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Cover Page Footnote

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Structural Examination of Moral Injury and PTSD and Their Associations With Suicidal Behavior Among Combat Veterans

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Abstract

Moral injury and post-traumatic stress disorder are argued to be distinct yet related constructs. However, few studies have evaluated the factors distinguishing moral injury from PTSD. The present study sought to extend the work of Bryan et al. (2018) by differentiating the symptomology of moral injury and PTSD and their associations with suicidal behaviors among combat veterans. The study evaluated data from 129 combat veterans exposed to potentially morally injurious events. Exploratory structural equation modeling evaluated a measurement and structural model. Results revealed a four-factor solution, with the relevant factors being PTSD symptoms, guilt/shame, psychiatric comorbidities, and meaning in life. Guilt/shame and psychiatric comorbidities had significant positive effects on suicidal behaviors. The present findings suggest that combat veterans have a complex, dimensional response to combat trauma and pMIE exposure. These results diverged from previous research to suggest that moral injury symptoms may not constitute a single factor but rather a multifaceted constellation of symptoms. The present study also provided evidence that moral injury symptoms are both unique and overlapping with PTSD symptoms. Suicidal behaviors are a major area of concern among veterans, and the findings here implicate guilt/shame and psychiatric comorbidities as related to these suicidal behaviors.

Over the past decade, greater attention has been given to the psychological consequences of wartime transgressions that may violate servicemembers' moral beliefs and result in moral injury. Moral injury is believed to be the result of potentially morally injurious events (pMIEs), such as excessive violence, leadership failure, failure to save a life or prevent injury, or the act of injuring or killing a noncombatant (Frankfurt & Frazier, 2016). Although some combat veterans are able to resolve the dissonance or internal conflict of perpetrating or witnessing an act that transgresses one's moral code, for others, these actions result in strong emotional reactions, such as guilt, shame, loss of meaning, difficulties with forgiveness, and spiritual/existential crisis. Collectively, these reactions and emotions have been termed *moral injury* (Jinkerson, 2016; Litz et al., 2009; Shay, 2002, 2014). Core symptoms of moral injury (e.g., guilt, shame) are believed to drive secondary outcomes (Jinkerson, 2016; Litz et al., 2009), such as depression, anxiety, suicidal thoughts and behavior, and hazardous substance use (Battles et al., 2018; Battles et al., 2019; Bryan et al., 2014; Bryan et al., 2018; Jinkerson, 2016; Jinkerson & Battles, 2019; Kelley et al., 2019).

Although moral injury has received considerable attention, a theoretically fundamental issue is how moral injury differs from post-traumatic stress disorder (PTSD). In a pioneering study, Bryan et al. (2018) examined the similarities and differences between the symptoms of PTSD and those of moral injury and explored how PTSD and moral injury were associated with suicidal thoughts and behaviors. They found that among Army National Guard members, moral injury was uniquely characterized by anhedonia, anger, shame, guilt, and hostility toward oneself, whereas PTSD was uniquely characterized by flashbacks, memory loss, nightmares, insomnia, and startle reflex. Although the Bryan et al. (2018) study was groundbreaking, only 58.2% of the study's sample had ever deployed. Combat veterans are arguably more likely than other military members to have been exposed to pMIEs due to the increased opportunities they have had for high-stakes moral decision-making (Shay, 2014). Subsequently, they may be more likely to develop PTSD (Xue et al., 2015) or moral injury (Shay, 1991, 2002). Moreover, combat is associated with PTSD (Maguen & Litz, 2012; Stein et al., 2012) and moral injury symptoms (Drescher et

al., 2011; Nash & Litz, 2013). For this reason, we examined moral injury and PTSD symptoms in a sample consisting solely of combat veterans.

In general, investigators have found that both moral injury and PTSD are associated with suicidal behaviors. For instance, Bryan et al. (2018) found that the interaction of moral injury and PTSD predicted both suicidal ideation and attempts. Combat veterans, in particular, have been found to be at a higher risk for suicidality compared to noncombat veterans (Fanning & Pietrzak, 2013). This appears to be statistically explained, in part, by combat experiences, as those exposed to killing and atrocities of war have a 43% greater risk of suicide-related outcomes than deployed servicemembers without combat experiences (Bryan et al., 2015). Additionally, combat experiences, particularly killing and exposure to disproportionate violence (e.g., pMIEs), tend to have a stronger association with suicide than does deployment in and of itself (Bryan et al., 2014).

Purpose of the Present Study

Similar to Bryan et al. (2018), in the present study we conducted factor analyses of moral injury and PTSD symptoms. We extended the work of Bryan et al. (2018), however, by examining additional factors that have previously been construed as moral injury symptoms, such as impaired trust and loss of meaning in life (Currier, Holland, & Malott, 2015; Harris et al., 2015; Jinkerson, 2016). It was

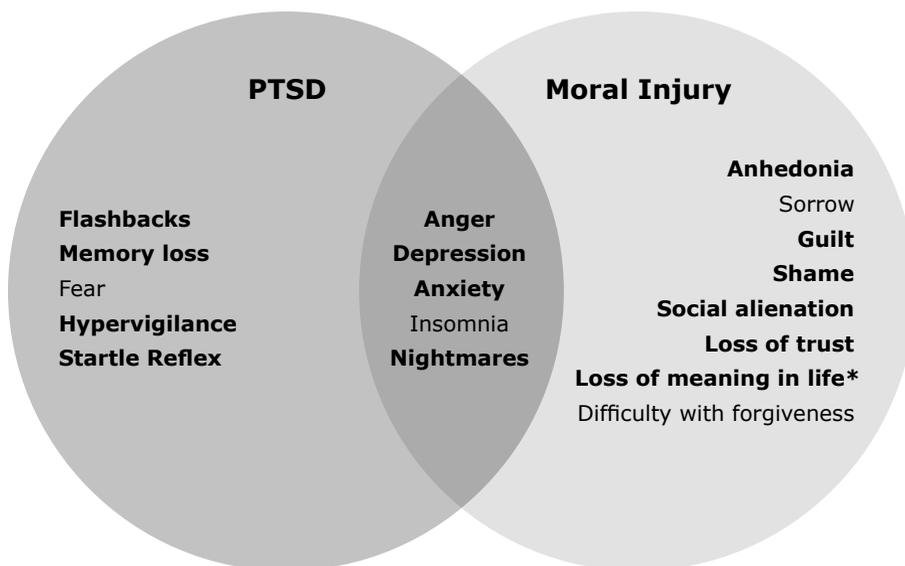
hypothesized that a measurement model of these constructs would provide additional support for as well as extend the model delineating the unique and shared symptoms of moral injury and PTSD as proposed by Bryan et al. (2018; see Figure 1). We anticipated that a PTSD factor would emerge separately from a moral injury factor but did not hold other specific hypotheses. Next, we examined whether moral injury symptoms and PTSD symptoms were associated with suicidal behaviors in combat veterans. Similar to the findings by Bryan et al. (2018), we hypothesized an interaction effect between moral injury symptoms and PTSD symptoms on suicidal behaviors.

Method

Participants

The final sample consisted of data collected from 129 combat veterans (99 men). Criteria for participation were (a) a history of at least one deployment lasting for 90 days or more and (b) being a “combat veteran,” defined as anyone who “attacked enemy combatants, was attacked, or who served in a military-designated dangerous region during wartime.” Most participants were male (77.3%), White (70.5%), and/or married (50.8%), with an average age of 36.72 years (*SD* = 10.52 years). Of the participants, 95 (73.6%) were former military members, 17 (13.2%) were presently serving on active duty, and 17 (13.2%) were currently National Guard/reserves members.

Figure 1. Expanded Model of the Theorized Overlap of PTSD and Moral Injury Components



Note. Constructs in bold were measured in the present study. Original model created by Bryan et al. (2018). *New proposed symptom evaluated in current study.

Branches of service (which were not mutually exclusive) represented in the current study included the U.S. Army ($n = 77$, 59.6%), U.S. Marine Corps ($n = 20$, 15.5%), U.S. Navy ($n = 16$, 12.4%), and U.S. Air Force ($n = 16$, 2.4%). Participants were involved in the following conflicts: Operation Enduring Freedom ($n = 54$, 41.9%), Operation Iraqi Freedom ($n = 81$, 62.8%), Persian Gulf War ($n = 14$, 10.9%), and Vietnam War ($n = 10$, 7.8%). Most participants were enlisted (110, 85.3%). On average, they had deployed 2.92 times ($SD = 0.83$) and had served in the military for 9.14 years ($SD = 6.58$). All participants reported exposure to at least one pMIE during deployment, per the Moral Injury Questionnaire–Military Version (MIQ-M).

Procedure

Participants were recruited through Amazon's Mechanical Turk (MTurk) service. Those who provided informed consent were presented with demographic questions followed by survey questionnaires, which were administered in a counterbalanced format. Two validity check items were administered: "What is the acronym for the location where physicals are taken prior to shipping off for basic training?" and "What is the acronym for the generic term the military uses for various job fields?" (Lynn & Morgan, 2016). Of the 496 individuals who responded affirmatively to having served in the U.S. military, only 132 answered the two validity checks accurately; of those 132 individuals, only 129 endorsed exposure to at least one pMIE. Data from these 129 participants was used in all analyses. Participants were compensated \$2 through MTurk. Following survey completion, participants were provided with service branch-specific and veteran-specific national mental health resources. The study received institutional review board approval.

Measures

Mirroring the approach of Bryan et al. (2018) and to reduce the burden on respondents, select items were used to represent corresponding constructs. For example, the PTSD symptom flashbacks was represented with the PTSD Checklist-5 item "Suddenly feeling or acting as if the stressful experience were actually happening again." Items or sample items for each construct are shown in Table 1. See Table 2 for descriptive statistics and reliability indices for all measures. For all constructs, item scores were summed to create a total score; higher scores reflected higher levels of a construct.

Exposure to pMIEs

The Moral Injury Questionnaire–Military Version (MIQ-M; Currier, Holland, Drescher, et al., 2015) is a 20-item self-report measure that assesses the degree of exposure to pMIEs (e.g., "I did things in the war that betrayed my personal values."). Participants rated each item on a 4-point Likert scale ranging from 1 (*never*) to 4 (*often*). Item scores were summed, with higher scores reflecting higher levels of pMIE exposure.

PTSD Symptoms

The PTSD Checklist for DSM-5 (PCL-5; Blevins et al., 2015) is a 20-item self-report measure that evaluates PTSD symptoms per DSM-5 criteria (American Psychiatric Association [APA], 2013). In the present study, two items were used to measure hypervigilance, one item was used to measure memory loss, two items were used to measure intrusive memories, and one item was used to measure nightmares. Items were rated on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). Item scores were summed; higher scores reflected higher levels of PTSD symptoms.

Trauma-Related Guilt

The Trauma-Related Guilt Inventory (TRGI; Kubany et al., 1996) is a 32-item self-report measure that assesses guilt after a traumatic event. Items were rated on a 5-point Likert scale ranging from 0 (*not at all true*) to 5 (*extremely true*). Two items were analyzed as representative of trauma-related guilt. Item scores were summed; higher scores reflected higher levels of trauma-related guilt.

Trauma-Related Shame

The Trauma-Related Shame Inventory (TRSI; Øktedalen et al., 2014) is a 24-item self-report measure of feelings of shame following a traumatic event. Participants rated their responses on a 4-point Likert scale ranging from 1 (*not true of me*) to 4 (*completely true of me*). Two items were used to represent trauma-related shame. Summed responses yielded continuous scores, with higher scores reflecting higher levels of trauma-related shame.

Trust

The World Assessment Questionnaire (WAQ; Kaler, 2009) is a 25-item self-report inventory that assesses an individual's fundamental assumptions about the world. Given the study's focus on trust in others, only the Trustworthiness and Goodness of People subscale was administered. Items were rated on a 6-point Likert scale ranging from 1 (*strongly*

Table 1. Indicator Variables Selected to Measure Each Symptom of PTSD and/or Moral Injury

Proposed Construct	Symptom	Indicators	Sample Item
MI	Guilt	TRGI items 18, 25	Overall, how guilty do you feel about the event(s)?
MI	Shame	TRSI items 3, 8	I am ashamed of myself because of what happened to me.
MI	Loss of trust	WAQ-T items 2, 4	Most people can be trusted.
MI	Loss of meaning in life	MLQ-P items 2, 3	My life has a clear sense of purpose.
MI	Social alienation	SFQ item 7	I feel lonely and isolated from other people.
MI	Anhedonia	PHQ-2 item 1	Little interest or pleasure in doing things
MI & PTSD	Depression	PHQ-2 item 2	Feeling down, depressed, or hopeless
MI & PTSD	Anger	DAR item 1	I often find myself getting angry at people or situations.
MI & PTSD	Anxiety	GAD-2	Feeling nervous, anxious, or on edge
MI & PTSD	Nightmares	PCL-5 item 2	Repeated, disturbing dreams of the stressful experience
PTSD	Flashbacks	PCL-5 items 3	Suddenly feeling or acting as if the stressful experience were actually happening again
PTSD	Memory loss	PCL-5 item 8	Trouble remembering important parts of the stressful experience
PTSD	Hypervigilance	PCL-5 item 17	Being "superalert" or watchful or on guard
PTSD	Startle reflex	PCL-5 item 18	Feeling jumpy or easily startled

Note. MI = moral injury; PTSD = post-traumatic stress disorder; TRGI = Trauma-Related Guilt Inventory; TRSI = Trauma-Related Shame Inventory; WAQ-T = World Assumption Questionnaire–Trustworthiness and Goodness of People subscale; MLQ-P = Meaning in Life Questionnaire–Presence subscale; SFQ = Social Functioning Questionnaire; PHQ-2 = Patient Health Questionnaire–2; DAR = Dimensions of Anger Reactions; GAD-2 = Generalized Anxiety Disorder–2; PCL-5 = PTSD Checklist for DSM-5.

agree) to 6 (*strongly disagree*). Two items were used to represent levels of trust in others. Responses were summed to yield continuous scores, with higher scores reflecting greater levels of trust.

Meaning in Life

The Meaning in Life Questionnaire (MLQ; Steger et al., 2006) is a 10-item self-report instrument with subscales measuring the presence of and search for meaning in life. Given

our focus on subjective meaning in life, only items from the Presence subscale were administered. Items were rated on a 7-point Likert scale ranging from 1 (*absolutely untrue*) to 7 (*absolutely true*). Two items were analyzed as representative of subjective meaning in life. Responses were summed to yield continuous total scores, with higher scores reflecting higher levels of subjective meaning in life.

Table 2. Descriptive Statistics for Study Measures

Measure	M (SD)	Range*	Reliability
MIQ-M	39.20 (9.74)	41 [21, 62]	.89
PCL-5	47.52 (18.14)	69 [20, 89]	.96
TRGI	78.02 (23.21)	98 [38, 136]	.94
TRSI	42.22 (18.18)	65 [24, 89]	.98
WAQ-T	15.10 (3.89)	20 [6, 26]	.77
MLQ-P	23.11 (7.48)	28 [7, 35]	.92
PHQ-2	5.22 (2.01)	9 [3, 12]	.83
GAD-2	4.07 (1.71)	6 [2, 8]	.84
DAR	11.30 (4.31)	17 [5, 22]	.85
SFQ	13.54 (2.53)	13 [6, 19]	.78
SBQ-R	5.24 (2.78)	12 [3, 15]	.82

Note. N = 129; MIQ-M = Moral Injury Questionnaire–Military version (modified); PCL-5 = PTSD Checklist for DSM-5; TRGI = Trauma-Related Guilt Inventory; TRSI = Trauma-Related Shame Inventory; WAQ-T = World Assumption Questionnaire–Trustworthiness and Goodness of People subscale; MLQ-P = Meaning in Life Questionnaire–Presence subscale; PHQ-2 = Patient Health Questionnaire–2; GAD-2 = Generalized Anxiety Disorder–2; DAR = Dimensions of Anger Reactions; SFQ = Social Functioning Questionnaire; SBQ-R = Suicide Behaviors Questionnaire–Revised.

*Range represents the range of scores for study participants and includes the [*Min, Max*];

Depression

The Patient Health Questionnaire–2 (PHQ-2; Kroenke et al., 2003) is a two-item screening measure of anhedonia and depressed mood (“Little interest or pleasure in doing things” and “Feeling down, depressed, or hopeless”). Responses were recorded on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*). Responses were summed to yield continuous total scores, with higher scores reflecting higher levels of anhedonia and depressed mood.

Anxiety

The Generalized Anxiety Disorder–2 (GAD-2; Kroenke et al., 2007) is a two-item screener for generalized anxiety symptoms. Items were rated on a 4-point Likert scale ranging from 0 (*not at all sure*) to 3 (*nearly every day*). Responses were summed to yield continuous total scores, with higher scores reflecting higher levels of anxiety symptoms.

Anger

The Dimensions of Anger Reactions (DAR; Forbes et al., 2004) is a seven-item self-report measure of anger directed toward others. Participants rated their degree of anger on a 9-point Likert scale ranging from 0 (*not at all*) to 8 (*exactly so*). One item was analyzed as representative of anger.

Social Functioning

The Social Functioning Questionnaire (SFQ; Tyrer et al., 2005) is an eight-item self-report measure of perceived social functioning. Items were rated on a 4-point Likert scale ranging from 0 to 3, with response options corresponding to the nature of each question.

Suicidal Behaviors

The Suicidal Behaviors Questionnaire–Revised (SBQ-R; Osman et al., 2001) is a four-item self-report questionnaire that assesses history of suicidal ideation and attempts, frequency of

ideation, suicidal verbal expressions, and likelihood of future suicide. At the request of the institutional review board, the item regarding likelihood of future suicide was excluded. Response options vary by question. Responses were summed to yield continuous total scores, with higher scores reflecting more suicidal behaviors.

Data Analyses

After removing data from participants who did not accurately respond to validity checks, no missing data were found. Analyses were conducted using Mplus 8.3 (Muthén & Muthén, 2017). Prior to testing the proposed hypotheses, common method variance was examined by conducting a factor analyses of all items to determine the presence of a single latent variable (Kline et al., 2000; Lindell & Whitney, 2001). No single latent variable was found, suggesting the presence of multiple variables. Individual items rather than full-scale sum scores were used in identifying latent variables, as is the preferred methodology for assessing latent factors.

To test the hypothesized model of overlapping constructs, a measurement model was examined using exploratory structural equation modeling (ESEM). ESEM allows for less restrictive measurement models by permitting correlated residuals among observed variables and potential cross-loading of observed variables onto multiple variables (Asparouhov & Muthén, 2009; Marsh et al., 2014). Select items were used from each measure as representative of their corresponding construct, mirroring the approach of Bryan et al. (2018), to ensure that each construct had a similar number of items and to reduce subject burden (see Table 2). Model fit criteria suggested by Hu and Bentler (1999) were used to evaluate overall model fit. All parameters were specified using robust maximum likelihood estimation. Indicator variables utilized different scoring systems, therefore standardized values are reported.

A structural model was then specified to determine how the latent variables of moral injury symptoms, PTSD symptoms, and their interactions were associated with suicidal behaviors. Given that the structural model involved the interaction of multiple continuous latent variables, Monte Carlo numerical integration with 500 randomly generated integration points was required to conduct maximum likelihood estimation procedures (Muthén & Muthén, 2017). Gender (dummy coded 1 = men, 0 = women) and branch of service (dummy coded 1 = Army, 0 = all other

branches of service) were significantly correlated with suicidal behaviors and were controlled for as covariates across structural model analyses.

Results

Exploratory Structural Equation Modeling (ESEM)

Over half (57.4%) of participants endorsed suicidal behaviors. Correlations among study-developed item constructs are presented in Table 3. Results of the ESEM model found that a four-factor model produced the best fit: $\chi^2(101) = 165.25, p = .001$, comparative fit index (CFI) = 0.947, Tucker–Lewis index (TLI) = 0.901, root-mean-square error of approximation (RMSEA) = 0.068 (90% confidence interval [CI; 0.050, 0.087]), standardized root-mean-square residual (SRMR) = 0.042. Utilizing Hu and Bentler's (1999) recommendations for evaluating overall model fit (i.e., CFI > .95, TLI > .95, RMSEA < .06, and SRMR < .08), the four-factor model was determined to have acceptable fit (Byrne, 2012). When considering only statistically significant factor loadings exceeding a minimum value of .30, the first factor was uniquely characterized by flashbacks, memory loss, startle reflex, and nightmares, which largely correspond with the proposed composition of PTSD (see Table 4). The second factor was composed of guilt/shame, which corresponded with proposed core symptoms of moral injury. The third factor was characterized by anhedonia, depression, anxiety, anger, loss of trust, and social alienation, which appeared to correspond with psychiatric comorbidities often associated with trauma exposure. The fourth factor was solely characterized by loss of meaning in life. Given that the hypervigilance item significantly cross-loaded with the PTSD and psychiatric comorbidities factors, this item was dropped from the structural model analyses.

Results of Structural Model

As shown in Figure 2, results of the ESEM structural model demonstrated that the factors guilt/shame ($\beta = 0.34, SE = 0.15, 95\% CI [0.02, 0.64]$) and psychiatric comorbidities ($\beta = 0.77, SE = 0.17, 95\% CI [0.44, 1.07]$) had a significant positive effect on suicidal behaviors such that Guilt/Shame and Psychiatric Comorbidities were associated with increased risk of suicidal behaviors (see Figure 2). Neither the PTSD factor nor Meaning in Life were associated with suicidal behaviors. No significant interaction effects were found.

Table 3. Correlations Between Study-Developed Item Constructs and Covariates

Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Guilt	—															
2. Shame	.68**	—														
3. Trust	-.10	-.06	—													
4. MiL	.05	.10	.01	—												
5. Alienation	-.37**	-.36**	.25**	-.11	—											
6. Anhedonia	.38**	.39**	-.28**	-.09	-.54**	—										
7. Depression	.44**	.51**	-.22**	.04	-.53**	.71**	—									
8. Anger	.37**	.33**	-.30**	-.10	-.35**	.53**	.43**	—								
9. Anxiety	.50**	.55**	-.22**	.03	-.62**	.74**	.74**	.56**	—							
10. Nightmare	.50**	.50**	-.17	-.08	-.45**	.50**	.54**	.34**	.53**	—						
11. Hyperarousal	.46**	.51**	-.21*	.04	-.43**	.56**	.47**	.51**	.60**	.59**	—					
12. Memory loss	.37**	.33**	-.08	-.03	-.35**	.38**	.31**	.33**	.41**	.42**	.47**	—				
13. Flashback	.62**	.53**	-.15	.01	-.44**	.62**	.56**	.52**	.60**	.77**	.73**	.48**	—			
14. Suicide	.48**	.50**	-.12	.04	-.49**	.59**	.66**	.33**	.55**	.39**	.35**	.33**	.49**	—		
15. Gender	-.21*	-.27**	-.04	-.04	.15	-.19*	-.18*	-.17	-.26**	-.08	-.17	-.13	-.13	-.22*	—	
16. BoS	.14	.13	-.04	-.01	-.03	.12	.24**	.15	.10	.16	.12	.16	.18*	.16	.03	—

Note. N = 129; Guilt = Trauma-Related Guilt Inventory items 13 and 25; Shame = Trauma-Related Shame Inventory items 3 and 8; Trust = World Assumption Questionnaire-Trustworthiness and Goodness of People subscale items 2 and 4; MiL = Meaning in Life Questionnaire-Presence subscale items 4 and 5; Alienation = Social Functioning Questionnaire item 7; Anhedonia = Patient Health Questionnaire-2 item 1; Depression = Patient Health Questionnaire-2 item 2; Anger = Dimensions of Anger Reactions item 1; Anxiety = Generalized Anxiety Disorder screener-2; Nightmares = PTSD Checklist for DSM-5 item 2; Hyperarousal = PTSD Checklist for DSM-5 items 17 and 18; Memory loss = PTSD Checklist for DSM-5 item 8; Flashback = PTSD Checklist for DSM-5 items 1 and 3; Suicide = Suicide Behaviors Questionnaire-Revised Gender was dummy coded (men = 1; women = 0); BoS = Branch of Service was dummy coded (Army = 1; Other branches = 0). Pearson product-moment correlations were conducted for associations between two continuous variables and point-biserial correlations were conducted for associations consisting of one continuous variable and one dichotomous variable.
* $p < .05$ ** $p < .01$.

Table 4. Factor Loadings of the Four-Factor Measurement Model of Moral Injury and PTSD

Item	1	2	3	4
PCL-5 item 2	.60	.12	.14	-.02
PCL-5 item 3	.95	-.13	-.03	-.09
PCL-5 item 8	.36	.03	.18	-.08
PCL-5 item 17	.42	.02	.36	.16
PCL-5 item 18	.64	.16	.22	.11
TRGI item 18	.11	.36	-.06	-.09
TRGI item 25	.02	.75	-.04	.08
TRSI item 3	.08	.72	.07	-.05
TRSI item 8	-.03	.75	.06	-.10
PHQ-2 item 1	.14	-.15	.78	-.15
PHQ-2 item 2	.01	.13	.67	-.14
GAD-2 item 1	-.02	.07	.77	-.17
GAD-2 item 2	.05	.20	.64	-.04
DAR item 1	.15	.04	.57	.14
WAQ-T item 2	.21	.01	-.59	-.11
WAQ-T item 4	.15	.14	-.51	-.18
SFQ item 7	.07	.01	.51	-.26
MLQ-P item 2	.03	-.04	-.16	.78
MLQ-P item 3	-.06	-.02	-.02	.93

Note. Significant factor loadings are bolded and are based on a minimum eigenvalue of .30; PCL-5 = PTSD Checklist for *DSM-5*; TRGI = Trauma-Related Guilt Inventory; TRSI = Trauma-Related Shame Inventory; PHQ-2 = Patient Health Questionnaire-2; GAD-2 = Generalized Anxiety Disorder-2; DAR = Dimensions of Anger Reactions; WAQ-T = World Assumption Questionnaire-Trustworthiness and Goodness of People subscale; SFQ = Social Functioning Questionnaire; MLQ-P = Meaning in Life Questionnaire-Presence subscale.

Discussion

To extend the work of Bryan et al. (2018), we examined their model of the similarities and differences between moral injury and PTSD among combat veterans, included additional constructs key to moral injury and PTSD, and conducted factor analyses to test their model (see Figure 1). We then examined how these factors were associated with suicidal behaviors in combat veterans.

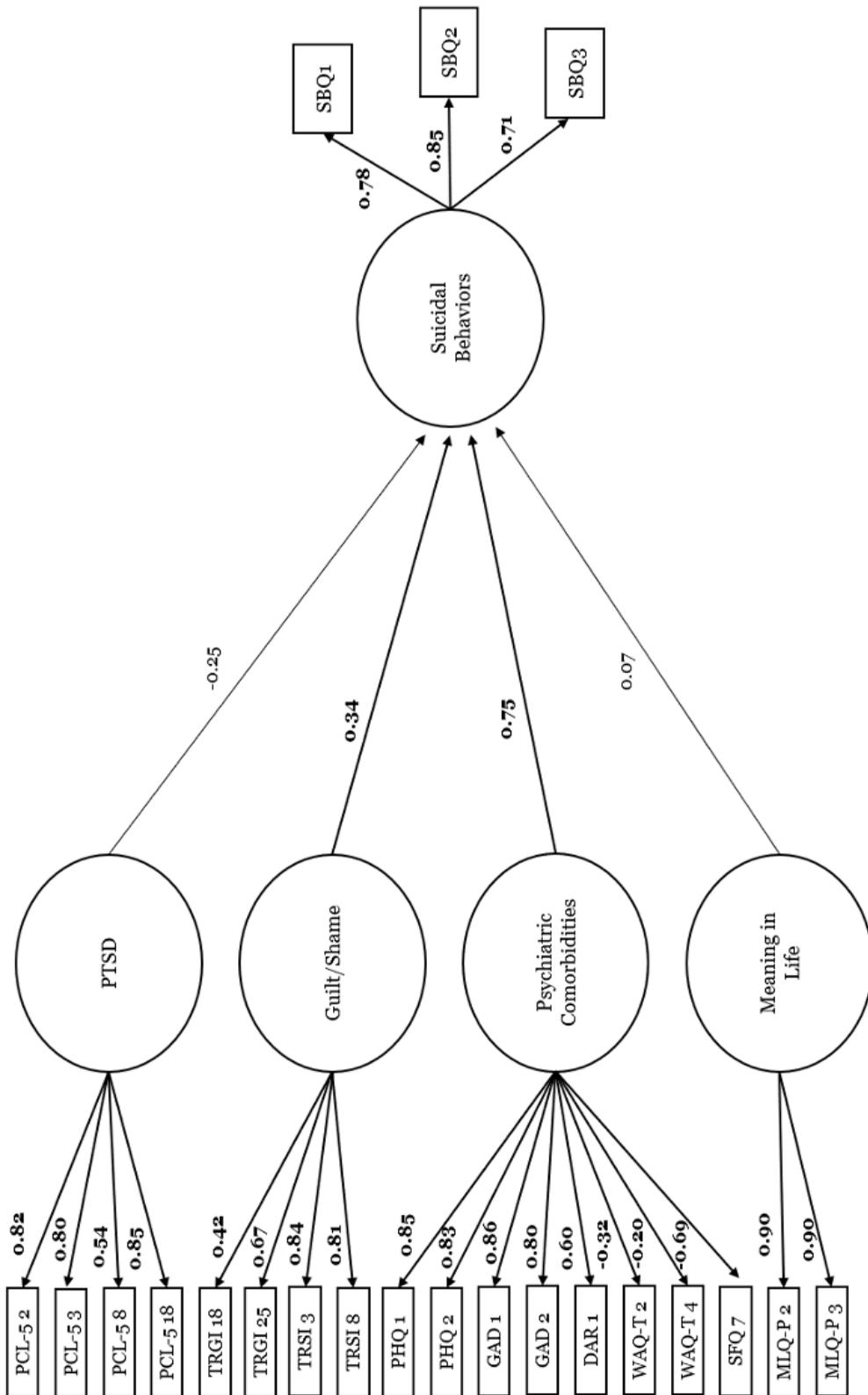
Delineation of Expressed Factors

The first factor was uniquely characterized by flashbacks, memory loss, startle reflex, and nightmares and was nearly identical to a factor identified by Bryan et al. (2018). This factor corresponds closely to the PTSD criteria described

in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (APA, 2000). In the shift from the *DSM-IV-TR* to the *DSM-5* (APA, 2013) diagnostic system, negative changes in mood and thoughts were incorporated into the PTSD framework (p. 271). This alteration in diagnostic criteria from *DSM-IV-TR* to *DSM-5* could be indicative of various PTSD diagnostic subtypes, an issue that Bryan et al. (2018) considered along with Griffin et al. (2019). It may also be viewed as an inclusion of proposed “moral injury” symptoms into the broader PTSD framework.

As to moral injury, our outcomes diverge from Bryan et al. (2018), as their “Moral Injury” factor contained items/symptoms that, for us, were distributed across three factors. Our second factor

Figure 2. Structural Equation Model of Effects on Suicide Behaviors



Note. Standardized path coefficients are shown. Significant effects are in bold.

was characterized by guilt and shame symptoms, which have been referred to as the linchpin components of moral injury (Jinkerson, 2016; Litz et al., 2009). Consistent with previous research (Bryan et al., 2013; Currier, Holland, & Malott, 2015; Marx et al., 2010; Stein et al., 2012), our results underscore the primacy of guilt and shame symptoms for moral injury.

The third factor, however, posed greater difficulty with respect to nomenclature, as it included items indicating depression, anhedonia, anxiety, anger, loss of trust, and social alienation. As shown in Bryan's et al.'s model (2018; see Figure 1), this third factor appears to be best categorized as psychiatric comorbidities involving negative alterations in thought and mood that frequently co-occur with both PTSD and moral injury (Griffin et al., 2019; Jinkerson, 2016; Litz et al., 2009). Thus, the third factor appears consistent with both the symptoms of moral injury (other than guilt and shame) as well as the negative alterations in thought and mood that characterize PTSD.

In accordance with Jinkerson's (2016) formulation, the second factor (Guilt/Shame) could be viewed as encompassing the core moral injury symptoms, whereas the third factor, Psychiatric Comorbidities, might represent secondary, potentially co-occurring, mental health conditions that may be indicative of either PTSD or moral injury. Further, recent research has distinguished between self-directed moral injury and other-directed moral injury (e.g., Bravo et al., 2020). Acts of commission (i.e., perpetrating an action) and acts of omission (i.e., not limiting others' wrongdoing) may be more likely to result in self-directed moral injury. That is, when servicemembers feel personally responsible for perpetrating a transgressive act or not limiting others' wrongdoing, they may be more likely to experience guilt and shame. In contrast, acts of betrayal or leadership failure may result in experiences of other-directed moral injury and may be more likely to result in anger, disgust, and mistrust (Currier et al., 2019). Although our measure of pMIEs and moral injury symptoms does not allow us to test this premise directly, this would be an important direction for future research.

The fourth factor, Meaning in Life, was comprised of items from the Presence subscale of the Meaning in Life Questionnaire, with higher scores denoting greater awareness of meaning in one's life. In the context of moral injury research, we are most concerned with the loss of meaning

in life (e.g., Jinkerson, 2016; Litz et al., 2009). The inclusion of meaning in life was distinct to the current study and marks meaning in life as an important outcome variable for consideration in future studies.

Differences between our findings and those of Bryan et al. (2018) may reflect the nature of the two studies' populations. Bryan et al. (2018) examined Army National Guard members, of which 58.2% had deployed. In contrast, participants in the present study all reported combat experience and exposure to at least one pMIE. It is possible that Bryan et al.'s (2018) findings may be most generalizable to a National Guard sample (and especially one of a western/southwestern demographic), whereas our findings may be more generalizable to a broader sample of pMIE-exposed combat veterans. Additionally, the current study included members of all service branches, which may have partially accounted for the differences. Service branches are known to have cultures specific to themselves in addition to the general military culture and warrior ethos. It is possible that these distinct service-branch cultures and additional subcultures may influence the development and cause of combat-related reactions. Although the current study cannot speak more to the influence of military culture on PTSD and moral injury, it is imperative that future research adopt a multicultural lens to examine the role of military culture in moderating veterans' responses to service-related traumatic events.

Our findings highlight the complexities of combat trauma reactions and emphasize that the moral injury construct may not be as clear cut as previously found. Although there are unique differences between our findings and those of Bryan et al. (2018), both studies suggest clear differences between PTSD and moral injury factors. Both studies also demonstrate, however, that some constructs, such as depression and anhedonia, may overlap between PTSD and moral injury. Overall, our factorial findings paint a cloudier picture of the symptomatology of PTSD and moral injury. The diversity of symptom clusters found here suggests that conceptualizations of moral injury may need revision, possibly to include loss of trust as a comorbidity rather than a core symptom, though that is speculative at this point.

Structural Model Outcomes

Suicide Behaviors

Our results suggest that Guilt/Shame and Psychiatric Comorbidities may be key to

suicidal behaviors in combat veterans. It was not surprising that the Psychiatric Comorbidities factor was associated with suicidal behaviors, as its components of depression, anhedonia, and social alienation are included in many models of suicide (e.g., Jobes, 2012; Stanley et al., 2010; Van Orden et al., 2010). Surprisingly, the PTSD and Meaning in Life factors were not associated with suicidal behaviors. This finding was unexpected given that previous research has shown that PTSD is robustly associated with suicide attempts and deaths (Hendin & Haas, 1991; Koven, 2016) and that loss of meaning in life tends to be a primary predictor of suicide (Kleiman & Beaver, 2013). Our findings suggest that core symptoms of moral injury (i.e., guilt and shame) and other comorbid mental health concerns (e.g., depression, anhedonia) may have a greater association with suicidal behavior in combat veterans than do symptoms unique to PTSD, such as intrusive memories and hyperarousal. This emphasizes the salience of negative changes in mood and cognition when considering risk for suicidal behaviors among combat veterans.

Limitations

Several limitations of the current study warrant discussion. First, our findings are based on cross-sectional data and therefore limit the current investigation's ability to determine temporal associations. The current study also utilized retrospective self-report measures subject to response bias. Additionally, akin to Bryan et al. (2018) and to reduce subject burden, in some cases, we analyzed one or two items to measure each construct. Our findings deviated from those found by C. Bryan and colleagues (2018), and sample size may have played a role in the differential outcomes. Alternatively, within-factor shared method variance may provide some explanation for the current findings. As such, future research will benefit from replication of and expansion of the current research, utilizing alternate means of assessing the variables in question.

Future Directions and Conclusion

The present study reevaluated the symptomatic profiles of moral injury and PTSD found in Bryan et al.'s (2018) seminal research among a group of pMIE-exposed combat veterans. Consistent with Bryan et al., a clear PTSD factor was identified; however, our results suggest that moral injury may not represent a single factor but rather a multidimensional constellation of

symptoms. This dimensional argument is not intended to defeat existing theories/constructs but rather to spur moral injury research to embrace construct flexibility. The differences found between the current study and Bryan et al. (2018) leave us wanting to understand the divergence in addition to the convergence. One promising area for further exploration may be to consider how military and unit culture affect servicemembers' moral expressions and responses to their military experiences. Ultimately, a deeper understanding of the symptomology and implications of moral injury and PTSD may help us understand and fight against the persistent rise of suicidal behaviors among combat veterans.

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