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Moral Injury, Substance Use, and Posttraumatic Stress Disorder Symptoms Among Military Personnel: An Examination of Trait Mindfulness as a Moderator

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Abstract

Mindfulness-based approaches have been suggested as possible methods to treat moral injury in military personnel. However, empirical research has yet to evaluate if mindfulness acts as a protective factor for the possible negative effects of moral injury, such as alcohol use, drug use, or posttraumatic stress disorder (PTSD) symptoms. In this study, we investigated if five facets of mindfulness (i.e., observing, nonjudging, nonreactivity, awareness, and describing) moderated associations between moral injury and the outcomes of PTSD symptoms, alcohol misuse, and drug abuse symptoms in a sample of military personnel. Participants were 244 military personnel (the majority former military members) who had been deployed at least once during the Iraq War, War in Afghanistan, other wars, or humanitarian missions. The study results indicated that nonjudging, $\beta = -.22$, and awareness, $\beta = -.25$, had significant attenuating effects on the association between moral injury and drug abuse symptoms. However, observing, $\beta = .17$; nonreactivity, $\beta = .23$; and describing, $\beta = .15$, had significant synergistic effects (i.e., they strengthened the association between moral injury and drug abuse symptoms). There were no significant moderation effects on the associations between moral injury and PTSD symptoms or between moral injury and alcohol misuse. Our results provide initial evidence that not all facets of mindfulness may protect against the challenges of coping with moral injury. Directions for future research and implications for practice are discussed.

Among veterans deployed to recent conflicts, such as the War in Afghanistan (2001–present) and Iraq War (2003–2011), links between combat exposure and both substance use disorder (see Kelsall et al., 2015 for a meta-analysis) and posttraumatic stress disorder (PTSD) and its symptoms (see Fulton et al., 2015 for a meta-analysis) have been well established. However, recent research suggests that an important construct to consider in relation to veteran health is *moral injury*, an inner conflict used to describe psychological, ethical, and/or spiritual conflict experienced when an individual's basic sense of humanity is

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violated (Drescher et al., 2011; Litz et al., 2009). Violations that give rise to moral injury are believed to develop from the inner conflict that results from exposure to potentially morally injurious experiences (PMIEs; Litz et al., 2009), which involve witnessing an event, failing to stop that event, or committing an act that violates personal belief systems (Drescher et al., 2011; Litz et al., 2009). There is considerable variation in PMIEs as some are intentional and unsanctioned, such as excessive violence or destruction of property, whereas others are accidental or ambiguous, such as killing a civilian or failing to save a life (Drescher et al., 2011; Litz et al., 2009). Exposure to PMIEs (and its possible resulting consequence, moral injury) has been identified as a key risk factor for an increased likelihood of PTSD development (Jordan, Eisen, Bolton, Nash, & Litz, 2017) and substance use (Frankfurt & Frazier, 2016; Jinkerson, 2016).

Exposure to PMIEs is common among veterans of the recent and ongoing conflicts in Iraq and Afghanistan (Mental Health Advisory Team, 2009; Wisco et al., 2017). For example, in a study of 564 recent-era U.S. combat-exposed veterans, 10.8% of veterans endorsed transgressions by self (e.g., “I acted in ways that violated my own moral code or values”), 25.5% endorsed transgressions by others (e.g., “I saw things that were morally wrong”), and 25.5% endorsed betrayal (e.g., “I felt betrayed by leaders who I once trusted,” Wisco et al., 2017). These percentages may indicate that recent-era veterans may have had exposure to PMIEs; this is concerning as PMIEs may result in moral injury which may, in turn, lead to disorders common in veterans, including PTSD and substance use disorders (e.g., Fulton et al., 2015; Teeters, Lancaster, Brown, & Back, 2017). Moral injury is believed to result from unresolved internal conflict or cognitive dissonance (Festinger, 1962) that stems from exposure to PMIEs (Litz et al., 2009). This internal conflict is theorized to develop into moral injury when negative cognitions surrounding the conflict become attributions that are stable, internal, and global (e.g., “I am forever an awful person”), as this type of negative cognition may lead to the development of the core features of moral injury (e.g., guilt and shame), which manifest into other core features (e.g., withdrawal) and, finally, to secondary features which further enforce the stable, internal, and global attributions that encompass moral injury (Litz et al., 2009). Other suggested core features of moral injury include distrust in others, distrust in self, and grief (Bryan, Bryan, Roberge, Leifker, & Rozek, 2018; Currier, Holland, Drescher, & Foy, 2015; Jinkerson, 2016; Litz et al., 2009), whereas secondary features of moral injury include depression, anxiety, self-harm, reexperiencing of the PMIE(s), and social problems (Jinkerson, 2016; Litz et al., 2009). We have followed Maguen and Litz’s (2012) concept that moral injury is a dimensional problem and, thus, there is no threshold for deciding moral injury’s presence.

Although cross-sectional studies have found associations between PTSD and moral injury (Currier, Holland, & Malott, 2014; Currier et al., 2015; Nazarov et al., 2015), Jinkerson (2016) argued that PTSD is distinct from moral injury. Debatably, PTSD and moral injury develop differently, as PTSD may develop through experiencing physiological distress or threat-based trauma (e.g., life-threatening situations), whereas moral injury may originate from the cognitive dissonance an individual experiences when confronted with PMIEs. Further, guilt and shame are not always present in individuals with PTSD yet they are critical features of moral injury (Jinkerson, 2016; Litz et al., 2009). Thus, despite some overlapping aspects of PTSD and moral injury, such as depression, there is evidence that

they are distinct, yet related, constructs (Bryan et al., 2018). Moral injury can contribute to PTSD symptoms because negative moral emotions, such as shame, may provide justification for having PTSD symptoms (Currier et al., 2014) and thus decrease the willingness to explore methods to reduce symptoms or contribute to self-punishing behaviors that exacerbate the symptoms. For example, veterans may isolate themselves if they become ashamed of having participated in a PMIE; this can either add to or increase the severity of isolation, which is a symptom of PTSD.

Researchers have also suggested that moral injury may contribute to problematic substance use (e.g., Frankfurt & Frazier, 2016; Jinkerson, 2016). The cognitive dissonance theory states that an internal tension builds when individuals act inconsistently with their beliefs, and they become motivated to reduce this tension (Festinger, 1962), possibly via substance use. Stress-dampening (Sher & Levenson, 1982) and tension-reduction models of substance use (Greeley & Oei, 1999) posit that individuals experiencing high levels of stress may use alcohol and drugs as a tension-reduction technique. Killgore and colleagues (2008) found that soldiers returning from the Iraq War who had experienced PMIEs used alcohol more frequently and in greater quantities than intended. Although few studies have examined moral injury as a predictor, shame is a proposed core component of moral injury (Jinkerson, 2016), and research has shown that civilians turn to drugs and alcohol to cope with shame (Dearing, Stuewig, & Tangney, 2005). Thus, given the higher levels of alcohol use among veterans of recent wars (see Teeters et al., 2017 for a review), it is important to identify possible protective factors that may reduce the risk for high levels of alcohol use.

Mindfulness encompasses elements that may reduce the severity of problematic symptoms and negative thought patterns, thereby lessening the strength of the association between moral injury and the outcomes of PTSD symptoms and substance use. Thompson, Arnkoff, and Glass (2011) suggested that some components of mindfulness (i.e., living in the present moment, awareness, and nonjudging) may reduce the core symptoms of PTSD (i.e., hyperarousal, avoidance, and reexperiencing symptoms). For example, being nonjudgmental of one's experience may diminish the overreactive physiological responses, and living in the present moment may permit more exposure to, rather than avoidance of, triggering stimuli, thus allowing for the trauma to be emotionally processed (Thompson et al., 2011). Previous research has shown that distinct facets of mindfulness (i.e., acting with awareness, nonjudging of inner experience, nonreactivity to inner experience, describing, and observing) differentially relate to PTSD. For example, awareness and nonjudgment are the only facets of mindfulness that are significantly correlated with PTSD, yet these two facets are not correlated with the same core PTSD symptoms (Vujanovic, Youngwirth, Johnson, & Zvolensky, 2009).

Breslin, Zack, and McMain's (2002) information-processing model proposes that mindfulness may reduce substance use relapse through increased awareness of negative thought patterns, emotions, and triggers. As is the case with PTSD, researchers have found that mindfulness facets relate differentially to substance use as well. Observing and nonreactivity interact in a manner in which observing has a positive association with substance use when nonreactivity is low (Eisenlohr-Moul, Walsh, Charnigo, Lynam, & Baer, 2012). Further, a meta-analysis revealed that only nonjudgment, awareness, and

nonreactivity were significantly negatively correlated with substance use (Karyadi, VanderVeen, & Cyders, 2014).

To our knowledge, no research to date has investigated whether mindfulness attenuates the associations between moral injury and substance use and PTSD symptoms. In the present study, we examined whether naturally occurring levels of trait mindfulness attenuate the associations between moral injury, drug abuse symptoms, alcohol misuse, and PTSD symptoms among recent-era military personnel. We expected that (a) moral injury would be positively correlated with PTSD symptoms and substance use outcomes and (b) positive associations between moral injury and outcomes would be attenuated for individuals high in trait mindfulness, with the largest attenuation at high levels of moral injury exposure. Given the lack of research that has examined mindfulness and moral injury, we had no a priori hypotheses as to which facet of mindfulness—acting with awareness, nonjudging of inner experience, nonreactivity to inner experience, describing, and observing—would result in the largest attenuation of associations.

Method

Participants

The present study was a secondary data analysis of a larger study involving a community sample of military personnel and civilians (Bravo, Pearson, & Kelley, 2017). For the present study, we restricted our sample ($N = 244$) to veterans ($n = 184$, 75.4%), National Guard members or reservists ($n = 43$, 17.6%), and active duty military personnel ($n = 17$, 7.0%) who had experienced one or more deployments (defined as 90 days or more) as part of the Iraq War ($M = 2.26$, $SD = 1.29$), War in Afghanistan ($M = 2.39$, $SD = 1.33$), other wars ($M = 2.51$, $SD = 1.59$), or humanitarian missions ($M = 2.28$, $SD = 1.64$). The majority of participants identified as being White, non-Hispanic ($n = 159$; 65.2%), men ($n = 145$; 59.4%), with a reported mean age of 32.35 years ($SD = 6.74$). The majority of participants served in the Army ($n = 127$, 52.3%) or Navy ($n = 69$, 28.3%).

Procedures

The parent study focused on examining trauma experiences, mental health, substance use, and spiritual and religious beliefs among current military members, veterans, and civilians. Participants were recruited through Facebook, military listservs, the Department of Psychology research pool at the participating university, student veteran organization announcements, snowball sampling via friends or family, flyers, Craigslist, and other sources. After reviewing the study description and consenting to participate, participants completed a 30-min online self-report survey. Nonstudent participants were emailed a \$10 (USD) gift card for a major online retailer; students were given research credit or were entered into one of 20 raffles for a \$20 gift card. The study was approved by the institutional review board at Old Dominion University (Norfolk, Virginia, USA), where data were collected.

Measures

Moral injury.—Moral injury was assessed with a modified version (Braitman et al., 2018) of the Moral Injury Questionnaire–Military Version (MIQ-M; Currier et al., 2015). The original MIQ-M is a 20-item self-report measure that assesses PMIEs during combat or other types of deployment. All items were assessed on a 4-point response scale, ranging from 1 (*never*) to 4 (*often*). For the present study, we modified the MIQ-M in two ways. First, each PMIE item was separated into distinct items to assess direct involvement versus bearing witness; this resulted in a total of 27 PMIEs. Second, after each PMIE item, participants reported how much guilt, shame, inability to forgive self, inability to forgive others, and withdrawn behavior the PMIE had caused them, again using a 4-point response scale ranging from 1 (*never*) to 4 (*often*). Thus, respondents completed 27 PMIE items and 135 follow-up questions (five follow-up questions per PMIE item), for a total of 162 moral injury items. The highest possible score was 648 (i.e., highest possible score per item of 4×162 items). Due to high collinearity, we summed the PMIE follow-up questions such that there was a single total moral injury score, with higher scores indicating greater endorsement of moral injury. Braitman and colleagues (2018) found strong reliability among the PMIEs using Cronbach's alpha values, with values ranging from .67 to .95. The items moderately correlated with, yet were distinct from, symptoms of anxiety, depression, and PTSD (Braitman et al., 2018). In our analytic sample, Cronbach's alpha was .95. It is important to note that any PMIEs a participant indicated he or she did not experience (i.e., a rating of *never*) were excluded from this calculation (see Braitman et al., 2018 for psychometric information on the revised version of the MIQ-M). On average, participants reported having experienced 18 distinct PMIEs ($M = 18.24$; $SD = 8.10$), with 98% of participants reporting having experienced at least two PMIEs.

Mindfulness.—Mindfulness was assessed using the 39-item Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). Responses are measured on a 5-point scale 1 (*never or very rarely true*) to 5 (*very often or always true*). The FFMQ assesses five specific components of mindfulness: acting with awareness (eight reverse-coded items, such as “I find it difficult to stay focused on what’s happening in the present”), Cronbach's $\alpha = .89$; nonjudging of inner experience (eight reverse-coded items, such as “When I have distressing thoughts or images, I judge myself as good or bad depending what the thought or image is about”), Cronbach's $\alpha = .87$; nonreactivity to inner experience (seven items, such as “When I have distressing thoughts of images, I ‘step back’ and am aware of the thoughts or image without getting taken over by it”), Cronbach's $\alpha = .81$; describing (eight items, such as “Even when I’m feeling terribly upset, I can find a way to put it into words”), Cronbach's $\alpha = .61$; and observing (eight items, such as “I pay attention to how my emotions affect my thoughts and behavior”), Cronbach's $\alpha = .84$. Possible score ranges are 8–40 for the eight-item facets and 7–35 for the seven-item nonreactivity facet. Items were summed for each distinct mindfulness facet such that higher scores were indicative of a higher level of endorsement of a specific mindfulness facet.

PTSD symptoms.—The Posttraumatic Stress Disorder Checklist for *DSM-5* (PCL-5; Blevins, Weathers, Davis, Witte, & Domino, 2015) was used to assess PTSD symptoms. The PCL-5 includes 20-items that are rated a 5-point response scale, which ranges from 0 (*not at*

all) to 4 (*extremely*). An example item includes, “How much have you been bothered by repeated, disturbing, and unwanted memories of the stressful experience?” The possible total score ranges from 0 to 80. Items were summed such that there was a single total PTSD symptoms score, with higher scores indicating a higher level of endorsement of PTSD symptoms. In the current sample, Cronbach’s alpha was .95 for the total score. A score of 33 or higher is used as a cutoff for probable PTSD (Blevins et al., 2015). Within the present sample, 137 (56.1%) participants exceeded the cutoff for probable PTSD.

Alcohol misuse.—Hazardous drinking was assessed using the 10-item Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), which assesses three facets of hazardous drinking: alcohol-related problems, dependency symptoms, and alcohol use. Scores can range from 0 to 40, with different questions scored in different ways, depending on the item. In the current sample, Cronbach’s alpha was .85. For the present study, all items were summed such that there was a single total AUDIT score, with higher scores indicating greater endorsement of alcohol misuse. A score of 8 or higher is used as a cutoff for hazardous drinking, and a score of 16 or higher is used as a cutoff for probable alcohol use disorder (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). Within the present sample, 176 (72.1%) participants exceeded the cutoff for hazardous drinking, and 141 (57.8%) exceeded the cutoff for probable alcohol use disorder. Although not part of the AUDIT, we asked participants if their alcohol use had increased since their last deployment and, if so, whether this increased alcohol use was related to deployment. In total, 109 (44.7%) participants indicated that their alcohol use increased since their last deployment; of these, 63.6% indicated that this increase was related to deployment.

Drug abuse symptoms.—Drug abuse symptoms were assessed using the 10-item Drug Abuse Screening Test (DAST-10; Skinner, 1982; Yudko, Lozhkina, & Fouts, 2007). Participants were asked to respond to questions based on the past 12 months. Each item is measured dichotomously to reflect presence or absence of drug abuse symptoms (0 = *no*, 1 = *yes*) in the past 12 months. An example item is, “Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs?” Possible total scores for the measure range from 1 to 10. All items were summed such that there was a single total DAST score, with higher scores indicating more endorsement of drug abuse symptoms. In the current sample, Cronbach’s alpha was .69. A score of 3 or higher is used as a cutoff for probable drug use disorder (Skinner, 1982; Yudko et al., 2007). Within the present sample, 141 (57.8%) participants exceeded the cutoff for probable drug use disorder. Although not part of the DAST, we asked participants if drug use had increased since their last deployment; if they answered affirmatively, they were asked if the increased drug use was related to deployment. In total, 185 (77.1%) participants indicated that their drug use increased since their last deployment, and of these individuals, 98.9% indicated that this increase was related to deployment.

Data Analysis

Using Model 1 of the PROCESS (Version 3.0) macro for SPSS (Hayes, 2017), we conducted moderation analyses to determine if any of the five facets of mindfulness moderated the

associations between moral injury and alcohol misuse, drug abuse symptoms, and PTSD symptoms. Specifically, independent models aimed at predicting alcohol misuse, drug abuse symptoms, and PTSD symptoms from specific trait mindfulness facets, moral injury, and their interactions (e.g., Observing x Moral Injury) were conducted. We used *z* scores to standardize every variable so as to produce standardized regression coefficients. In order to examine how each mindfulness facet uniquely contributed to the interaction, all other mindfulness facets were entered as covariates within each model. In every model, we also controlled for sex, years served in the military, number of deployments to the War in Afghanistan, number of deployments to the Iraq War, number of deployments to other wars, number of humanitarian deployments, and number of other deployments.

Given the large number of interactions tested (15 moderation models were tested in the present study), we used a 99% bootstrapped confidence interval that does not contain zero to determine significant effects instead of 95% confidence intervals (lowering our alpha to .01 per analysis rather than the customary .05) to ameliorate concerns associated with the likelihood of incorrectly rejecting the null hypothesis when multiple hypotheses are examined (i.e., Type 1 error; Banerjee, Chitnis, Jadhav, Bhawalkar, & Chaudhury, 2009). As recommended by Cohen, Cohen, West, and Aiken (2003), if the interaction term was significant, the interpretations of how the five facets of mindfulness moderated the associations between moral injury and alcohol misuse, drug abuse symptoms, and PTSD symptoms were determined by plotting outcome values and conditional effects at levels of the moderator. To determine effect sizes, the following cutoffs were used: 0.10 for a small effect, 0.30 for a medium effect, and 0.50 for a large effect (Cohen, 1992).

Results

Correlations

Bivariate correlations and descriptive statistics among study variables are shown in Table 1. We found strong positive associations between moral injury and alcohol misuse, drug abuse symptoms, and PTSD symptoms; additionally, all mental health outcomes were positively correlated with each other. The mindfulness facets had differential associations with the mental health outcomes. Describing was the only facet negatively correlated with drug abuse symptoms whereas the other mindfulness facets were not. Observing and nonreactivity were positively correlated with PTSD symptoms and alcohol misuse. Nonjudging, awareness, and describing were negatively correlated with PTSD symptoms and alcohol misuse. See Table 1 for correlations with covariates.

Moderation Models

Table 2 presents results from the moderation models. None of the five facets significantly moderated the associations between moral injury and PTSD symptoms or between moral injury and alcohol misuse. However, we found significant moderation effects for all five facets of mindfulness on the association between moral injury and drug abuse symptoms (there are discussed later).

Synergistic effects.—Observing, $\beta = .17$, 99% CI [.03, .36]; describing, $\beta = .15$, 99% CI [.02, .29]; and nonreactivity, $\beta = .23$, 99% CI [.06, .41] had significant synergistic effects on the association between moral injury and drug abuse symptoms. Specifically, the association between moral injury and drug abuse symptoms strengthened at higher levels of observing: a low level of observing (1 standard deviation below the mean) had a small effect, $\beta = .10$, 99% CI [−.16, .35]; an average level had a small–medium effect, $\beta = .27$, 99% CI [.10, .44]; and a high level (1 standard deviation above the mean) had a medium–large effect, $\beta = .44$, 99% CI [.21, .67]. Similarly, the association between moral injury and drug abuse symptoms strengthened at higher levels of describing: a low level of describing (1 standard deviation below the mean) had a small effect, $\beta = .12$, 99% CI [−.12, .36]; an average level had a small–medium effect, $\beta = .27$, 99% CI [.10, .44]; and a high level (1 standard deviation above mean) had a medium–large effect, $\beta = .42$, 99% CI [.20, .64]. Likewise, the association between moral injury and drug abuse symptoms strengthened at higher levels of nonreactivity: a low level (1 standard deviation below mean) had a trivial effect, $\beta = .04$, 99% CI [−.21, .29]; an average level had a small–medium effect, $\beta = .27$, 99% CI [.10, .44]; and a high level (1 standard deviation above the mean) had a large effect, $\beta = .49$, 99% CI [.26, .72]. Simple slopes of these synergistic effects are presented in Figure 1.

Attenuating effects.—Awareness, $\beta = -.25$, 99% CI [−.46, −.09], and nonjudging, $\beta = -.22$, 99% CI [−.42, −.06], had attenuating effects on the association between moral injury and drug abuse symptoms. Specifically, the association between moral injury and drug abuse symptoms strengthened at lower levels of awareness: a low level of awareness (1 standard deviation below mean) had a large effect, $\beta = .50$, 99% CI [.28, .73]; an average level had a small–medium effect, $\beta = .26$, 99% CI [.09, .43]; and high level (1 standard deviation above mean) had a trivial effect, $\beta = .01$, 99% CI [−.24, .26]. Similarly, the association between moral injury and drug abuse symptoms strengthened at lower levels of nonjudging: a low level (1 standard deviation below mean) had a medium–large effect, $\beta = .48$, 99% CI [.25, .70]; an average level had a small–medium effect, $\beta = .26$, 99% CI [.09, .43]; and a high level (1 standard deviation above mean) had a trivial effect, $\beta = .04$, 99% CI [−.22, .30]. Simple slopes of the moderation models that had attenuating effects are presented in Figure 2.

Discussion

Our prediction that moral injury would be positively associated with PTSD symptoms, alcohol misuse, and drug abuse symptoms was supported. Further, these results align with what has been reported in past research (Currier et al., 2014, 2015; Nazarov et al., 2015). Our prediction that the facets of mindfulness would attenuate associations between moral injury and the examined outcomes was partially supported. Awareness and nonjudging were found to attenuate the association between moral injury and drug abuse symptoms, yet, in contrast, observing, describing, and nonreactivity acted as risk factors for associations between moral injury and drug abuse symptoms. That is, for veterans with higher levels of observing, describing, and nonreactivity, the link between moral injury and drug abuse symptoms was strengthened. Possible explanations for why these results may have occurred are provided; however, our explanations are speculative due to the cross-sectional study

design. In contrast, none of the facets of mindfulness moderated the effects of moral injury on alcohol misuse or PTSD symptoms, a finding that did not support our predictions.

Of note is the relative strengths of the correlations between moral injury and alcohol misuse, $r = .69$; PTSD, $r = .71$; and drug abuse symptoms, $r = .45$. One possible explanation for the lack of moderation effects of mindfulness on the associations between moral injury and alcohol misuse and PTSD is that the direct effects were too strong to be moderated. Related to this point, it is also possible that differences between the nature of alcohol misuse and drug abuse symptoms may contribute to differential findings. Specifically, alcohol misuse is embedded in military culture for many reasons, including boredom, morale-lifting, and unit cohesion (Ames, Cunradi, Moore, & Stern, 2007), whereas drug use is strictly forbidden and grounds for separation. Thus, the normative nature of alcohol misuse may have reduced the ability of mindfulness facets to attenuate associations between moral injury and alcohol misuse.

Our finding that awareness and nonjudging serve to attenuate the associations between moral injury and drug abuse symptoms supports the concept of moral healing (see Farnsworth, Drescher, Evans, & Walser, 2017 for a review). Using qualitative data, Farnsworth and colleagues found it was helpful for individuals experiencing moral injury to nonjudgmentally experience their negative moral emotions (i.e., guilt and shame) and then view negative moral emotions as indicators that their morality was still intact, as those who possess low morality would not feel these negative moral emotions. In addition, being aware of how and to what degree moral injury has impacted their behaviors was also helpful in moral healing. Perhaps when individuals are more aware of negative moral emotions, they may have greater awareness of how these emotions are associated with negative coping practices, such as drug use. If so, this would support the theory of *monitor and acceptance*. This theory suggests living in the present moment, which entails utilizing observing, describing, and nonreactivity, does not predict positive health outcomes alone. Instead, nonjudgment and acceptance are the driving forces in the effectiveness of mindfulness as they work together to increase cognitive functioning, which includes emotional regulation, reduce negative emotions, and reduce stress-related outcomes (Lindsay & Creswell, 2017). Moreover, awareness and nonjudging have been found to be beneficial in relation to other mental health outcomes in various populations, such as stress, anxiety, and depression in civilians (Soysa & Wilcomb, 2013; Brown, Bravo, Roos, & Pearson, 2015) and PTSD symptoms in veterans (Wahbeh & Oken, 2011).

Although awareness and nonjudging appear to decrease the strength of the association between moral injury and drug abuse symptoms, higher scores for the describing facet strengthened the association. Some veterans may attempt to describe the events they experienced in order to understand and cope; however, some the events they faced may never be fully understood, such as seeing children die, seeing massive destruction, or the inability to save a life. Describing these events may lead to distress and subsequent drug use to subdue that distress, as suggested by the stress-dampening (Sher & Levenson, 1982) and tension-reduction models (Greeley & Oei, 1999). Further, the cognitive dissonance theory suggests that when individuals describe events during which they acted in opposition to their morals, cognitive dissonance is created, which may result in tension (Festinger, 1962) and

possible drug use. Future research might examine how higher levels of describing might be helpful in contexts that value verbal expression of internal states (e.g., engagement in psychotherapy) yet are detrimental in contexts that require action rather than language (e.g., completing military missions).

Along with describing, it is possible that observing may act as a risk factor for drug abuse symptoms because of how the observing is being conducted. Perhaps the participants observe with a nonaccepting and negative attitude, such as with rumination, which may amplify distress, guilt, shame, and detrimental beliefs (e.g., the belief that one is unforgivable; Litz et al., 2009). Further, observing items differ in that most assess external stimuli (e.g., smells) and bodily sensations rather than cognition and emotion, like the other facets (Baer et al., 2006). Focusing on one's physiological responses to guilt or shame may produce distress. If this is the case, being highly observant of one's guilt and shame may increase distress and create a feedback loop in which distress leads to drug use, which in turn results in more distress. Therefore, when individuals are continually highly observant of their guilt and shame, distress may result, which could lead to eventual drug use to relieve distress (Greeley & Oei, 1999; Sher & Levenson, 1982). Additionally, if an individual ruminates on negative moral emotions, it may be difficult to develop adaptive moral emotions, such as compassion, pride, and elevation, which assist in moral healing (Farnsworth et al., 2017).

Military members are trained to be nonreactive in order to best complete their mission. If a military member is paralyzed by or overwhelmed with stress during battle, it could lead to the injury or death of fellow military members. When returning to the civilian world, reflection on war experiences may reveal moral injury (Drescher & Foy, 2008). Although nonreactivity may be adaptive in combat situations and encouraged in training, it is possible that nonreactivity may be associated with the use of drugs to assuage emotional pain (Khantzian, 1997). If this is the case, it may explain why our findings contradict findings reported in previous research, which have emphasized the effectiveness of nonreactivity in community or student samples (Soysa & Wilcomb, 2013).

It is important to note that this study measured trait mindfulness and that mindfulness can be considered as a skill cultivated through practice (Baer et al., 2006). It may be possible that mindfulness-based treatments cultivate a healthier version of the facet producing the efficacious results. The mere presence of the trait may not explain the totality of the effects.

The present study should be considered in light of its limitations. This study utilized a cross-sectional design, and therefore, causality cannot be established. It could be that drug abuse alters mindfulness facets; for example, an individual could become extremely nonreactive while using a certain drug. In addition, we asked about a variety of symptomology at different timeframes, which may produce lower internal validity. Further, our results may not generalize to the general population of veterans and active duty military personnel as we utilized a convenience sample of recent-era veterans. In addition, although we advertised for and asked questions specific regarding military service, we cannot be assured that all respondents were completely accurate and honest in reporting on their military service. Moreover, in relation to previous samples, our sample had a higher percentage of

participants with a probable alcohol use disorder at (57.8% compared to an alcohol misuse rate of 36% reported by Burnett-Zeigler et al., 2011) and a higher percentage of participants with a probable PTSD diagnosis (56.1% vs. 12% reported by Hoge, Riviere, Wilk, Herrell, & Weathers, 2014). It is important to note that our sample consisted of young veterans who had been deployed at least once, and frequently multiple times, as part of recent wars.

Another limitation is that moral injury may be composed of components, such as anger and sorrow or grief, which we did not examine in the current study. It is also possible that participants may have underreported or overreported substance use and mental health symptoms. Future research should include clinical diagnoses from mental health professionals to address known biases that result from self-report data (e.g., retrospective recall bias). We did not include a Criterion A index event, and we used PTSD symptoms, not a diagnosis of PTSD, which may have implications for the magnitude of moderation effects. Specifically, the correlation between PTSD symptoms and moral injury was high, $r = .65$, and although this correlation did not meet the typical definition for multicollinearity (i.e., $r > .79$), high correlations increase the variance of regression coefficient estimates and reduce statistical power. Finally, we did not ask any specifying questions relating to participants' trauma, and we cannot discern if participants responded based on PMIEs or traumas that were not related to their military careers but rather occurred in other aspects of their lives.

Albeit preliminary, our results suggest that awareness and nonjudging may attenuate associations between moral injury and drug abuse symptoms. Contrarily, observing, describing, and nonreactivity were found to strengthen the association between moral injury and drug abuse symptoms. Although additional research is needed to understand how facets of mindfulness may attenuate associations between moral injury and drug abuse symptoms, clinicians who work with individuals in treatment for substance abuse should assess for moral injury as it may contribute to substance use among recent-era veterans. Finally, mindfulness did not attenuate the association between alcohol misuse and PTSD symptoms, which suggests the need for future research to investigate what additional factors moderate or mediate the associations between moral injury, alcohol misuse, and PTSD symptoms (e.g., self-compassion).

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Figure 1.

Simple slopes of the moderation models that had synergistic effects on the association between moral injury and drug abuse symptoms. “Low” indicates 1 standard deviation below the mean of each mindfulness facet. “High” indicates 1 standard deviation above the mean of each mindfulness facet.

Figure 2.

Simple slopes of the moderation models that had attenuating effects on the association between moral injury and drug abuse symptoms. “Low” indicates 1 standard deviation below the mean of each mindfulness facet. “High” indicates 1 standard deviation above the mean of each mindfulness facet.

Table 1**Bivariate Correlations and Descriptive Statistics Among Study Variables**

Variable	1	2	3	4	5	6	7	8	9	M	SD
1. Moral injury	---	.25**	-.19**	-.53**	-.52**	.28**	.69**	.71**	.45**	209.34	120.62
2. Observing		---	.36**	-.57**	-.61**	.76**	.42**	.20**	-.15	23.47	6.18
3. Describing			---	.04	.03	.47**	-.22**	-.18**	-.22**	24.57	4.57
4. Awareness				---	.79**	-.49**	-.75**	-.42**	-.08	25.74	6.67
5. Nonjudging					---	-.50**	-.74**	-.40**	-.01	25.31	6.91
6. Nonreactivity						---	.33**	.22**	-.11	20.36	5.18
7. PTSD							---	.55**	.18**	35.37	18.01
8. Alcohol misuse								---	.39**	14.44	8.31
9. Drug abuse symptoms									---	3.26	2.38

Note. PTSD = posttraumatic stress disorder. Correlations of the covariates are available from the authors upon request.

**
 $p < .01$.

Table 2

Summary of the Effects of Moral Injury, the Five Facets of Mindfulness, and Their Interactions on Alcohol Misuse, Drug Abuse Symptoms, and Posttraumatic Stress Disorder (PTSD) Symptoms

	Alcohol Misuse				Drug Abuse Symptoms				PTSD Symptoms			
	β	SE	99% CI		β	SE	99% CI		β	SE	99% CI	
Observing												
Constant	.02	.05	[-.11, .16]		-.04	.05	[-.17, .09]		-.02	.04	[-.11, .07]	
Observing	-.07	.09	[-.29, .18]		.02	.08	[-.19, .23]		.09	.08	[-.11, .29]	
Moral Injury	.55	.07	[.36, .71]***		.27	.06	[.10, .43]***		.32	.05	[.19, .45]***	
Observing $\times$ MI	-.10	.07	[-.29, .08]		.17	.06	[.03, .36]**		.10	.05	[-.03, .22]	
Describing	-.05	.08	[-.25, .14]		-.02	.05	[-.17, .12]		-.12	.06	[-.29, .03]	
Awareness	-.06	.10	[-.34, .20]		-.08	.08	[-.29, .11]		-.35	.08	[-.54, -.13]***	
Nonjudging	-.07	.10	[-.35, .19]		.15	.08	[-.07, .37]		-.29	.08	[-.48, -.09]***	
Nonreactivity	.10	.08	[-.15, .28]		-.03	.08	[-.22, .18]		-.07	.07	[-.24, .13]	
Model summary	$R^2 = .55, F(13, 230) = 21.86$ ***				$R^2 = .55, F(13, 230) = 21.65$ ***				$R^2 = .75, F(13, 230) = 52.40$ ***			
Describing												
Constant	.02	.05	[-.09, .15]		.03	.05	[-.09, .15]		.001	.04	[-.08, .11]	
Describing	-.001	.08	[-.22, .21]		.05	.06	[-.12, .21]		-.10	.06	[-.24, .05]	
Moral injury	.53	.08	[.32, .71]***		.27	.06	[.11, .42]***		.32	.05	[.19, .46]***	
Describing $\times$ MI	.09	.07	[-.08, .28]		.15	.05	[.02, .29]*		.05	.04	[-.11, .19]	
Observing	-.04	.09	[-.27, .21]		-.05	.07	[-.23, .13]		.06	.08	[-.14, .26]	
Awareness	-.05	.10	[-.32, .22]		-.08	.07	[-.30, .09]		-.35	.08	[-.56, -.13]***	
Nonjudging	-.06	.10	[-.34, .19]		.16	.08	[-.06, .38]		-.29	.08	[-.48, -.09]***	
Nonreactivity	.11	.08	[-.12, .31]		.01	.08	[-.18, .22]		-.05	.07	[-.23, .15]	
Model summary	$R^2 = .55, F(13, 230) = 21.91$ ***				$R^2 = .55, F(13, 230) = 21.58$ ***				$R^2 = .75, F(13, 230) = 51.65$ ***			
Awareness												
Constant	.04	.06	[-.10, .22]		-.13	.06	[-.30, .02]		.03	.04	[-.08, .15]	
Awareness	-.03	.11	[-.33, .22]		-.14	.06	[-.36, .06]		-.34	.08	[-.54, -.13]***	
Moral injury	.55	.07	[.35, .72]***		.26	.07	[.10, .41]***		.34	.05	[.20, .46]***	

	Alcohol Misuse				Drug Abuse Symptoms				PTSD Symptoms			
	β	SE	99% CI		β	SE	99% CI		β	SE	99% CI	
Awareness $\times$ MI	.08	.07	[-.08, .28]		-.25	.05	[-.46, -.09]	***	.05	.06	[-.09, .22]	
Observing	-.04	.10	[-.27, .23]		-.04	.07	[-.22, .14]		.06	.08	[-.15, .26]	
Describing	-.05	.08	[-.24, .15]		-.05	.05	[-.20, .08]		-.12	.06	[-.28, .03]	
Nonjudging	-.05	.11	[-.37, .22]		.11	.08	[-.11, .32]		-.28	.08	[-.48, -.08]	***
Nonreactivity	.12	.09	[-.13, .32]		-.10	.08	[-.30, .11]		-.05	.07	[-.21, .15]	
Model summary	$R^2 = .55, F(13, 230) = 21.73$ ***				$R^2 = .56, F(13, 230) = 22.85$ ***				$R^2 = .75, F(13, 230) = 51.60$ ***			
Nonjudging												
Constant	.03	.06	[-.12, .20]		-.12	.06	[-.27, .03]		.01	.04	[-.09, .13]	
Nonjudging	-.03	.11	[-.34, .24]		.02	.09	[-.23, .25]		-.28	.08	[-.46, -.08]	***
Moral injury	.55	.07	[.35, .72]	***	.26	.06	[.11, .40]	***	.33	.05	[.20, .45]	***
Nonjudging $\times$ MI	.06	.08	[-.13, .26]		-.22	.07	[-.42, -.06]	***	.03	.06	[-.12, .17]	
Observing	-.03	.09	[-.26, .22]		-.05	.07	[-.23, .14]		.06	.08	[-.14, .27]	
Describing	-.05	.07	[-.24, .14]		-.05	.05	[-.20, .08]		-.12	.06	[-.29, .04]	
Awareness	-.06	.10	[-.33, .20]		-.07	.08	[-.29, .12]		-.36	.08	[-.55, -.14]	***
Nonreactivity	.11	.09	[-.14, .32]		-.08	.08	[-.28, .12]		-.06	.07	[-.24, .15]	
Model summary	$R^2 = .55, F(13, 230) = 21.59$ ***				$R^2 = .56, F(13, 230) = 22.22$ ***				$R^2 = .74, F(13, 230) = 51.33$ ***			
Nonreactivity												
Constant	-.004	.05	[-.14, .14]		-.06	.05	[-.20, .07]		-.02	.04	[-.11, .07]	
Nonreactivity	.10	.08	[-.15, .30]		.04	.08	[-.16, .25]		-.04	.07	[-.21, .14]	
Moral injury	.54	.07	[.35, .71]	***	.27	.06	[.11, .42]	***	.32	.05	[.20, .45]	***
Nonreactivity $\times$ MI	.01	.07	[-.18, .20]		.23	.07	[.06, .41]	***	.08	.05	[-.07, .20]	
Observing	-.04	.09	[-.27, .22]		-.03	.07	[-.21, .15]		.06	.08	[-.14, .27]	
Describing	-.05	.07	[-.25, .15]		-.01	.05	[-.15, .13]		-.12	.06	[-.28, .04]	
Awareness	-.05	.11	[-.34, .21]		-.05	.07	[-.27, .12]		-.34	.08	[-.54, -.12]	***
Nonjudging	-.07	.11	[-.37, .19]		.17	.08	[-.04, .37]		-.28	.08	[-.48, -.08]	***
Model summary	$R^2 = .55, F(13, 230) = 21.48$ ***				$R^2 = .56, F(13, 230) = 22.48$ ***				$R^2 = .75, F(13, 230) = 51.94$ ***			

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Note. Significant effects are denoted with asterisks and were found using a 99% bias-corrected bootstrapped confidence that does not contain zero. Covariates were included in the analyses but are not shown in the table for the sake of parsimony. MI = moral injury. CI = confidence interval. BSE = bootstrapped standard errors.

 $p < .001$.