other established predictors remained significant in the final model. PI only accounted for a small portion of variance in NSSI engagement, which suggests that PI may be playing a more limited role in driving NSSI in comparison to other factors established in the existing literature, such as emotional dysregulation and distress tolerance. That drug use remained a significant predictor of NSSI, may be due to factors present in the sample not explicitly examined in this analysis. Moreover, in comparing the DeBeer et al. (2018) study, where alcohol use significantly predicted suicidal ideation at baseline but not at follow-up, in this study, alcohol use did not predict NSSI at baseline, rather, drug use was significant in both steps of the model. It is possible that these findings are a result of different controlled variables (suicidal attempts, PTSD-depression factor) vs. PTSD, MDD, and combat exposure at baseline. Nonetheless, it is integral to further study drug use as associated with NSSI engagement.

The non-significant moderation for *hypothesis 3*, may have reflected MDD's lack of association with NSSI frequency over time. The supposition was that with MDD's negative affective states, NSSI may be used as an alleviation tool. However, it is probable that since components of MDD largely deal with states that fluctuate; PI's influence, which reflects a consistent approach to negative stimuli, may not interact enough to influence frequency of NSSI engagement. Also, if NSSI's main component is in handling negative affect through avoidance mechanisms, and yet MDD's mechanisms do not employ avoidance, then modifications in PI may not influence MDD's relationship to NSSI.

The exploratory analysis, mapping the presence PTSD-only, MDD-only, and PTSD-MDD comorbidity onto types of NSSI engagement showed that hitting was the most common form of NSSI in veterans across all diagnostic categories and warrants more clinical attention. Currently, there is limited research regarding hitting specifically as a form of NSSI predicting psychopathology, which may be a hindrance in forwarding clinical treatments. Kleiman et al. (2015) found that higher levels of aggression distinguished those who engaged in hitting NSSI from those who only engaged in non-hitting NSSI; individuals with poorer emotion regulation appeared more likely to engage in any form of NSSI. Thus, examining types of NSSI compared to each other (i.e. hitting vs. cutting) as well as studying their individual components mapped onto psychopathology should be an area of interest. A broader examination of NSSI as a multifaceted factor with distinguishing predictors may be needed. Interestingly, multiple forms of NSSI (scratching, hitting, and cutting) occurred frequently among those with no PTSD/MDD. However, the no PTSD/MDD group is an unknown segment that may include psychopathology conducive to the use of NSSI and it is possible that these veterans had other disorders that weren't assessed in this study. The importance of identifying forms of NSSI that may be present

in relation to individual disorders is crucial to the continued defining and accurate measurement of self-injurious behaviors; this informs treatment measures in providing clear operational definitions for clinical care. Moreover, risk of suicide is made more obvious with clear signs by way of NSSI behavior type and their connection to disorders that present their own risks to suicide.

## LIMITATIONS AND STRENGTHS

There are several limitations to the present study. The use of cross-sectional data does not allow for any directionality or causal relation inference; thus, it is important to recognize other mechanisms by which PTSD and MDD may influence engagement in NSSI. Given this design, it cannot be determined whether the assessment of NSSI engagement is representative of the specific psychopathology investigated (PTSD, MDD, PTSD-MDD comorbidity) or an unknown variable within the sample. In addition, the sample was majority male and from war theatre, which limits generalizability to a female and non-veteran population. Also, using a regression analysis foregoes the possibility of spurious variables not accounted for in the models, which could have accounted for larger variance in some of the observed results. The use of non-random recruitment and of the converted MHQ-4 are also important limitations that should be considered in the interpretation of the study's findings. Despite these limitations, some strengths of the study include the element of the cross-sectional analyses that revealed that drug abuse was predictive of NSSI beyond PTSD and MDD. Also, the findings of the present study clearly provide evidence to support the importance of assessing use of NSSI and type among those with comorbid disorders. Indeed, this investigation expands the empirical evidence regarding psychopathology and NSSI engagement as well as studying PI as a moderator for the relationship between PTSD and NSSI in military members.



## CONCLUSION AND FUTURE DIRECTIONS

Humans are imbued with an innate sense of self-preservation. The act of self-injury, used to manage internal processes, runs counter to this instinct and may cause not only psychological and physical damage, but death to the injurer. Vulnerabilities (i.e., psychopathology) that may make individuals more susceptible to engagement in NSSI need to be consistently examined. Thus, studying the relationships between PTSD, MDD, PTSD-MDD comorbidity, no PTSD/MDD, PI, and NSSI, provides a means to further understand the underlying mechanisms that connect them. It may be that NSSI is reinforced and perpetuated by its relationship with PTSD and comorbidity with MDD. The importance of this study lies, not only in emphasizing the association of NSSI as component of suicide risk, but as a problem in and of itself. As a marker of NSSI engagement, increased observation could be made to modulating the occurrence PI as part of treatment efforts and subsequent research in those with PTSD. Since many military members and veterans are highly likely to undergo experiences (e.g., trauma associated with combat, deployment) that may influence development of PTSD, prospective research that tackles how underlying mechanisms and factors impact engagement in NSSI and other predictors of suicide risk is paramount. Aims may be to acquire more modifiable traits that connect to NSSI and replace with adaptive behaviors. Because PTSD has negative associations with NSSI, it is important for clinicians to recognize and treat the mental disorder in patients who engage in NSSI. Future research would benefit from associating NSSI engagement to forms of psychopathology not normally studied, thus facilitating the detection of suicide risk. In addition, models that focus on types of NSSI (i.e. hitting) as a particular vulnerability would also aide in reflecting the complexity of NSSI engagement. By investigating the relationships that surround

engagement in NSSI and identifying those psychological mechanisms that influence NSSI, this study may guide efforts to impact rates of suicide in individuals.

## REFERENCES

- Aiken, L., & West, S. (1991). *Multiple Regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- American Psychiatric Association. (2013) Diagnostic and Statistical Manual of Mental Disorders. 5th ed. American Psychiatric Association; Arlington, VA
- Angst, F., Stassen, H., Clayton, P., & Angst, J. (2002). Mortality of patients with mood disorders: follow-up over 34–38 years. *Journal of Affective Disorders*, 68(2), 167–181. [https://doi.org/10.1016/S0165-0327\(01\)00377-9](https://doi.org/10.1016/S0165-0327(01)00377-9)
- Avenevoli, S., Swendsen, J., He, J., Burstein, M., & Merikangas, K. (2015). Major Depression in the National Comorbidity Survey–Adolescent Supplement: Prevalence, Correlates, and Treatment. *Journal of the American Academy of Child & Adolescent Psychiatry*, 54(1), 37–44. e2. <https://doi.org/10.1016/j.jaac.2014.10.010>
- Beck, A., Steer, R., Beck, J., & Newman, C. (1993). Hopelessness, Depression, Suicidal Ideation, and Clinical Diagnosis of Depression. *Suicide and Life-Threatening Behavior*, 23(2), 139–145. <https://doi.org/10.1111/j.1943-278X.1993.tb00378.x>
- Blanchard, E., Buckley, T., Hickling, E., & Taylor, A. (1998). Posttraumatic Stress Disorder and Comorbid Major Depression: Is the Correlation an Illusion? *Journal of Anxiety Disorders*, 12(1), 21–37. [https://doi.org/10.1016/S0887-6185\(97\)00047-9](https://doi.org/10.1016/S0887-6185(97)00047-9)
- Bond, F., Hayes, S., Baer, R., Carpenter, K., Guenole, N., Orcutt, H., Zettle, R. (2011). Preliminary Psychometric Properties of the Acceptance and Action Questionnaire–II: A Revised Measure of Psychological Inflexibility and Experiential Avoidance. *Behavior Therapy*, 42(4), 676–688. <https://doi.org/10.1016/j.beth.2011.03.007>
- Brewin, C., Andrews, B., Valentine, J. (2000). Meta-analysis of risk factors for posttraumatic

- stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, 68(5): 748-766.
- Brown, T., Campbell, L., Lehman, C., Grisham, J., Mancill, R., & Brown, T. (2001). Current and lifetime comorbidity of the DSM-IV anxiety and mood disorders in a large clinical sample. *Journal of Abnormal Psychology*, 110(4), 585–599.  
<https://doi.org/10.1037/0021-843X.110.4.585>
- Bryan, C., Rudd, M., Wertenberger, E., Young-McCaughon, S., & Peterson, A. (2015). Nonsuicidal self-injury as a prospective predictor of suicide attempts in a clinical sample of military personnel. *Comprehensive Psychiatry*, 59.
- Bryan, C., & Rudd, M. (2016). The Importance of Temporal Dynamics in the Transition from Suicidal Thought to Behavior. *Clinical Psychology: Science and Practice*, 23(1), 21–25.  
<https://doi.org/10.1111/cpsp.12135>
- Bryan, C., & Bryan, A. (2014). Nonsuicidal Self-Injury Among a Sample of United States Military Personnel and Veterans Enrolled in College Classes. *Journal of Clinical Psychology*, 70(9), 874–885. <https://doi.org/10.1002/jclp.22075>
- Bryan, C., & Corso, K. (2011). Depression, PTSD, and suicidal ideation among active duty veterans in an integrated primary care clinic. *Psychological Services*, 8, 94.  
<https://doi.org/10.1037/a0023451>.
- Campbell, D., Felker, B., Liu, C., Yano, E., Kirchner, J., Chan, D., Chaney, E. (2007). Prevalence of Depression–PTSD Comorbidity: Implications for Clinical Practice Guidelines and Primary Care-based Interventions. *Journal of General Internal Medicine*, 22(6), 711–718. <https://doi.org/10.1007/s11606-006-0101-4>
- Carver, C., Scheier, M., Weintraub, J., & Carver, C. (1989). Assessing coping strategies: a

- theoretically based approach. *Journal of Personality and Social Psychology*, 56(2), 267–283. <https://doi.org/10.1037/0022-3514.56.2.267>
- Chapman, A. L., Gratz, K. L., & Brown, M. Z. (2006). Solving the puzzle of deliberate self-harm: The experiential avoidance model. *Behaviour Research and Therapy*, 44, 371–394. <https://doi.org/10.1016/j.brat.2005.03.005>.
- Cogle, J., Resnick, H., & Kilpatrick, D. (2009). PTSD, depression, and their comorbidity in relation to suicidality: cross-sectional and prospective analyses of a national probability sample of women. *Depression and Anxiety*, 26(12), 1151–1157. <https://doi.org/10.1002/da.20621>
- Crosby, A. E., Ortega, L., & Melanson, C. (2011). Self-directed violence surveillance: Uniform definitions and recommended data elements, version 1.0. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control
- Debeer, B., Meyer, E., Kimbrel, N., Kittel, J., Gulliver, S., & Morissette, S. (2018). Psychological Inflexibility Predicts of Suicidal Ideation Over Time in Veterans of the Conflicts in Iraq and Afghanistan. *Suicide and Life-Threatening Behavior*, 48(6), 627–641. <https://doi.org/10.1111/sltb.12388>
- Ehlers, A., Clark, D. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, 38(4), 319–345. [https://doi.org/10.1016/S0005-7967\(99\)00123-0](https://doi.org/10.1016/S0005-7967(99)00123-0)
- Erickson, D., Wolfe, J., King, D., King, L., Sharkansky, E., & Erickson, D. (2001). Posttraumatic stress disorder and depression symptomatology in a sample of Gulf War veterans: a prospective analysis. *Journal of Consulting and Clinical Psychology*, 69(1), 41–49. <https://doi.org/10.1037/0022-006X.69.1.41>

- Felsten, G. (2002). Minor stressors and depressed mood: reactivity is more strongly correlated than total stress. *Stress and Health, 18*(2), 75–81. <https://doi.org/10.1002/smi.925>
- First, M., Spitzer, L., Gibbon, M., Williams, J. (1995) Structural clinical interview for Axis I DSM-IV disorders (SCID). American Psychiatric Association, Washington, DC
- Flory, J., Yehuda, R. (2015). Comorbidity between post-traumatic stress disorder and major depressive disorder: alternative explanations and treatment considerations. *Dialogues in Clinical Neuroscience, 17*(2), 141–150. <http://search.proquest.com/docview/1702656679/>
- Gratz, K. (2001). Measurement of Deliberate Self-Harm: Preliminary Data on the Deliberate Self-Harm Inventory. *Journal of Psychopathology and Behavioral Assessment, 23*(4), 253–263. <https://doi.org/10.1023/A:1012779403943>
- Gratz, K., Conrad, S., & Roemer, L. (2002). Risk Factors for Deliberate Self-Harm Among College Students. *American Journal of Orthopsychiatry, 72*(1), 128–140. <https://doi.org/10.1037/0002-9432.72.1.128>
- Gratz, K. (2003). Risk Factors for and Functions of Deliberate Self-Harm: An Empirical and Conceptual Review. *Clinical Psychology: Science and Practice, 10*(2), 192–205. <https://doi.org/10.1093/clipsy.bpg022>
- Gratz, K., & Roemer, L. (2004). Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41–54. <https://doi.org/10.1023/B:JOBA.0000007455.08539.94>
- Greco, L., Lambert, W., Baer, R., & Greco, L. (2008). Psychological inflexibility in childhood

- and adolescence: development and evaluation of the Avoidance and Fusion Questionnaire for Youth. *Psychological Assessment*, 20(2), 93–102. <https://doi.org/10.1037/1040-3590.20.2.93>
- Guan, K., Fox, K. R., & Prinstein, M. J. (2012). Non-suicidal self-injury as a time-invariant predictor of adolescent suicidal ideation and attempts in a diverse community sample. *Journal of Consulting and Clinical Psychology*, 80(2), 842–849. doi:10.1037/a0029429.
- Hamza, C.A., Stewart, M.E., Willoughby, T., 2012. Examining the link between non-suicidal self-injury and suicidal behavior: a review of the literature and an integrated model. *Clinical Psychology Review* 32 (6), 482–495.
- Hawton, K., Rodham, K., Evans, E., & Weatherall, R. (2002). Deliberate self-harm in adolescents: self-report survey in schools in England. *BMJ*, 325(7374), 1207–1211. <https://doi.org/10.1136/bmj.325.7374.1207>
- Hayes, S., Wilson, K., Gifford, E., Follette, V., Strosahl, K., & Hayes, S. (1996). Experimental avoidance and behavioral disorders: a functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*, 64(6), 1152–1168. Retrieved from <http://search.proquest.com/docview/78652763>
- Hayes, S., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York: Guilford Press.
- Hayes, S., Strosahl, K., Wilson, K., Bissett, R., Pistorello, J., Toarmino, D., ... McCurry, S. (2004). Measuring experiential avoidance: A preliminary test of a working model. *The Psychological Record*, 54(4), 553–578. <https://doi.org/10.1007/BF03395492>
- Hayes, S., Luoma, J., Bond, F., Masuda A., Lillis, J., (2006). *Acceptance and Commitment*

- Therapy: Model, processes and outcomes. *Behavior and Research Therapy*, 44(1), 1-25.  
<https://doi.org/10.1016/j.brat.2005.06.006>
- Hayes, A. (2017). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression Based Approach*. New York: Guilford Publications
- Hegel, M., Unützer, J., Tang, L., & Areán, P. (2005). Impact of Comorbid Panic and Posttraumatic Stress Disorder on Outcomes of Collaborative Care for Late-Life Depression in Primary Care. *The American Journal of Geriatric Psychiatry*, 13(1), 48–58. <https://doi.org/10.1176/appi.ajgp.13.1.48>
- Hoge, C., Castro, C., Messer, S., McGurk, D., Cotting, D., & Koffman, R. (2004). Combat Duty in Iraq and Afghanistan, Mental Health Problems, and Barriers to Care. *The New England Journal of Medicine*, 351(1), 13–22. <https://doi.org/10.1056/NEJMoa040603>
- Joiner, T. (2005). *Why people die by suicide*. Cambridge, MA: Harvard University Press.
- Karekla, M., & Panayiotou, G. (2011). Coping and experiential avoidance: Unique or overlapping constructs? *Journal of Behavior Therapy and Experimental Psychiatry*, 42(2), 163–170. <https://doi.org/10.1016/j.jbtep.2010.10.002>
- Kessler, R., Sonnega, A., Bromet, E., Hughes, M., Nelson, CB. (1995). Posttraumatic Stress Disorder in the National Comorbidity Survey. *Arch Gen Psychiatry*. 52(12):1048–1060.  
[doi:10.1001/archpsyc.1995.03950240066012](https://doi.org/10.1001/archpsyc.1995.03950240066012)
- Kessler, R., Berglund, P., Demler, O., Jin, R., Merikangas, K., Walters, E. (2005) Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry*. 62(6):593–602.  
<https://doi.org/10.1001/archpsyc.62.6.593>
- Kimrel, N., Johnson, M., Clancy, C., Hertzberg, M., Collie, C., Van Voorhees, E., Beckham, J.



- (2014). Deliberate Self-Harm and Suicidal Ideation Among Male Iraq/Afghanistan-Era Veterans Seeking Treatment for PTSD. *Journal of Traumatic Stress*, 27(4), 474–477. <https://doi.org/10.1002/jts.21932>
- Kimbrel, N., Evans, L., Patel, A., Wilson, L., Meyer, E., Gulliver, S., & Morissette, S. (2014). The critical warzone experiences (CWE) scale: Initial psychometric properties and association with PTSD, anxiety, and depression. *Psychiatry Research*, 220(3), 1118–1124. <https://doi.org/10.1016/j.psychres.2014.08.053>
- Kimbrel, N., Meyer, E., Debeer, B., Gulliver, S., & Morissette, S. (2016). A 12-Month prospective study of the effects of PTSD-depression comorbidity on suicidal behavior in Iraq/Afghanistan-era veterans. *Psychiatry Research*, 243, 97–99. <https://doi.org/10.1016/j.psychres.2016.06.011>
- King, D., King, L., & Vogt, D. (2003). Manual for the Deployment Risk and Resilience Inventory (DRRI): A collection of measures for studying deployment-related experiences in military veterans. Boston, MA: National Center for PTSD.
- King, D., King, L., Vogt, D. (2003). *Manual for the Deployment Risk and Resilience Inventory (DRRI): A Collection of Measures for Studying Deployment Related Experiences of Military Veterans*. Boston, Mass: National Center for PTSD
- Kleiman, E., Ammerman, B., Kulper, D., Uyeji, L., Jenkins, A., & McCloskey, M. (2015). Forms of non-suicidal self-injury as a function of trait aggression. *Comprehensive Psychiatry*, 59, 21–27. <https://doi.org/10.1016/j.comppsy.2014.12.004>
- Klonsky, E., Oltmanns, T., & Turkheimer, E. (2003). Deliberate self-harm in a nonclinical population: prevalence and psychological correlates. (Author Abstract). *American Journal of Psychiatry*, 160(8), 1501–1508.

- Klonsky, E., & Klonsky, E. (2011). Non-suicidal self-injury in United States adults: prevalence, Socio-demographics, topography and functions. *Psychological Medicine*, 41(9), 1981–1986. <https://doi.org/10.1017/S0033291710002497>
- Krause, E., Kaltman, S., Goodman, L., & Dutton, M. (2008). Avoidant coping and PTSD symptoms related to domestic violence exposure: A longitudinal study. *Journal of Traumatic Stress*, 21(1), 83–90. <https://doi.org/10.1002/jts.20288>
- Kumpula, M., Orcutt, H., Bardeen, J., & Varkovitzky, R. (2011). Peritraumatic dissociation and experiential avoidance as prospective predictors of posttraumatic stress symptoms. *Journal of Abnormal Psychology*, 120(3), 617–627. <https://doi.org/10.1037/a0023927>
- Linehan, M. (1993). *Cognitive-Behavioral Treatment of Borderline Personality Disorder*. New York: Guilford Press
- Low, G., Jones, D., Macleod, A., Power, M., & Duggan, C. (2000). Childhood trauma, dissociation and self-harming behaviour: a pilot study. *The British Journal of Medical Psychology*, 73 ( Pt 2), 269–278.
- Magruder, K., Frueh, B., Knapp, R., Johnson, M., Vaughan, J., Carson, T., Hebert, R. (2004). PTSD symptoms, demographic characteristics, and functional status among veterans treated in VA primary care clinics. *Journal of Traumatic Stress*, 17(4), 293–301. <https://doi.org/10.1023/B:JOTS.0000038477.47249.c8>
- Maguen, S., Luxton, D. D., Skopp, N. A., Gahm, G. A., Reger, M. A., Metzler, T. J., & Marmar, C. R. (2011). Killing in combat, mental health symptoms, and suicidal ideation in Iraq war veterans. *Journal of Anxiety Disorders*, 25, 563–567. <http://dx.doi.org/10.1016/j.janxdis.2011.01.003>
- Marx, B., Sloan, D. (2005). Peritraumatic dissociation and experiential avoidance as

- predictors of posttraumatic stress symptomatology. *Behaviour Research and Therapy*, 43(5), 569–583. <https://doi.org/10.1016/j.brat.2004.04.004>
- Meyer, E., Morissette, S., Kimbrel, N., Kruse, M., and Gulliver, S. (2013). Acceptance and Action Questionnaire – II scores as a predictor of posttraumatic stress disorder symptoms among war Veterans. *Psychological Trauma: Theory, Research, Practice and Policy*, 5, 521-528. doi: 10.1037/a0030178.
- Meyer, E., La Bash, H., Debeer, B., Kimbrel, N., Gulliver, S., & Morissette, S. (2019). Psychological inflexibility predicts PTSD symptom severity in war veterans after accounting for established PTSD risk factors and personality. *Psychological Trauma : Theory, Research, Practice and Policy*, 11(4), 383–390. <https://doi.org/10.1037/tra0000358>
- Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V., Ustun, B., & Moussavi, S. (2007). Depression, chronic diseases, and decrements in health: results from the World Health Surveys. *Lancet (London, England)*, 370(9590), 851–858. [https://doi.org/10.1016/S0140-6736\(07\)61415-9](https://doi.org/10.1016/S0140-6736(07)61415-9)
- National Alliance on Mental Illness (NAMI) (2009). *Depression and veteran’s fact sheet*. Arlington: VA. <http://www.nami.org>.
- Nock, M. K., Prinstein, M. J. (2004). A Functional Approach to the Assessment of Self-Mutilative Behavior. *Journal of Consulting and Clinical Psychology*, 72(5), 885-890. <http://dx.doi.org/10.1037/0022-006X.72.5.885>
- Nock, M., & Prinstein, M. (2005). Contextual features and behavioral functions of self-mutilation among adolescents. *Journal of Abnormal Psychology*, 114(1), 140–146. <https://doi.org/10.1037/0021-843X.114.1.140>
- Nock, M., Joiner, T., Gordon, K., Lloyd-Richardson, E., & Prinstein, M. (2006). Non-suicidal

- self-injury among adolescents: Diagnostic correlates and relation to suicide attempts. *Psychiatry Research*, 144(1), 65–72. <https://doi.org/10.1016/j.psychres.2006.05.010>
- Nock, M. K. (2010). Self-injury. *Annual review of clinical psychology*, 6, 339–363. <https://doi.org/10.1146/annurev.clinpsy.121208.131258>
- Osby, U., Brandt, L., Correia, N., Ekblom, A., Sparén, P. (2001). Excess mortality in bipolar and unipolar disorder in Sweden. *Arch Gen Psychiatry*. 58:844–850
- Ozer, E., Best, S., Lipsey, T., & Weiss, D. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin*, 129(1), 52–73. <https://doi.org/10.1037//0033-2909.129.1.52>
- Panagioti, M., Gooding, P., Tarrier, N. (2009) Post-traumatic stress disorder and suicidal behavior: A narrative review. *Clinical Psychology Review*. 29(6), 471-482
- Resnick, H., & Weaver, T. (1994). *Habit Questionnaire*. Unpublished manuscript, Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina, Charleston, SC.
- Rogosa, D. (1981). On the relationship between the Johnson-Neyman region of significance and statistical tests of parallel within group regressions. *Educational and Psychological Measurement*, 41(1), 73-84
- Rojas, S., Bujarski, S., Babson, K., Dutton, C., Feldner, M., & Rojas, S. (2014). Understanding PTSD comorbidity and suicidal behavior: associations among histories of alcohol dependence, major depressive disorder, and suicidal ideation and attempts. *Journal of Anxiety Disorders*, 28(3), 318–325. <https://doi.org/10.1016/j.janxdis.2014.02.004>
- Rudd, M. D. (2006). Fluid vulnerability theory: A cognitive approach to understanding the

- process of acute and chronic risk. In T. E. Ellis (Ed.), *Cognition and suicide: Theory, research, and therapy* (pp. 355–368). Washington, DC: American Psychological Association.
- Sacks, M. B., Flood, A. M., Dennis, M. F., Hertzberg, M. A., & Beckham, J. C. (2008). Self-mutilative behaviors in male veterans with posttraumatic stress disorder. *Journal of Psychiatric Research, 42*, 487–494. doi:10.1016/j.jpsychires.2007.05.001
- Saunders, J., Aasland, O., Babor, T., de La Fuente, J., Grant, M., & Saunders, J. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption-II. *Addiction (Abingdon, England), 88*(6), 791–804. Retrieved from <http://search.proquest.com/docview/75851680/>
- Skegg, K. (2005). Self-harm. *The Lancet, 366*(9495), 1471–1483. [https://doi.org/10.1016/S0140-6736\(05\)67600-3](https://doi.org/10.1016/S0140-6736(05)67600-3)
- Skinner H. (1982). The Drug Abuse Screening Test. *Addictive Behaviors, 7*:363–371.
- Stander, V., Thomsen, C., & Highfill-Mcroy, R. (2014). Etiology of depression comorbidity in combat-related PTSD: A review of the literature. *Clinical Psychology Review, 34*(2), 87–98. <https://doi.org/10.1016/j.cpr.2013.12.002>
- Stanley, B., Gameroff, M., Michalsen, V., & Mann, J. (2001). Are Suicide Attempters Who Self-Mutilate a Unique Population? *American Journal of Psychiatry, 158*(3), 427–432.
- Tolentino, J. C., & Schmidt, S. L. (2018). DSM-5 Criteria and Depression Severity: Implications for Clinical Practice. *Frontiers in psychiatry, 9*, 450. doi:10.3389/fpsy.2018.00450
- van Der Kolk, B., & Fisler, R. (1995). Dissociation and the fragmentary nature of traumatic

memories: Overview and exploratory study. *Journal of Traumatic Stress*, 8(4), 505–525.

<https://doi.org/10.1002/jts.2490080402>

van der Kolk, B. A. (1996). The complexity of adaptation to trauma: Self-regulation, stimulus discrimination, and characterological development. In B. A. van der Kolk, A. C. McFarlane, & L. Weisaeth (Eds.), *Traumatic stress: The effects of overwhelming experience on mind, body, and society* (pp. 182–213). New York: Guilford Press.

Weathers, F., Blake, D., Schnurr, P., Kaloupek, D., Marx, B., & Keane, T. (2013). *The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5)*. [Assessment] [www.ptsd.va.gov](http://www.ptsd.va.gov)

Wicksell, R., Renöfält, J., Olsson, G., Bond, F., Melin, L., & Wicksell, R. (2008). Avoidance and cognitive fusion--central components in pain related disability? Development and preliminary validation of the Psychological Inflexibility in Pain Scale (PIPS). *European Journal of Pain (London, England)*, 12(4), 491–500. Retrieved from <http://search.proquest.com/docview/70370532/>

## **VITA**

Joanna Fagan is from Clearwater, FL. She studied at the University of Central Florida and earned a Bachelor of Arts in Psychology; she later earned a Master of Science in Psychology from the University of Texas at San Antonio. Her future plans include attending the University of Texas at Tyler to complete a Ph.D. program in Clinical Psychology.