



Published in final edited form as:

*Traumatology (Tallahass Fla)*. 2020 March ; 26(1): 52–60. doi:10.1037/trm0000198.

## Rumination as a Mediator of the Associations Between Moral Injury and Mental Health Problems in Combat-Wounded Veterans

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### Abstract

Moral injury is hypothesized to develop from witnessing or engaging in events that violate one's beliefs about themselves and has been shown to be associated with negative mental health symptoms. Although there has been an increase in research examining moral injury among military veterans, mechanisms that link moral injury to mental health outcomes are not well understood. The present study examined rumination subcomponents (problem-focused thoughts, counterfactual thinking, repetitive thoughts, and anticipatory thoughts) as possible mediators of the associations between moral injury (both self-directed and other-directed symptoms) and negative mental health symptoms (i.e., depression, anxiety, suicidality, sleep disturbance, memory problems, and posttraumatic stress disorder symptoms). Participants were 189 combat wounded veterans (180 men; Mean age = 43.14 years) who had experienced one or more deployments (defined as 90 days or more). Nearly all participants reported a service-connected disability ( $n = 176, 93.1\%$ ), with the average participant reporting a 90% total VA disability ranking, and most participants had received a purple heart ( $n = 163, 86.2\%$ ). Within our comprehensive mediation model, we found eight significant mediation effects with the most consistent mediator being problem-focused thoughts. Specifically, both self-directed and other-directed moral injury were associated with increased problem-focused thoughts, which in turn was associated with higher reported symptoms of depression, anxiety, and posttraumatic stress disorder. Taken together, rumination, and in particular, problem-focused thoughts, is relevant to understand the increased

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vulnerability of military veterans to exhibit poor mental health outcomes when experiencing moral injury.

### Keywords

wounded veterans; rumination; moral injury; mental health

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### Introduction

Many veterans who have deployed in support of recent combat and military operations have developed diagnosable disorders, such as posttraumatic stress disorder (PTSD) and depression (Porter et al., 2018; Ramsey et al., 2017; Wilco et al., 2014). Although these disorders account for many mental health problems experienced by veterans, recently, moral injury, first introduced by Shay (1991) and later expounded upon by Litz and colleagues (2009), has received considerable attention. Moral injury is an inner conflict (or cognitive dissonance) used to describe psychological, ethical, and/or spiritual conflict experienced when an individual's basic sense of humanity is violated (Drescher et al., 2011; Litz et al., 2009). While no consensus exists as to the components of moral injury, guilt, shame, difficulty with forgiveness, isolation, anger, and spiritual or existential crisis are commonly put forth as symptoms of moral injury (Bryan, Bryan, Roberge, Leifker, & Rozek, 2017; Currier, Holland, Drescher, & Foy, 2015; Frankfurt & Frazier, 2016; Jinkerson, 2016; Litz et al., 2009). Moral injury has been associated with negative mental health problems, including depression, anxiety, and PTSD (Braitman et al., 2018; Bryan, Bryan, Morrow, Etienne, & Ray-Sannerud, 2014; Dennis et al., 2017). Although there has been an increase in research examining moral injury among military veterans, mechanisms that link moral injury to mental health outcomes are not well understood. One possible mechanism of this association is rumination which has been shown to be associated with greater mental health problems among military samples (Blackburn & Owens, 2016; Borders, Rothman, & McAndrew, 2015; Bravo, Pearson, & Kelley, 2018). The present study examined rumination as a possible mediator of the association between moral injury (both self-directed and other-directed symptoms) and negative mental health outcomes (i.e., depression, anxiety, suicidality, sleep disturbance, memory problems, and PTSD symptoms) in a sample of combat wounded veterans.

### Mental Health among Combat Wounded Veterans

Combat increases risk for depression, anxiety, and PTSD (Crum-Cianflone, Powell, LeardMann, Russell, & Boyko, 2016; Martindale, Morissette, Rowland, & Dolan, 2017; Mustillo et al., 2015; Wilco et al., 2014). For instance, both self-reported direct and indirect combat exposure were associated with greater odds of new onset of PTSD, new-onset of depression, and new-onset of alcohol-related problems (Porter et al., 2018). Whether suicide is associated with deployment to Iraq and Afghanistan is inconclusive (Kang et al., 2015; LeardMann et al., 2013); however, deployment to warzones is associated with the development of mental health problems, such as mood disorders, anxiety, sleep problems, and adjustment problems which are associated with suicide (e.g., Department of Defense Suicide Event Report, 2018; LeardMann et al., 2013).

Veterans wounded in combat constitute a large but understudied subset of veterans. Among post-9/11 veterans, 37.6% had one or more service-connected disabilities (U.S. Department of Veterans Affairs, 2018). Using data from the Wounded Warrior Project ( $N = 34,822$ ), Fales (2017) found 88.1% of wounded veterans reported more than three service-connected health problems or injuries. The most commonly reported service-connected injuries or problems were PTSD (77.4%), sleep problems (75.0%), back, neck, or shoulder problems (72.6%), and depression (70.1%). Negative mental health outcomes can adversely affect veterans' transition to civilian life (Albright et al., 2018; Freytes, LeLaurin, Zickmund, Resende, & Uphold, 2017), damage personal relationships (Allen, Rhoades, Stanley & Markman, 2010), impact employability (Gerber, Weinstein, Frankenfield, & Huynh, 2016), and hinder educational attainment (see Barry, Whiteman, & Wadsworth, 2014 for a review). From the perspective of the veteran, this trend can potentially serve to reinforce the presence of rumination and serve to enhance negative mental health outcomes.

### **Rumination and Mental Health among Military Members**

Rumination is one variable that may explain why negative and traumatic experiences of military members may exacerbate mental health problems. Response styles theory (Nolen-Hoeksema, Wisco, & Lyubormisky, 2008; Nolen-Hoeksema, 1991) posits that rumination is a method of responding to distress that is defined by the compulsive and repetitive focus on the symptoms of one's distress, potential causes, and consequences of the symptoms. Although rumination may initially represent a strategic response to manage a difficult situation, over time, focusing on the causes and consequences of one's distress but failing to address the problem may serve to prolong and enhance distress (Tanner, Voon, Hasking, & Martin, 2013). For example, among a sample of veterans who served in Iraq and Afghanistan, rumination was associated with greater combat exposure and PTSD severity (Blackburn & Owens, 2016). Veterans may have extremely stressful experiences (e.g., combat exposure) that could influence psychological distress due to ineffective coping methods such as rumination. Further, the unique experiences that veterans face may impact rumination and mental health outcomes.

### **Moral Injury, Moral Pain, Rumination, and Mental Health**

Moral injury is thought to develop from exposure to or participation in morally injurious experiences. In the context of war, events such as the inability to assist wounded women and children, extreme acts of violence, friendly fire, betrayal by leaders and trusted civilians, and mistakes that lead to injury or death, and so forth, constitute morally injurious experiences (Currier et al., 2015). Witnessing or engaging in morally injurious experiences is thought to result in inner conflict. Although many veterans are able to resolve this inner conflict and do not develop moral injury, others are thought to develop distinct symptoms associated with these experiences (Drescher et al., 2011; Litz et al, 2009).

One structure for understanding moral injury is whether the individual perpetrated an act, versus witnessed an act, that may violate their sense of humanity. When veterans perpetrate transgressive acts, this self-directed moral injury may result in feelings of shame, guilt, social isolation, and the perception that one is fundamentally flawed and incapable of being loved. In contrast, in instances of witnessing morally injurious experiences, other-directed

moral injury may result in feelings of mistrust, anger, and hostility toward others or those in authority positions (Currier, Farnsworth, Drescher, & McCormick, 2018; Currier, McDermott, Farnsworth, & Borges, 2019). In the case of wounded veterans, witnessing violations of rules of engagement or errors that lead to one's injuries may result in anger. Although perpetrating morally injurious experiences may result in anger toward one's self, it may also lead to guilt or shame, about one's unwillingness to prevent morally injurious experiences such as harsh treatment of civilians. Thus, self-directed versus other-directed moral injury may be especially relevant for wounded veterans, and at the same time, have different associations with mental health outcomes.

Notably, Farnsworth, Drescher, Evans, and Walser (2017) proposed a separation of moral injury from moral pain by defining moral pain as "the experience of dysphoric moral emotions and cognitions (e.g. self-condemnation) in response to a morally injurious event (p. 392)". In this way, Farnsworth et al. propose that moral pain is the suffering that occurs as a result of a morally injurious experience in which the individual retains social-moral functioning. Moral injury would subsequently develop as a result of the maladaptive behaviors that arise in the unrectified or mismanaged individual-suffering of moral pain. Although an individual may suffer from moral pain, it does not always constitute a moral injury.

To better inform and tailor prevention and treatment efforts among combat wounded veterans, it is important to understand the potential psychosocial mechanisms that explain (i.e., mediate) the associations between moral injury and mental health outcomes. Perhaps the situations that veterans are exposed to enhances rumination because they are trying to make sense of the "unrectified or mismanaged individual-suffering of moral pain" (i.e., moral injury). Consequently, this ruminative process of self-exploration of their actions and experiences increases psychological distress. Although little research has examined rumination in the context of moral injury, rumination has been robustly associated with depression and other mental health problems (Nolen-Hoeksema et al., 2008; McLaughlin, Borkovec & Sibrava, 2007; McLaughlin & Hoeksema, 2011) and has been integrated in conceptual models of PTSD (e.g., Elwood, Hahn, Olatunji, & Williams, 2009).

## Present Study

The purpose of the present study was to extend research on the associations between moral injury (self and other-directed moral injury) and negative mental health symptoms by examining rumination as a mechanism that may explain why some individuals with moral injury experience mental health problems. Research has indicated that rumination may be a multidimensional construct (see Smith & Alloy, 2009 for a review) and thus the present study examined four distinct rumination facets (problem-focused thoughts, counterfactual thinking, repetitive thoughts, and anticipatory thoughts) as potential mediators. Given that rumination may be associated with different mental health outcomes among those with self-directed versus other-directed moral injury, we examined a comprehensive model in which both self-directed and other-directed moral injury predicted rumination facets; which in turn predicted mental health outcomes. Although we did not have any *a priori* hypotheses as to which rumination facet would explain the most variance as a mediator, we did anticipate that

moral injury (both self and other-directed) would be associated with more rumination, which in turn would be associated with worse mental health symptoms.

## Method

### Participants and Procedure

Participants were veterans who were members of the Combat Wounded Coalition (<https://combatwoundedcoalition.org>). In collaboration with the founder of the organization, members were recruited via email about participating in a 30-minute online study (for more details, see Bravo, Witkiewitz, Kelley, & Redman, 2018). Although 212 veterans participated in the study, given the focus on moral injury, we limited the analytic sample for the present study to 189 participants (89.2%) who had experienced one or more deployments (defined as 90 days or more). The majority of participants identified as being White ( $n = 140$ , 74.1%), were men ( $n = 180$ , 96.8%), and reported a mean age of 43.14 ( $Median = 40.00$ ,  $SD = 12.23$ ) years. Nearly all reported a service-connected disability ( $n = 176$ , 93.1%) with participants on average reporting having a 90% total disability VA ranking and many had received a purple heart ( $n = 163$ , 86.2%). The Army ( $n = 86$ , 45.7%) and Marines ( $n = 46$ , 24.5%) were the most represented branches and the majority of participants were deployed as part of Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), or Operation New Dawn (OND) ( $n = 162$ , 85.7%). Participants were offered a \$10 amazon gift card for completing the study. All study documents and procedures were approved by an Institutional Review Board committee at the participating university.

### Measures

**Moral injury.**—Moral injury was assessed using the 17-item Expression of Moral Injury Scale – Military Version (EMIS-M; Currier, Farnsworth, Drescher, McDermott et al., 2018) measured on a 5-point response scale (1 = *strongly disagree*, 5 = *strongly agree*). Items are divided into two sections: 1) self-directed symptoms (9 items; e.g., “I am ashamed of myself because of things that I did/saw during my military services”) and 2) other-directed symptoms (8 items; e.g., “When I look back on my military service, I feel disgusted by things that other people did”). Initial psychometric work among U.S. military veterans (Currier, Farnsworth, Drescher, McDermott et al., 2018) provided evidence of the validity and reliability of EMIS-M subscales for measuring self-directed and other-directed moral injury.

**Rumination facets.**—Rumination facets was assessed using a 15-item version (Tanner et al., 2013) of the Ruminative Thought Style Questionnaire (RTSQ; Brinker & Dozois, 2009) measured on a 7-point response scale (1 = *not at all*, 7 = *very well*). Although originally examined as a single factor, a more recent examination of the factor structure of the measure (Tanner et al., 2013) found four rumination subcomponents with good to excellent reliability: problem-focused thoughts (i.e., consistent thinking of causes, consequences, and symptoms of negative affect), counterfactual thinking (i.e., thinking about alternative outcomes/reality), repetitive thoughts (i.e., persistent reflection on negative affect), and anticipatory thoughts (i.e., future-orientated rumination). Recent psychometric work has

provided further evidence for the validity and reliability of the four rumination subscales (Bravo, Pearson, Pilatti, et al., 2018).

**Mental health problems.**—Past 2-week psychopathology was assessed using the 23-item DSM-5 Self-Rated Level 1 Cross-Cutting Symptoms Measure—Adult (American Psychiatric Association, 2013). Participants are asked, “During the past TWO (2) WEEKS, how much (or how often) have you been bothered by the following problems?” and responded on a 5-point response scale (0 = *none, not at all*, 4 = *severe, nearly every day*). Although the measure assesses 13 domains, for the present study we focused on those that have been shown to be prevalent in prior military research: depression (2 items averaged), anxiety (3 items averaged), suicidal ideation (1 item), sleep disturbance (1 item), and memory problems (1 item). Prevalence rates (i.e., percentages) of participants who met the threshold for psychopathology symptom criteria in our analytic sample are as follows: sleep disturbance (80.2%), memory problems (68.7%), depression (68.0%), anxiety (59.4%), and suicidal ideation (16.5%). The measure has been validated in both clinical (Narrow et al., 2013) and non-clinical (Bravo, Villarosa-Hurlocker, Pearson, & Protective Strategies Study Team, 2018) samples.

**PTSD Symptoms.**—PTSD symptoms were assessed using the 20-item Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5; Blevins, Weathers, Davis, Witte, & Domino, 2015) measured on a 5-point response scale (0 = *not at all*, 4 = *extremely*). Recent psychometric work has provided further evidence for the validity and reliability of this measure among military personnel (Wortmann et al., 2016). Of note, 96 (50.8%) veterans in this sample exceeded the cutoff for probable PTSD (based on a PCL-5 score  $\geq 33$ ; Wortmann et al., 2016).

### Data Analysis Plan

To test the proposed comprehensive mediation model, a single path analysis (fully saturated model) using *MPlus 7.4* (Muthén & Muthén, 1998–2017) was conducted simultaneously examining mediated paths (i.e., unique indirect effects) for each subcomponent of rumination from moral injury (both self-directed and other-directed) to negative mental health symptoms (e.g., self-directed moral injury  $\rightarrow$  problem-focused thoughts  $\rightarrow$  depressive symptoms). Years served in the military and number of deployments (in months) were modeled as predictors of all variables in the model (i.e., covariates). Statistical significance was determined by 95% bias-corrected bootstrapped confidence intervals (based on 10,000 bootstrapped samples) that do not contain zero.

### Results

Bivariate correlations, descriptive statistics, and internal consistency of all study variables are presented in Table 1. It is important to note that both self-directed and other-directed moral injury were significantly ( $p < .05$ ) positively associated with each rumination facet and mental health outcome. Moreover, each rumination facet was positively associated with each mental health outcome (only exception was counterfactual thinking with sleep disturbance). All mental health outcomes were positively associated with each other. The

total, total indirect, specific indirect, and direct effects of the comprehensive mediation model are summarized in Table 2.

Within the model, there were 8 significant specific indirect effects. In predicting 3 mental health outcomes and for both self-directed and other-directed moral injury, indirect effects for problem-focused thoughts accounted for: a) 34.62% and 30.95% of the total effects of self-directed moral injury (indirect  $\beta = .11$ ) and other-directed moral injury (indirect  $\beta = .09$ ) on depressive symptoms, respectively; b) 35.58% and 57.14% of the total effects of self-directed moral injury (indirect  $\beta = .14$ ) and other-directed moral injury (indirect  $\beta = .13$ ) on anxiety symptoms, respectively; and c) 25.90% and 27.85% of the total effects of self-directed moral injury (indirect  $\beta = .09$ ) and other-directed moral injury (indirect  $\beta = .08$ ) on PTSD symptoms, respectively.

There were only two other significant indirect effects: 1) anticipatory thoughts accounted for 17.56% of the total effect of self-directed moral injury on PTSD symptoms (indirect  $\beta = .06$ ) and 2) counterfactual thinking mediated the associations between other-directed moral injury and sleep disturbance (suppression effect given a negative indirect effect but a significant positive direct effect between other-directed moral injury and sleep disturbance; see Table 2). It is important to note that even when accounting for the effects of rumination facets and other-directed moral injury, there were significant positive direct effects between self-directed moral injury on anxiety symptoms ( $\beta = .26$ ), suicidality ( $\beta = .53$ ), and PTSD symptoms ( $\beta = .20$ ). Furthermore, there was a significant positive direct effect between other-directed moral injury and sleep disturbance ( $\beta = .49$ ).

## Discussion

This is the first study to examine four facets of rumination as mechanisms between self-directed and other-directed moral injury and psychological distress in a sample of veterans who had been wounded in combat. Moral injury occurs after witnessing (i.e., other-directed) or engaging (i.e., self-directed) in moral injurious experiences that violate one's beliefs of ethical or moral behaviors (Litz et al., 2009) and requisite development of maladaptive behaviors in response to moral pain (Farnsworth et al, 2017). Prior research has shown that moral injury (e.g., Braitman et al., 2018; Bryan et al., 2017; Dennis et al., 2017) and rumination (Blackburn & Owens, 2016; Borders et al., 2015) are associated with higher severity of PTSD among veterans. However, few studies have examined why some veterans who experience moral injury experience psychological distress and others do not. The present study expanded on findings from previous research by suggesting that rumination, particularly problem-focused thoughts, is a mechanism linking moral injury to distinct mental health problems (i.e., depression, anxiety, and PTSD).

Problem-focused thought rumination is defined as having recurrent thoughts, but not taking action, to find solutions to problems (Tanner et al., 2013) and has been linked to nonproductive coping strategies (e.g., using alcohol to cope with negative affect; Bravo, Pearson, & Henson, 2017; Bravo, Pilatti et al., 2018). Prior research has found that problem-focused thoughts mediate the association between killing during combat and several mental health outcomes (i.e., depressive symptoms, anxiety symptoms, PTSD symptoms) among

recent-era veterans (Kelley, Bravo, Hamrick, Braitman, & Judah, 2018). As proposed by Frankfurt and colleagues (2017), moral injury may develop as a result of unrectified or mismanaged individual suffering of moral pain; thus, problem-focused thoughts may be a critical link between moral injury and mental health outcomes as veterans may dwell on why they have not found an appropriate solution to their moral pain/injury, which in turn may exacerbate mental health symptoms. Moreover, if they do not seek formal or informal treatment (or use a productive coping strategy), it is possible that these moral injury symptoms may progressively get worse which may potentially amplify their mental health problems.

Anticipatory thoughts mediated the relationship between self-directed moral injury and PTSD, but no other outcome variables. PTSD is a fear-based disorder and when considered in light of the current findings, may result from thoughts of future events occurring that were similar to moral injury experiences during combat. It is possible that worry or concerns about future events that may trigger reoccurrences may explain this association. Our findings expand on prior research that has found that anticipatory thoughts mediate the association between killing during combat and PTSD symptoms among recent-era veterans (Kelley et al., 2018).

Rumination facets largely did not mediate the relationship between moral injury and suicidality, memory problems, or sleep disturbances in the current study. Consistent with prior research among active duty Air Force and Army personnel seeking outpatient mental health treatment, self-directed moral injury symptoms were directly related to suicidality (Bryan et al., 2014). In the present study, we found a strong ( $\beta = .53$ ) direct association between moral injury and suicidality, even when accounting for rumination effects. It is possible that rumination could be acting as a protective barrier to some mental health issues (e.g., suicidality). Some prior studies suggest that rumination is an adaptive behavior in veterans, when such rumination focuses on the meaning and nature of negative experiences (Kashdan, Young, & McKnight, 2012). Another study suggests that action rumination (task-focused thinking) can improve later performance (Ciarocco, Vohs, & Baumeister, 2010). It could be that prior exposure to military training practices, such as tactical decision-making games (TDGs; task-based thought exercises within the military used to solve hypothetical, impossible missions, tasks or situations to develop beneficial decision-making skills in future high-stakes environments), provide veterans with beneficial adaptations of action rumination and even some rudimentary skills found in cognitive therapies. This form of rumination may ward off the development of moral injury. Without the adaptive rumination and cognitive tools inherent in these military task-based thought exercises, an individual may develop maladaptive behaviors into moral injury, which may explain the presence of hopelessness and, subsequently, suicidality. Further, other research suggests that deployment to warzones is associated with mental health problems (e.g., PTSD, depression, sleep problems), thus, it may be mental health problems, as well as adjustment problems, that are more closely associated with suicidality (e.g., Department of Defense Suicide Event Report, 2018; LeardMann et al., 2013).

The only facet of rumination that mediated the relationship between moral injury and sleep disturbance was counterfactual thinking. Specifically, wounded veterans who engage in



more counterfactual thinking were less likely to report sleep disturbance. However, counterfactual thinking did not mediate the relationship between any other outcome variables. These findings are consistent with other research that counterfactual thinking is not significantly associated with psychological distress and may act as a protective factor by shifting attention from current problems, which may reduce psychological distress (Tanner et al., 2013). Finally, no rumination facet mediated the associations between moral injury and memory problems. It is possible that other mediators not assessed in the current study might explain the relationship between moral injury and memory problems (e.g., dissociative symptoms; Boyd et al., 2018).

### Clinical Implications

Several treatments have been developed or proposed for moral injury. Perhaps the most widely known therapy option specifically for moral injury is adaptive disclosure (e.g., Litz, Lebowitz, Gray, & Nash, 2016). Adaptive disclosure works to help veterans accept their part in any transgressions without attempting to repress or deny responsibility, while at the same time learning to forgive one's self and recover the possibility of living a moral and honorable life. A modified version of Cognitive Processing Therapy (CPT), called Spiritually Integrated CPT (SICPT), has also been proposed for moral injury (Pearce, Haynes, Rivera, & Koenig, 2018). CPT is traditionally a 12-session psychotherapy that addresses trauma survivors by helping them become unstuck from maladaptive beliefs about self-worth, trust, and their ability to trust themselves and others. CPT is effective in reducing symptoms of PTSD, depression, guilt, and suicidal ideation (Kopacz et al., 2016; Resick et al., 2015; Monson et al., 2006; Gradus, Suvak, Wisco, Marx, & Resick, 2013). SICPT modifies CPT in the following ways: specific focus on moral injury; using spirituality/religiosity of the patient to challenge maladaptive beliefs; employing skills such as compassion, forgiveness, making amends, etc., when challenging maladaptive beliefs is not appropriate; seeking support from a spiritual community; and normalizing of spiritual struggles (Pearce et al., 2018). Although additional research is needed on both Adaptive Disclosure and SICPT to determine their efficacy for moral injury, both appear very promising. Furthermore, one could posit that both treatments likely address rumination by challenging maladaptive beliefs and employing other cognitive strategies (e.g., forgiveness), although research is needed to understand what aspects of rumination (if any) are actually mechanisms of these interventions.

Those with moral injury may also benefit from alternative treatments such as prayer, meditation, and Reiki (Ellison, Bradshaw, & Roberts, 2012). For instance, a promising avenue to further explore regarding rumination is mindfulness. Mindfulness-based interventions teach individuals to bring awareness to the present moment, with a sense of nonjudgment and acceptance of current thoughts, emotions, and sensations (Kabat-Zinn, 1994; Roemer & Orsillo, 2003; Shapiro, Carlson, Astin, & Freedman, 2006). A key component of these interventions include the ability to "decenter" from current experiences, which allows an individual to observe/notice internal experiences, as opposed to simply reacting to them (Shapiro et al., 2006; Teasdale, Segal, & Williams, 1995). When applied to rumination specifically, the ability to observe current experiences is likely to help an individual disengage from ruminative thought processes and potentially reappraise the

current situation (Garland, Gaylord, & Fredrickson, 2011; Garland, Gaylord, & Park, 2009; Garland, Hanley, Farb, & Froeliger, 2015; Segal, Williams, & Teasdale, 2002; Williams, 2008). In fact, high mindfulness is associated with decreased rumination (Williams, 2008) and increased cognitive reappraisal (Garland et al., 2009; Garland et al., 2011; Garland et al., 2015).

However, clinicians should also recognize that veterans may become frustrated with the barriers that they face when seeking treatment for their psychological distress, which, in turn, increases the severity of their negative mental health symptoms. These barriers include overcoming the negative stigma of PTSD to seek treatment (Hoge, Castro, Messer, & Koffman, 2004) and veterans being resistant to cognitive behavior therapies (Zayfert & DeViva, 2004). The individual's perceived lack of accessibility to adequate treatment may have an impact on the development of moral pain into moral injury. Additionally, some treatments found to be effective may not be being offered to some veterans by their providers because of the risk concerns of iatrogenic effects of PTSD treatments (Becker, Zayfert, & Anderson, 2004).

### Limitations

Several limitations should be noted. First, this was a cross-sectional study limiting causal inferences and future longitudinal research is needed to corroborate findings. In addition, it is possible that mental health symptoms prior to military service and other variables not assessed may be associated with moral injury and mental health symptoms outcomes reported here. Second, our sample was comprised of predominantly White male combat wounded veterans, the majority of whom had deployed to recent conflicts and results may not generalize to the larger military veteran population. Although the current study is underpowered to test for race or sex differences, future research should examine if those who identify as a different race or sex may have greater reports of moral injury symptoms, rumination, or mental health problems. Third, the current study relied on self-report measures. Although all measures used for the current study are well validated in the literature, it is unknown if results for mental health would replicate using clinical diagnostic criteria. Fourth, given our sample was comprised of combat wounded veterans, we excluded veterans who had not deployed. However, moral injury may occur in situations that do not involve deployment. Clearly, future research should examine moral injury among those who do not experience deployment. Finally, other measures of moral injury (e.g., Moral Injury Symptom Scale-Military Version; Koenig et al., 2018) and rumination (e.g., Ruminative Responses Scale, Treynor, Gonzalez, & Nolen-Hoeksema, 2003; Perseverative Thinking Questionnaire, Ehring et al., 2011) exist that include other subscales and future research should explore whether other facets of rumination mediate associations between these moral injury subcommands and mental health outcomes. Related to this point, our measure of rumination measured the global disposition to ruminate, versus rumination about specific events. It is possible that rumination about specific moral injury events may be helpful in understanding the development of mental health symptoms following military-related trauma exposure.

## Conclusions

This study adds to the literature about the urgent need to develop effective mental health treatments for combat wounded veterans. Moral injury has gained increased attention and may be a risk factor for other mental health problems. Findings from the present study suggest that rumination (particularly problem-focused thoughts) should be further explored as a possible mechanism that treatment programs and clinicians should target when treating veterans who report symptoms of moral injury. Adaptive Disclosure and SICPT are two proposed interventions in the literature for moral injury, and research is needed to understand whether rumination might be a mechanism central to these treatments. In sum, it could be posited that various interventions could impact ruminating about experiences during combat that are associated with symptoms of moral injury, which could ultimately have a positive impact on mental health among veterans.

## Acknowledgments:

This work was supported by a grant from the American Psychological Association to Michelle L. Kelley from the Society for Military Psychology (Division 19). Adrian J. Bravo is supported by a training grant (T32-AA018108) from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). The authors would like to thank members of the Combat Wounded Coalition for their participation.

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**Table 1**

Bivariate correlations among study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	M	SD
1. Self-Directed MI	<u>.94</u>														21.30	9.37
2. Other-Directed MI	<b>.80</b>	<u>.92</u>													21.49	8.41
3. Problem-focused Thoughts	<b>.53</b>	<b>.51</b>	<u>.92</u>												3.81	1.57
4. Counterfactual Thinking	<b>.36</b>	<b>.39</b>	<b>.56</b>	<u>.78</u>											4.63	1.36
5. Repetitive Thoughts	<b>.49</b>	<b>.55</b>	<b>.68</b>	<b>.60</b>	<u>.94</u>										5.07	1.48
6. Anticipatory Thoughts	<b>.45</b>	<b>.40</b>	<b>.71</b>	<b>.60</b>	<b>.65</b>	<u>.80</u>									4.47	1.56
7. CC: Depression	<b>.55</b>	<b>.54</b>	<b>.60</b>	<b>.43</b>	<b>.49</b>	<b>.49</b>	<u>.88</u>								4.24	2.39
8. CC: Anxiety	<b>.59</b>	<b>.55</b>	<b>.67</b>	<b>.44</b>	<b>.50</b>	<b>.50</b>	<b>.80</b>	<u>.91</u>							5.93	3.78
9. CC: Suicidality	<b>.55</b>	<b>.43</b>	<b>.35</b>	<b>.16</b>	<b>.27</b>	<b>.28</b>	<b>.41</b>	<b>.36</b>	---						0.68	1.04
10. CC: Sleep Disturbance	<b>.39</b>	<b>.49</b>	<b>.35</b>	<b>.14</b>	<b>.39</b>	<b>.29</b>	<b>.52</b>	<b>.53</b>	<b>.21</b>	---					2.70	1.25
11. CC: Memory Problems	<b>.35</b>	<b>.37</b>	<b>.39</b>	<b>.27</b>	<b>.31</b>	<b>.34</b>	<b>.58</b>	<b>.65</b>	<b>.29</b>	<b>.44</b>	---				2.40	1.40
12. PTSD Symptoms	<b>.60</b>	<b>.58</b>	<b>.64</b>	<b>.40</b>	<b>.55</b>	<b>.57</b>	<b>.77</b>	<b>.83</b>	<b>.46</b>	<b>.54</b>	<b>.67</b>	<u>.97</u>			37.13	21.44
13. Years in Military	-.10	-.00	-.13	-.07	-.14	-.19	-.06	-.05	-.04	-.12	-.03	-.10	---		12.79	7.81
14. Number of Deployments Months	.04	.08	.02	-.05	-.01	-.08	.06	.10	.06	.12	.06	<b>.14</b>	<b>.35</b>	---	20.65	16.30

Note. MI = Moral Injury, PTSD = posttraumatic stress disorder, CC = Cross-Cutting DSM-5 level 1 measure. Cronbach's alphas are underlined and shown on the diagonals. We only examined the reliability of test scores from the Cross-Cutting DSM-5 level 1 measure domains that had multiple items. Significant associations are in bold typeface for emphasis and were determined by a 95% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero.



Summary of total, indirect, and direct effects of moral injury and rumination facets on mental health problems in a comprehensive mediation model

Table 2

Outcome Variables:	CC: Depression		CC: Anxiety		CC: Suicidality		CC: Sleep Disturbance		CC: Memory Problems		PTSD Symptoms	
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI
<b>Predictor Variable: Self-Directed MI</b>												
Total	.31	<b>0.08, 0.51</b>	.40	<b>0.21, 0.61</b>	.57	<b>0.32, 0.79</b>	-.07	-0.30, 0.15	.13	-0.11, 0.37	.35	<b>0.16, 0.54</b>
Total indirect <sup>a</sup>	.13	<b>0.03, 0.25</b>	.15	<b>0.03, 0.27</b>	.04	-0.05, 0.13	.05	-0.03, 0.17	.10	<b>0.02, 0.21</b>	.15	<b>0.05, 0.29</b>
Specific indirect:												
Problem-focused Thoughts	.11	<b>0.03, 0.24</b>	.14	<b>0.05, 0.27</b>	.03	-0.04, 0.15	.02	-0.06, 0.12	.06	-0.01, 0.19	.09	<b>0.02, 0.21</b>
Counterfactual Thinking	.01	-0.01, 0.07	.01	-0.01, 0.08	-.01	-0.09, 0.01	-.03	-0.11, 0.02	.00	-0.03, 0.07	-.01	-0.06, 0.01
Repetitive Thoughts	.00	-0.03, 0.05	-.00	-0.05, 0.02	-.00	-0.05, 0.02	.02	-0.01, 0.11	-.01	-0.07, 0.02	.01	-0.01, 0.06
Anticipatory Thoughts	.02	-0.04, 0.12	-.00	-0.07, 0.07	.02	-0.06, 0.12	.03	-0.04, 0.13	.04	-0.04, 0.16	.06	<b>0.01, 0.18</b>
Direct	.17	-0.05, 0.40	.26	<b>0.08, 0.45</b>	.53	<b>0.26, 0.78</b>	-.12	-0.35, 0.11	.04	-0.21, 0.29	.20	<b>0.03, 0.38</b>
<b>Predictor Variable: Other-Directed MI</b>												
Total	.30	<b>0.09, 0.50</b>	.22	<b>0.01, 0.42</b>	-.03	-0.26, 0.21	.54	<b>0.32, 0.75</b>	.26	<b>0.01, 0.49</b>	.29	<b>0.06, 0.49</b>
Total indirect <sup>a</sup>	.12	-0.01, 0.29	.13	<b>0.00, 0.29</b>	-.00	-0.10, 0.10	.05	-0.06, 0.18	.06	-0.06, 0.20	.12	-0.01, 0.28
Specific indirect:												
Problem-focused Thoughts	.09	<b>0.02, 0.22</b>	.13	<b>0.01, 0.27</b>	.03	-0.03, 0.14	.02	-0.04, 0.14	.05	-0.00, 0.18	.08	<b>0.01, 0.19</b>
Counterfactual Thinking	.02	-0.02, 0.09	.02	-0.03, 0.10	-.03	-0.12, 0.02	-.07	<b>-0.17, -0.01</b>	.01	-0.07, 0.09	-.01	-0.08, 0.03
Repetitive Thoughts	.01	-0.09, 0.12	-.01	-0.13, 0.07	-.01	-0.11, 0.07	.08	-0.01, 0.23	-.02	-0.15, 0.08	.03	-0.06, 0.12
Anticipatory Thoughts	.01	-0.02, 0.08	-.00	-0.05, 0.03	.01	-0.02, 0.09	.01	-0.01, 0.11	.02	-0.02, 0.11	.03	-0.01, 0.10
Direct	.17	-0.08, 0.40	.09	-0.11, 0.29	-.03	-0.28, 0.23	.49	<b>0.26, 0.72</b>	.20	-0.07, 0.46	.17	-0.02, 0.34
<b>Direct Effects: Rumination Facets</b>												
Problem-focused Thoughts	.35	<b>0.15, 0.55</b>	.47	<b>0.31, 0.63</b>	.11	-0.15, 0.36	.07	-0.20, 0.34	.20	-0.07, 0.45	.30	<b>0.12, 0.48</b>
Counterfactual Thinking	.07	-0.10, 0.23	.07	-0.10, 0.25	-.09	-0.28, 0.10	-.22	<b>-0.40, -0.05</b>	.02	-0.22, 0.25	-.04	-0.20, 0.11
Repetitive Thoughts	.01	-0.21, 0.23	-.03	-0.22, 0.15	-.03	-0.21, 0.16	.18	-0.05, 0.40	-.04	-0.27, 0.18	.06	-0.14, 0.23
Anticipatory Thoughts	.05	-0.14, 0.27	-.01	-0.18, 0.18	.05	-0.19, 0.30	.10	-0.14, 0.34	.11	-0.15, 0.37	.19	<b>0.02, 0.39</b>

Note. MI = Moral Injury, PTSD = posttraumatic stress disorder, CC = Cross-Cutting DSM-5 level 1 measure. Significant associations are in bold typeface for emphasis and were determined by a 95% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero.

<sup>a</sup>Reflects the combined indirect associations within the model. Effects of covariates (i.e., number of years in the military and number of months deployed) are not reported for parsimony but are available upon request. Self-Directed MI was significantly positively associated with problem-focused thoughts ( $\beta = .31$ ) and anticipatory thoughts ( $\beta = .33$ ); but not significantly associated with counterfactual

thinking ( $\beta = .12$ ) and repetitive thoughts ( $\beta = .11$ ). Other-Directed MI was significantly positively associated with problem-focused thoughts ( $\beta = .27$ ), counterfactual thinking, ( $\beta = .30$ ), and repetitive thoughts ( $\beta = .45$ ); but not significantly associated with anticipatory thoughts ( $\beta = .14$ ).

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