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Morally Injurious Experiences, Trauma-Related Guilt, and Substance Use among Iraq and Afghanistan Combat Veterans

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MORALLY INJURIOUS EXPERIENCES, TRAUMA-RELATED GUILT, AND SUBSTANCE USE AMONG IRAQ AND AFGHANISTAN COMBAT VETERANS

by

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ABSTRACT

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Exposure to morally injurious experiences (MIEs), or stressors that transgress deeply held moral beliefs, are risk factors for hazardous alcohol use and drug abuse among combat veterans. Guilt following a traumatic event also has a negative impact on veteran's mental health and is conceptualized as a core symptom of moral injury that may elicit secondary outcomes, including substance use. Significant gaps remain in our understanding of the way MIEs and trauma-related guilt relate to hazardous alcohol use and drug abuse symptoms. Most prior research on MIEs and substance use have been limited to veterans sampled from the general population and further the role of both MIEs and trauma-related guilt in hazardous alcohol use and drug abuse symptoms has not been examined. Consequently, the present study used data collected by the Department of Veterans Affairs (VA): (1) to investigate the relationships between combat, MIEs, hazardous alcohol use, and drug abuse symptoms; (2) to explore the effects of combat and MIEs on drug abuse symptoms; (3) to examine the potential mediating role of MIEs on the association between combat and hazardous alcohol use; (4) to evaluate the effects of trauma-related guilt on combat, MIEs, and drug abuse symptoms; and (5) to examine both the individual mediating role of trauma-related guilt and the sequential mediating role of MIEs and trauma-related guilt on the combat-alcohol abuse association. The sample consisted of 285 Iraq and Afghanistan combat veterans; the majority were receiving VA benefits for service-connected disabilities. Participants completed questionnaires on combat experiences, MIEs, trauma-related guilt, hazardous alcohol

use, and drug abuse symptoms. Correlational findings revealed that MIEs were positively associated with trauma-related guilt, hazardous alcohol use, and drug abuse symptoms. Hierarchical logistic regression results demonstrated that MIEs have a significant, positive effect on drug abuse symptoms. However, trauma-related guilt did not have a significant effect on drug abuse symptoms. Structural equation modeling revealed that MIEs mediated the association between combat exposure and hazardous alcohol use. However, trauma-related guilt did not mediate the associations between combat exposure, MIEs, and hazardous alcohol use. Study findings partially supported the model that substance abuse symptoms are related to MIE exposure and that MIEs are a pathway through which combat may be related to hazardous alcohol use. However, no evidence was found to support trauma-related guilt's role in combat veterans' alcohol use or drug abuse symptoms. Given increasing rates of substance use among recent-era veterans, it is imperative that future research explore additional mechanisms that may be associated with alcohol use and drug abuse symptoms.

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CHAPTER I

INTRODUCTION

Challenges service members face in combat, such as exposure to high levels of violence and killing, are shown to have a lasting impact on service members' well-being and daily functioning (Hoge & Castro, 2006; Hoge et al., 2004). In addition to exposure to killing and violence, many service members deployed in recent conflicts report being confronted with ethical dilemmas to which they did not know how to respond (Mental Health Advisory Team [MHAT-VI], 2009). Traumatic events associated with combat and other types of military deployments have the potential to conflict with or transgress individual moral and ethical belief systems. Moral injury is a distinct syndrome that arises from exposure to morally and ethically challenging situations that fail to conform to an individual's moral belief systems (e.g., beliefs about right and wrong and personal goodness) or conflict with ethical guidelines or rules of appropriate behavior (e.g., military rules of engagement; Frankfurt & Frazier, 2015; Jinkerson, 2016; Litz et al., 2009; Shay, 2002). Combat and morally injurious experiences may also be associated with trauma-related guilt among military members and veterans. Further, moral injury is proposed to lead to the development of secondary outcomes including substance use. The purpose of this study was to investigate the associations between combat exposure, morally injurious experiences (MIEs), trauma-related guilt, hazardous alcohol use, and drug abuse symptoms among Iraq and Afghanistan-era combat veterans controlling for PTSD symptoms.

Combat Exposure

Combat engagements and other military deployments place service members in complex and potentially dangerous situations that can result in physical or psychological harm to self and others. Among Operation Iraqi Freedom (OIF) Marines and Army soldiers, the majority (87%

and 77%, respectively) reported shooting or directing fire at an enemy combatant, and 65% and 48%, respectively, reported being responsible for the death of an enemy combatants (Hoge et al., 2004). Exposure to high levels of violence and death, are shown to have a lasting impact on service members' functioning (Hoge & Castro, 2006; Hoge et al., 2004). Additionally, greater involvement in killing, violence, and destruction has increased the potential for MIE exposure and moral conflict (Grossman, 2009). Killing has increased in combat operations in the post-Vietnam era. In part, this increase may be due to the nature of recent combat operations. Specifically, recent wars (i.e., Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), and Operation New Dawn (OND)) involved more urban warfare and malevolent use of civilians which resulted in greater likelihood of ambiguity and uncertainty discerning an appropriate course of action.

Acts of perpetration, including atrocities (i.e., unnecessary, cruel, and abusive harm to others or lethal violence) and killing, are uniquely morally challenging events that have been found to be significant predictors of mental health outcomes including PTSD, depression, suicidality, dissociation, and functional impairment (see Frankfurt & Frazier, 2015 for review; Kelley, Bravo, Hamrick, Braitman, & Judah, 2019; Litz et al., 2009). Maguen, Lucenko, et al. (2010) found that both direct (e.g., intentional or willed killing) and indirect (e.g., perceiving or believing that others were killed because of personal actions) killing significantly predicted veterans' post-deployment functioning, even after controlling for combat exposure. Killing during combat can also have a significant influence on substance use in that service members may experience distress following combat and may use substances in an attempt to cope with distress (Kelley, Bravo, et al., 2019; Maguen, Lucenko, et al., 2010). Research with OIF veterans has shown that killing is a significant predictor of substance abuse, PTSD, dissociation,

functional impairment, and relationship problems, even after controlling for combat exposure (Maguen & Litz, 2012). Further, Fontana and Rosenheck (1999) found that after controlling for killing, other combat experiences (e.g., witnessing atrocities) no longer predicted PTSD symptoms, suggesting that killing a combatant or non-combatant during wartime is a more salient factor in predicting mental health outcomes compared to other combat experiences such as witnessing the death of an enemy. However, Fontana and Rosenheck (1999) also acknowledged that other forms of killing, including other sanctioned acts of killing, killing in self-defense, offensive initiatives, counterinsurgencies, and friendly fire (i.e., unintentional, collateral civilian deaths), can have damaging effects of service members (e.g., depressive symptoms, PTSD, and substance use). Although killing an enemy or non-combatant appears to have the strongest impact on mental health, witnessing atrocities and their effects, failing to prevent atrocities, and learning about atrocities in combat are also associated with PTSD symptoms (Fontana, Rosenheck, & Brett, 1992; Laufer, Brett, & Gallops, 1985).

Moral and ethical challenges in the military. Military culture attempts to prepare members to anticipate and react appropriately to the use of violence, killing, and witnessing the effects of war by incorporating moral and ethical trainings into military training (Grossman, 2009; Litz et al., 2009). Although training aids in fostering ideals of strong moral and ethical conduct, some combat situations may deviate from the service members' realm of moral and ethical understanding. Exposure to morally and ethically challenging combat stressors may disrupt service members' compliance with and belief in appropriate rules of engagement. These threats may motivate service members to act in an unnecessarily and inappropriately aggressive manner towards enemy combatants or civilian non-combatants and may result in service members subsequently violating rules of engagement. For instance, among soldiers deployed to

Iraq, 31% reported insulting or cursing at civilians, 5% reported mistreating civilians, and 11% reported damaging property unnecessarily (MHAT-VI, 2009). Furthermore, while 45% of a sample of OIF soldiers and Marines assessed in theater believed non-combatants (i.e., local civilians) should be treated with respect, 17% of military members surveyed believed that non-combatants should be treated as insurgents, that is, enemies (MHAT-VI, 2009). Regardless of the specific type of experience (e.g., witnessing a violent death, engaging in the death of an enemy combatant, intentional and/or unintentionally harming civilians, or ethical ambiguities), combat experiences can have a significant impact on moral and ethical belief systems (Fontana & Rosenheck, 2004).

Moral Injury

Combat experiences are often examined in relation to mental health outcomes; however, limited research has focused on the moral implications of combat. In response to these limitations, the construct of moral injury was developed to address the psychological, spiritual, behavioral, and social impact of exposure to a morally or ethically challenging situation. Moral injury is conceptualized as a "distinct syndrome of psychological, biological, behavioral, and relational problems" resulting from "perpetrating, failing to prevent, or bearing witness to acts that transgress deeply held moral beliefs and expectations" and may "cause dissonance and inner conflict" (Litz et al., 2009, p. 697). Moral injury develops from violations in an individual's moral and ethical belief systems. These belief systems are maintained by moral emotions, both self-focused and other-focused, and are predominately driven by expectations of others' responses to perceived transgressions (Litz et al., 2009; Shay, 2002, 2014). How individuals respond to internal conflict resulting from MIEs is suggested to be a key determinant in the development of moral injury (Lancaster & Erbes, 2017; Litz et al., 2009; Shay, 2014). When

military members are unable to assimilate or accommodate MIEs within existing self- and relational-schemas, they may experience internal conflict in the form of guilt, shame, and difficulties with forgiveness, all of which are characteristic of moral injury (Drescher et al., 2011; Lancaster & Erbes, 2017; Litz et al., 2009; Nash & Litz, 2013; Shay, 2002, 2014; Tangney, Stuewig, & Mashek, 2007).

Difficulties making meaning of traumatic experiences, especially those of a moral nature, are shown to be uniquely linked to PTSD and other mental health complaints (Currier, Holland, Chisty, & Allen, 2011). Moral conflict has been shown to create severe peri- or post-event emotional distress which subsequently increases motivation to avoid cues that serve as reminders of the experience (Litz et al., 2009; Shay, 2014). Behavioral, cognitive, and emotional responses to unreconciled moral conflict that manifest as withdrawal and self-condemnation (i.e., blaming oneself) tend to mirror symptoms of re-experiencing, avoidance, and emotional numbing typically associated with PTSD (Farnsworth, Drescher, Nieuwsma, Walser, & Currier, 2014; Jinkerson, 2016; Litz et al., 2009).

Although moral injury and PTSD are related and can co-occur, it should be noted that moral injury is mechanistically distinct from PTSD. Specifically, moral injury and PTSD can be distinguished by their etiology and symptom profiles. Moral injury is theorized to develop from exposure to a *moral* danger (e.g., violating one's moral code), whereas PTSD arises from a *mortal* danger (e.g., risk of physical harm; Nieuwsma et al., 2015). The DSM-5 criteria for PTSD restricts for "exposure to actual or threatened death, serious injury, or sexual violence" (American Psychiatric Association, 2013, p. 271), which further limits the focus of PTSD to traumas that elicit fear. In contrast to fear-based traumas, MIEs (which may or may not place military members at risk of direct or indirect physical harm) are believed to result in moral crisis

(Buechner & Jinkerson, 2016; Nieuwsma et al., 2015). Additionally, moral injury and PTSD are argued to have different symptom profiles such that PTSD is characterized by hypervigilance/hyperarousal, whereas moral injury is characterized by guilt and shame. (Buechner & Jinkerson, 2016). In the first empirical investigation of the differences between moral injury and PTSD, C. J. Bryan, Bryan, Roberge, Leifker, and Rozek (2017) found preliminary support that moral injury and PTSD are distinct constructs in that PTSD was uniquely characterized by startle reflex, memory loss, and flashbacks, while moral injury was uniquely characterized by guilt, shame, anhedonia, and social alienation. Additionally, a recent meta-analysis of functional MRI (fMRI) studies that examined neurobiological differences between danger and non-danger types of traumas found that veterans with PTSD as a result of danger- and/or fear-based traumas had higher glucose metabolism in the amygdalae (i.e., groups of nuclei within temporal lobes of the brain involved in processing of emotions such as fear, anger, and pleasure), whereas veterans with PTSD due to non-danger-based traumas (i.e., witnessing violence, traumatic loss, MIEs by self or other) had higher metabolism in the precuneus (i.e., the portion of the superior parietal lobule involved in episodic memory, reflections upon self, and aspects of consciousness; Barnes, Hurley, & Taber, 2019). Although evidence supports that moral injury and PTSD are distinct, they are likely to co-occur as events that contribute to one may also contribute to the other. Given the focus on moral injury in the present study, the author controlled for PTSD symptoms across all analyses.

Morally injurious experiences. Combat situations are suggested to place military personnel at increased risk for experiencing morally injurious experiences (MIEs), which are occurrences that are incongruent with fundamental beliefs and assumptions about how the world operates, how an individual or group should be treated, or is at odds with military training and

rules of combat engagement (Litz et al., 2009; Shay 2002, 2014). Litz and colleagues (2009) argued that MIEs are acts of transgression that create dissonance and conflict because they violate assumptions about right and wrong and personal goodness. Potential MIEs have been suggested to include perpetrating, failing to prevent, bearing witness to, or learning about acts that transgress deeply held moral beliefs and expectations as well as actions that are inhumane, cruel, depraved, or violent that bring about pain, suffering, or death of others (Drescher et al., 2011; Litz et al., 2009; Shay, 2002, 2014). Reactions to MIEs may take time to develop and individuals may come to perceive their actions or inactions as transgressing their moral code when they further reflect upon the experience or encounter others' reactions to their behavior (Frankfurt & Fraizer, 2016; Litz et al., 2009; Shay 2002, 2014). Although MIEs can occur in non-combat situations, such as police shootings, potential MIEs are frequent in modern combat theaters, thus, the possibility of moral injury is high.

Research examining combat-related moral and ethical challenges among Vietnam veterans found that the most common types of MIEs reported involved civilian deaths, betrayals, and within-rank violence (Flipse Vargas, Hanson, Kraus, Drescher, & Foy, 2013). In interviews with 23 mental health providers and chaplains who work with veterans, the most common forms of MIEs reported were betrayal (e.g., leadership failures and failure to act in accordance with one's values), incidents involving harm to civilians or their property, within-rank violence (e.g., sexual assault), inability to prevent death and suffering, and ethical dilemmas/moral conflicts (Drescher et al., 2011). Investigators also have found that across combat eras (e.g., Vietnam War, OEF/OIF/OND) certain types of MIEs (e.g., betrayal and killing civilians) increase the risk of maladjustment following combat compared to traditional combat experiences (e.g., firing

weapon on combatants; Lancaster, 2018; Maguen et al. 2009; Maguen, Lucenko, et al., 2010; Maguen, Vogt et al., 2010; Maguen et al., 2011).

Moral injury symptoms. Service members who encounter MIEs may experience cognitive dissonance and internal conflict and thus face the task of reconciling their discomfort and expectations of social condemnation and rejection (Higgins, 1987; Litz et al., 2009; Shay, 2002, 2014). It is this unresolved moral dissonance that theoretically leads to the potential core symptoms of moral injury which may include, but are not limited to, guilt, shame, difficulties with forgiveness, loss of trust, loss of meaning in life, and spiritual/existential distress (Frankfurt & Frazier, 2016; Jinkerson, 2016; Litz et al., 2009). These core symptoms are proposed to serve as pathways to possible secondary outcomes, including self-condemnation, psychological problems (e.g., depressive symptoms, anxiety, substance use), and interpersonal impairment (Currier, Holland, & Malott, 2015; Currier, Holland, Drescher, & Foy, 2015; Drescher et al., 2011; Frankfurt & Fraizer, 2016; Litz et al., 2009; Nash & Litz, 2013; Shay, 2002). According to Litz and colleagues' (2009) model, self-condemnation is a critical component that further contributes to a host of secondary problems, including re-experiencing of moral conflicts, avoidance, self-punishment, and self-harming behaviors, including substance abuse. Although the idea of the moral impact of war and combat is far from new, empirical investigations into the construct of moral injury is a recent occurrence. Moreover, there has been much debate regarding moral injury's symptomology. Across subject matter experts, self-deprecation (i.e., shame and guilt), loss of trust, difficulties with forgiveness, and spiritual/existential issues were found to constitute core symptoms of moral injury and additional psychological problems (i.e., depression, anxiety, re-experiencing, and substance abuse) were found to constitute secondary outcomes of moral injury (A. O. Bryan, Bryan, Morrow, Etienne, & Ray-Sannerud, 2014; C. J.

Bryan et al., 2017; Drescher et al., 2011; Maguen & Litz, 2012; Nash et al., 2013). When the National Vietnam Veterans Readjustment Survey was qualitatively reviewed with these areas in mind, the moral injury domains described most frequently by veterans were loss of trust, social problems (e.g., withdrawal), feelings of betrayal, spiritual/existential problems, and secondary psychological problems (e.g., depressive symptoms, substance use; Conway, 2013; Flipse Vargas et al., 2013). Several participants also described shame and guilt (Flipse Vargas et al., 2013). Literature on the impact of killing in combat has also lent itself to the understanding of moral injury. Specifically, among veterans receiving treatment for PTSD, killing in combat and failing to save a life were both associated with traumatic guilt, spiritual crisis, and loss of subjective spiritual meaning (Fontana & Rosenheck, 2004). Additionally, MacNair (2002a, 2002b) found that Vietnam veterans who reported killing were more likely to exhibit intrusive thoughts, anger, sleep problem, violent outbursts, social alienation, nightmares, survivors' guilt, hyper-alertness, and substance abuse. Collectively, these studies demonstrate that guilt, shame, difficulties with forgiveness, loss of trust, and spiritual/existential problems may constitute core symptoms of moral injury.

Based upon a review of theoretically and empirically supported moral injury symptoms, Jinkerson (2016) proposed an updated syndrome definition that is consistent with Litz and colleagues' (2009) etiological model. In Jinkerson's (2016) model, moral injury is comprised of several core symptoms which may catalyze or contribute to the development of secondary symptoms, or, the broader constellation of co-morbid symptoms associated with moral injury. Guilt, shame, spiritual/existential conflict (including loss of subjective meaning in life), and loss of trust were identified as core symptoms, whereas psychological problems (i.e., depression, anxiety, re-experiencing, suicidal ideation, and substance abuse) and social problems (e.g.,

alienation, interpersonal difficulty) were construed as secondary symptoms. As it relates to the current discussion, substance abuse may be understood as a secondary outcome of moral injury and exposure to MIEs.

Measuring moral injury experiences. To accurately assess MIE exposure and moral injury among military members and veterans, an accurate and comprehensive empirical measure is necessary. At present, two published self-report measures are available that assess for exposure to MIEs. The Moral Injury Exposure Scale (MIES; Nash et al., 2013) is an 11-item self-report measure of exposure to MIEs; it contains two subscales of perceived transgressions (e.g., perpetrating acts of commission or acts of omission) and perceived betrayals (e.g., perceived betrayal by leaders, self, and trusted others). A second measure is the Moral Injury Questionnaire – Military version (MIQ-M; Currier, Holland, Drescher, et al., 2015). The MIQ-M is a 20-item unidimensional measure of exposure to military deployment-related MIEs. Although both scales measure exposure to MIEs, neither assesses proposed defining characteristics of moral injury (i.e., guilt, shame, difficulties with forgiveness; Litz et al., 2009).

Validated measures of moral injury symptoms have been developed and include the Expressions of Moral Injury Scale – Military Version (EMIS-M; Currier et al., 2017) and Moral Injury Symptom Scale – Military Version (MISS-M; Koenig et al., 2018). However, at the time that the data for this study was collected, there were no validated measures for quantitatively assessing moral injury outcomes. Given that lack of validated measures at the time of the current data was collected, the original study investigators at the Department of Veterans Affairs (VA) utilized assessment strategies suggested by Jinkerson (2016) and standard measures at the time to examine the moral injury symptomatology, which, at that time, only included measures of exposure to MIEs (i.e., MIES (Nash et al., 2013) and MIQ-M (Currier, Holland, Drescher, et al.,

2015)). Guilt related to moral injury is proposed to be best understood as trauma-related guilt which has shown to possess facets separate from ordinary guilt, including survivor guilt, guilt for leaving combat, and guilt over failing to save a life (Jinkerson, 2016). Jinkerson (2016) recommended that researchers use the Trauma-Related Guilt Inventory (TRGI; Kubany et al., 1996). The TRGI assess for trauma-related guilt and its corresponding components: guilty cognitions, which measures guilt-related thinking; emotional distress, which measures pain and the negative emotional impact caused by the trauma; hindsight-bias /responsibility, which measures perceived responsibility for events; wrongdoing, which measures violation of personal moral standards; and lack of justification, which measures belief that actions were warranted. Given the lack of available moral injury symptom measures at the time the current data was collected, the current study examined trauma-related guilt as representative of potential moral injury.

Substance Use in the Military

While ample research has investigated the impact of PTSD and other mental health conditions among service members, less emphasis has been paid to substance use disorders among military members and veterans (Kelsall et al., 2015; Stimpson, Thomas, Weightman, Dunstan, & Lewis, 2003). Although fewer empirical works have focused on substance abuse, available research has long showed that alcohol and other substance use disorders are associated with combat experiences across theaters of war (e.g., Gulf War, OEF/OIF/OND; Bentel & Smith, 1971; Bray et al., 2010; Kelsall et al., 2015). Given the associations between combat and substance use, as well as rising rates of substance use among recent era veterans (Bonn-Miller, Harris, & Trafton, 2012; Bray, Brown, & Williams, 2013; Kelsall et al., 2015), it is imperative to

explore the mechanisms that impact hazardous alcohol use and drug abuse symptoms among combat veterans.

Alcohol use. Excessive alcohol use, particularly in the form of binge (i.e., drinking on a single occasion ≥5 drinks for men or ≥4 drinks for women) and heavy (i.e., drinking on a single occasion ≥5 drinks for men or ≥4 drinks for women at least one day a week in the past 30 days) drinking, is a well-known problem among military personnel (Bray et al., 2009; Bray et al., 2010; Kelsall et al., 2015). Alcohol use problems are of considerable concern given the increased likelihood that service members will experience negative alcohol-related problems such as work performance deterioration, legal problems, and possible disordered behaviors (Mattiko, Olmsted, Brown, & Bray, 2011; Stahre, Brewer, Fonseca, & Naimi, 2009). Among combat veterans of recent conflicts, estimates of alcohol misuse range from 12% to 40% (Bray, Brown, & Williams, 2013; Burnett-Zeigler et al., 2011; Calhoun, Elter, Jones, Kudler, & Straits-Troster, 2008; Kelley et al., 2013). Further, a meta-analysis of alcohol use disorders among Gulf War and OEF/OIF/OND veterans revealed that veterans who were deployed are at a greater risk of developing an alcohol use disorder compared to nondeployed veterans (Kelsall et al., 2015).

Military deployments and combat exposure are also associated with increases in alcohol consumption, binge and heavy drinking, and alcohol-related problems (Bray et al., 2010; Jacobson et al., 2008; Kelley et al., 2013; Lande, Marin, Chang, & Lande, 2008; Santiago et al., 2010; Spera, Thomas, Barlas, Szoc, & Cambridge, 2011). Deployment duration and frequency are associated with higher rates of heavy alcohol use among service members (Ong & Joseph, 2008; Spera et al., 2011). Bray, Brown, and Williams (2013) investigated trends in alcohol use among U.S. active duty personnel who served between 1998 and 2008. They found that personnel who experienced high levels of combat exposure reported significantly higher rates of

heavy (26.8%) and binge (54.8%) drinking compared to those with little or no combat exposure. High rates of hazardous alcohol use among military members is a significant concern given that problems stemming from excessive alcohol use can compromise the ability of military members to carry out their missions and result in lower readiness and lower total force fitness of the Armed Forces (Jonas et al., 2010). Research has only recently begun to examine the relationship between MIE exposure, moral injury, and alcohol misuse. Available research has demonstrated that exposure to MIEs is significantly associated with greater hazardous alcohol use (Battles et al., 2018; Battles, Kelley, Jinkerson, Hamrick, & Hollis, 2019; Braitman et al., 2018; Forkus, Breines, & Weiss, 2019; Kelley, Braitman, White, & Ehlke, 2019; Robbins, 2016). Additionally, limited research has examined mechanisms that may influence the relationships between MIEs, moral injury, and substance use. Available works have demonstrated that spiritual injury (i.e., distress elicited by an event that damages an individual's relationship with Higher Power and alienates them from meaning making systems) and moral injury symptoms (i.e., guilt, shame, difficulties with forgiveness, and withdrawal; measured based on Litz et al. (2009) model) were pathways through which MIEs were associated with hazardous alcohol use (Battles, et al., 2018; Battles et al., 2019; Robbins, 2016). Given the limited research regarding mechanisms influencing the relationship between MIEs and hazardous alcohol use, models of the connection between trauma and substance use may further illuminate the relationship between moral injury and hazardous alcohol use.

Drug use. Recent research has consistently demonstrated that rates of illicit drug use, particularly opioid use, have increased among both the general public (Cicero, Inciardi, & Munoz, 2005; Compton & Volkow, 2006; Gilson, Ryan, Joranson, & Dahl, 2004) and among military and veteran populations (Bonn-Miller et al., 2012; Bray et al., 2010). Illicit drug use

among military personnel has varied during previous U.S. wars and combat engagements, likely due to availability and access, levels of stress, and changes in cultural beliefs related to the use of specific substances (Federman, Bray, & Kroutil, 2000; Larson, Wooten, Adams, & Merrick, 2012). During the Vietnam War, over 80% of Army soldiers reported using marijuana and 45% reported trying narcotics (34% used heroin; 38% used opium; Robins, 1993). Further, among Army soldiers who were addicted to drugs during the Vietnam War, drug use decreased after returning from Vietnam such that 5% of personnel who were addicted to drugs in Vietnam remaining addicted after deployment (Robins, 1993). This widespread Vietnam-era drug use prompted the Department of Defense (DoD) to adopt a "zero tolerance" policy and to start mandatory routine drug tests for opiates, barbiturates, amphetamines, and cocaine which, if tested positive, could result in serious sanctions including possible discharge from service (Bachman, Freedman-Doan, O'Malley, Johnston, & Segal, 1999). Since the initiation of this policy, illicit drug use, excluding prescription drug use, has dramatically decreased among active duty military members and remains around 3% (Bray et al., 2010).

Although rates of reported illicit drug use among active duty members have remained relatively low, self-reported misuse of prescription medications have escalated such that more active duty military members are experiencing problems with narcotics, benzodiazepines, and other prescription medications (Army Suicide Prevention Task Force, 2010). Self-reports of non-medical prescription drug use among active duty members have increased from 4% in 2005 to 11% in 2008 (Bray et al., 2010). Additionally, Bray et al. (2009) found that self-reported prescription drug misuse (i.e., taking more prescription medication than prescribed or taking prescription medication without a prescription) among active duty personnel in the past 30 days was 10% for pain relievers and 3% for tranquilizers and muscle relaxers.

Research on veterans has demonstrated a significant increase in illicit drug use, particularly among Iraq and Afghanistan veterans. For instance, research has shown a significant increase in Cannabis Use Disorder (CUD) diagnosis among veterans receiving care from the Veterans Affairs Health Care System (VA) over a seven-year period (Bonn-Miller et al., 2012). The prevalence of veterans with a CUD diagnosis, but no other illicit substance use disorder (SUD) diagnosis, rose 115.41% from 0.27% in 2002 to 0.58% in 2009 (Bonn-Miller et al., 2012). Additionally, among states where cannabis use is legal, there were significantly higher rates of CUD diagnosis among VA users in 2002, 2008, and 2009 (Bonn-Miller et al., 2012). Although it is suspected that combat veterans misuse illicit substances as a part of maladaptive coping with combat-acquired physical or psychological injury, the extent to which combat exposure impacts drug abuse symptoms is not fully known (Dao & Frosch, 2010).

Although research has yet to examine mechanisms that impact veterans' substance use, available research has linked anxiety (Bonn-Miller & Moos, 2009; Johnson, Bonn-Miller, Leyro, & Zvolensky, 2009; Johnson, Mullin, Marshall, Bonn-Miller, & Zvolensky, 2010) and PTSD (Bonn-Miller, Vujanovic, & Drescher, 2011; Bonn-Miller, Vujanovic, Feldner, Bernstein, & Zvolensky, 2007; Bremner, Southwick, Darnell, & Charney, 1996) to more frequent and problematic cannabis use. Additionally, PTSD and other psychiatric diagnoses are higher among veterans with CUD compared with veterans with other SUD (i.e., amphetamine, barbiturate, cocaine, and opioid use disorder; Bonn-Miller et al., 2012). Although illicit drug use has been linked with combat exposure and PTSD, it remains unclear to what extent combat veterans misuse prescription drugs or other illicit drugs as part of maladaptive coping with combat-acquired wounds, pain, or psychological injury (Dao & Forsch, 2010).

Substance use theories. Many theories postulate that stress plays an important role in motivating addictive substance abuse (Dass-Brailsford & Myrick, 2010; Koob & Le Moal, 1997; Leventhal & Cleary, 1980; Marlatt & Gordon, 1985; Russell & Mehrabian, 1975; Shiffman, 1982; Wills & Shiffman, 1985). Many of these models are based on the longstanding view that individuals use both licit and illicit substances to cope with or ameliorate negative emotions and distress (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004; Dass-Brailsford & Myrick, 2010; Sinha, 2010). Most theories on mechanisms influencing substance use have focused on alcohol use. However, theories developed to explain hazardous alcohol use may also apply to drug abuse. The motivational models (Cox & Klinger, 1988), stress-coping theory (Khantzian, 1985; Wills & Shiffman, 1985), and tension-reduction models (Sher & Levenson, 1982) are among the most prominent models for understanding the connection between trauma and alcohol use and are reviewed here.

The motivational model of alcohol use postulates that alcohol consumption is largely driven by specific motivators (Cooper, 1994; Cooper, Frone, Russell, & Mudar, 1995; Cox & Klinger, 1988; Willis & Hirky, 1995). It identifies that individuals are driven to drink by a desire to either 1) enhance well-being, 2) obtain positive social rewards, 3) reduce or regulate negative emotions, and 4) avoid social rejection, or a combination of these motives (Cox & Klinger, 1988, 1990). These motivations are often developed based on patterns of experiences and consequences (Cooper, 1994; Cutter & O'Farrell, 1984), and are characterized by underlying dimensions of reinforcement (positive, negative) and expectations of the outcome (Cooper, 1994; Cooper et al., 1995; Cox & Klinger, 1988, 1990). Similar to the motivational model of alcohol use, the reinforcement model of drug use proposes that drug use is influenced by reinforcement mechanisms such that individuals attempt to maximize rewards while minimizing consequences

which in turn motivates further drug use (Goode, 2015). Both the motivational and reinforcement models suggest that the interactions of negative reinforcement (i.e., relief from stress) and positive reinforcement (i.e., enhanced mood, drug-elicited sense of euphoria) can increase vulnerability to hazardous alcohol use and drug abuse symptoms. In particular, stress is proposed to have a critical influence on substance use and is postulated to lead to state-related changes in the brain's reward system; resulting in greater sensitivity to the reinforcement properties of substances and increasing the motivation to use substances compulsively (Koob & Le Moal, 1997). Overall, substance use models assume that varying motives and factors influence alcohol and drug use behaviors, and these variances may differentiate phenomenologically distinct functional groups of substance users (Cooper, 1994; Goode, 2015).

Investigations into the relationship between motives and substance use outcomes have generally shown differential effects between specific motives and substance use outcomes (Cooper, Russell, Skinner, & Frone, 1992; Kuntsche, Knibbe, Gmel, & Engels, 2005; Sinha, 2001). Using alcohol to cope with negative mood both directly and indirectly predicts alcohol use problems (Cadigan, Martens, & Herman, 2015; Najavits & Ramya, 2016; Watkins, Franz, DiLillo, Grantz, & Messman-Moore, 2015). Further, drinking and drug use as a coping mechanism to reduce stress is positively associated with dependence symptoms and compulsive substance use (Cooper et al., 1992; Laurent, Catanzaro, & Callan, 1997; Sinha, 2010). Consistent with the motivational and reinforcement models, the stress-coping model (or, self-medication model) of substance use contends that individuals use alcohol and drugs to regulate negative affect/distress, which is effective for short-term relief but is maladaptive as a long-term coping strategy (Dass-Brailsford & Myrick, 2010; Khantzian, 1985; Wills & Shiffman, 1985).

Similar to the stress-coping models of substance use, tension reduction models propose that individuals use alcohol or drugs to enhance mood and alleviate tension or emotional distress (Cooper et al., 1992; Conger, 1956; Dass-Brailsford & Myrick, 2010; Sher & Levenson, 1982; Sinha, 2001, 2010). Accordingly, exposure to tension-producing circumstances (i.e., stressors) may contribute to increased alcohol or drug use, as individuals seek relief from stress or tension. Indeed, numerous investigations on alcohol use have demonstrated that social and problem drinkers expect alcohol to relieve tension, anxiety, and stress while promoting relaxation (Critchlow, 1986; Goldman, Brown, & Christiansen, 1987; Greeley & Oei, 1999; Jones, Corbin, & Fromme, 2001; Leigh, 1990). Further, research conducted with predominately college-student samples has demonstrated that alcohol and drug use often initially reduce symptoms of PTSD, anxiety, and depression (e.g., Kuntsche et al., 2005; Martens et al., 2008; Park & Levenson, 2002; Stewart & Devine, 2000) but this relief is only temporary. Because alcohol and drugs are used to relieve stress, there is increased motivation to use substances when stressors are present. Although both alcohol and drug use may initially temper distress and enhance mood, as the behavior is reinforced and becomes ubiquitous, it is less instrumentally successful (Sinha, 2001, 2010). Further, relying on either licit or illicit substances to cope may result in declining adaptive coping and increased belief that they can only effectively cope by consuming alcohol and/or drugs (Cooper, 1994; Cooper, Russell, & George, 1988; Sinha, 2001).

Regarding military members, stressors associated with military service (e.g., frequent deployments, combat exposure, and operational pressures) can significantly impact service members by increasing stress and negative mood states, which contribute to substance misuse risk. Indeed, military deployments and combat exposure have been correlated with increased substance use in service members (Bravo, Kelley, & Hollis, 2017; Bray, Brown, & Lane, 2013;

Bray et al., 2010; Burnett-Zeigler et al., 2011; Clarke-Walper, Riviere, & Wilk, 2014; Hoge, 2010; Institute of Medicine, 2012), with those with multiple deployments being at greater risk for substance use problems (Browne et al., 2008; Hooper et al., 2008; Kelley et al., 2013; Kelley et al., 2015; Maguen, Lucenko, et al., 2010; Wilk et al., 2010). In addition, degree of combat exposure has been shown to impact hazardous alcohol use as those with greater combat exposure report significantly higher rates of heavy and binge drinking (Bray, Brown, & Williams, 2013). Military personnel may also be motivated to use alcohol or drugs to cope with daily operational stressors (e.g., work orders, finances, separation from family) associated with service. Over time, individuals who use substances to attempt to regulate negative emotions may be at an increased risk for alcohol and drug related problems (Cooper et al., 1995).

Mood disorders, such as anxiety and depression, have also been associated with hazardous alcohol use and drug abuse symptoms among those exposed to combat (Prigerson, Maciejewski, & Rosenheck, 2002; Shipherd, Stafford, & Tanner, 2005). Studies have shown that among U.S. veterans of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), anywhere from 4 to 22% have PTSD (Milliken, Auchterlonie, & Hoge, 2007; Richardson, Frueh, & Acierno, 2010; Seal, Bertenthal, Miner, Sen, & Marmar, 2007; Vasterling et al., 2006). For some service members, substances may be used to cope with normal stressors, but to also cope with traumatic stress symptoms, such as hyperarousal or numbing/detachment. Thus, substances may be a way for veterans to experience relief from the psychological and physiological symptoms of warzone trauma (Al'Absi, 2007; Dixon, Leen-Feldner, Ham, Feldner, & Lewis, 2009; Hoge et al., 2004; Jacobsen, Southwick, & Kosten, 2001; Schumm & Chard, 2012). This argument is consistent with theories that contend that some individuals may use substances to reduce or regulate negative emotions (Cox & Klinger, 1988; Dass-Brailsford &

Myrick, 2010; Wills & Shiffman, 1985). Further, support has been demonstrated for the self-medication model of substance use among veterans (Kelley et al., 2013, 2015; Shipherd et al., 2005).

Moral injury and substance use. Although ample research has examined the influence of combat exposure on alcohol and drug use, far fewer empirical investigations, mainly in the author's lab (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; Kelley, Braitman, et al., 2019; Robbins, 2016) have examined the relationship between MIEs and alcohol use among military personnel and veterans. Among combat exposed military personnel and veterans, greater exposure to MIEs was significantly associated with greater hazardous alcohol use (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019; Robbins, 2016). Further, mediation analyses demonstrated that exposure to MIEs was a significant pathway through which combat exposure was associated with hazardous alcohol use (Battles et al., 2019; Robbins, 2016). To date, four studies have examined the association between exposure to MIEs and drug abuse symptoms (Battles et al., 2018; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019). All four studies found that MIE exposure was positively associated with drug abuse symptoms. Although research has consistently indicated that MIEs are positively associated with alcohol and drug abuse, the available works have been limited to community samples of combat veterans recruited from the general population. While these investigations have provided early findings on the associations between moral injury and drug abuse symptoms, limited researchers have examined additional mechanisms that may influence this relationship. Conceptualizations of moral injury postulates that substance use is a secondary outcome that is elicited by the core symptoms of moral injury (i.e., guilt, shame, difficulties with forgiveness) that arise from exposure to MIEs (C. Bryan et

al., 2017; Frankfurt & Frazier, 2016; Jinkerson, 2016; Litz et al., 2009). Given moral injury theory, available literature on the associations between MIEs, hazardous alcohol use (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; Kelley, Braitman, et al., 2019; Robbins, 2016), and drug abuse symptoms (Battles et al., 2018; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019), and other works demonstrating that more combat exposure is associated with greater substance use (Browne et al., 2008; Hooper et al., 2008; Kelley et al., 2013; Maguen, Lucenko, et al., 2010; Wilk et al., 2010), it was postulated that the association between combat exposure and substance use outcomes would be mediated by exposure to MIEs.

Trauma-Related Guilt

Traumatic events can have a lasting impact on individuals' perceptions of themselves, others, and the world around them. One specific implication of trauma is the development of guilt. Globally, guilt is defined as an aversive conscious emotion that involves self-reproach and remorse for one's thoughts, feelings, or actions, and a sense of wrongdoing as if one has violated moral principles (Hoffman, 1994; Kubany et al., 1995; Wright, 1971). Similarly, Kugler and Jones (1992) defined guilt as the dysphoric feeling associated with the recognition that one has violated a personally relevant moral or social standard. Although varying definitions are available (Buss & Durkee, 1957; Mosher, 1968; Opp & Samson, 1989), there is consistent agreement that guilt comprises both affective and cognitive dimensions (Baumeister, Stillwell, & Heatherton, 1994; Klass, 1990; Kubany, 1994; Kugler & Jones, 1992). Conceptualizations of guilt have also been expanded to understand how specific contexts can impact development and presentation. Research has explored the unique influence of trauma on guilt presentations. As a result, the concept of trauma-related guilt has been developed. Trauma-related guilt, as conceptualized in the current study, is defined as a construct consisting of affective symptoms

and a set of interrelated beliefs/cognitions about one's role in a negative event. Trauma-related guilt manifests as a maladaptive, paralyzing form of guilt related to attributing responsibility or blame to oneself, and it is often complicated by negative global beliefs of the self (Kubany et al., 1996). There is a significant interplay between cognitive and affective components and as such, it is proposed that both cognitive and emotional elements must be present for guilt to occur. As such, if a traumatic event does not elicit distress, it is unlikely that guilt will occur.

Affective components of trauma-related guilt are elicited when the outcome of an event is perceived as negative and is a source of distress. Guilty distress often manifests as emotional pain, grief/sorrow, and even physical sensation, including sweating and muscle tension (Kubany et al., 1996). Cognitive components associated with guilt are proposed to be comprised of four distinct factors. These factors include (a) violation of personal standards of right and wrong, (b) responsibility for causing the event, (c) perceived lack of justification for actions taken, and (d) false beliefs about pre-outcome knowledge caused by hindsight bias (Kubany et al., 1995). Cognitive factors are believed to be central to the development and severity of guilt. Specifically, researchers have posited that wrongdoing or violation of moral principles, as well as perceived personal responsibility for causing the negative event or outcome, are central components of guilt (Klass, 1990; Kugler & Jones, 1992; McGraw, 1987; Tangney, 1991). Individual perceptions about personal responsibility and wrongdoing are believed to be mitigated by whether an individual believes that their actions were justified (McGraw, 1987). Additionally, hindsight bias is another facet that is suspected to play a role in the etiology of guilt. Hindsight bias occurs when an individual possesses knowledge about the outcome of an event and falsely believes they were capable of predicting or affecting the outcome (Kubany et al., 1995). Information about outcomes gathered after the event tends to bias recollections of

what was known before the event occurred. Often, individuals will project new knowledge into the past with an accompanying denial that the information about the outcome has influenced their current judgment (Hawkins & Hastie, 1990). Compared to other factors, hindsight bias may help to explain why trauma survivors frequently experience guilt that may have little basis in reality (Kubany et al., 1995). The relative contribution of these cognitive components of guilt as determinants of the development and severity of guilt is thought to depend on the degree to which the components are manifested (Kubany, 1994). Specifically, research among Vietnam veterans has shown that the strength of beliefs about personal responsibility, wrongdoing, justification, and pre-outcome knowledge are positively associated with guilt about specific trauma-related events (Kubany et al., 1995).

Combat exposure and trauma-related guilt. Violence and killing are harsh realities in war and encounters with the aftermath of battle are enduring aspects of a service member's combat experience. Combat situations, particularly within recent engagements (i.e., OEF/OIF), were marked with significant moral and ethical ambiguity. Moral and ethical ambiguity produce situations in which the best course of action is difficult to determine (e.g., an unmarked enemy, civilian threats; Litz et al., 2009). Service members may find themselves engaging in actions (e.g., killing both combatants and noncombatants, witnessing disproportionate violence) that may be contrary to deeply ingrained personal and societal values (e.g., nonviolence and preservation of life) and these experiences may, in turn, evoke significant distress (Litz et al., 2009). Distress elicited by exposure to these challenging combat situations may manifest as trauma-related guilt (Dean, 1990; Glover, 1988; Henning & Frueh, 1997; Leskela, Dieperink, & Thuras, 2002; Marx et al., 2010; Nazarov et al., 2015; Opp & Samson, 1989; Parson, 1986; Williams, 1987).

To understand the unique influence of combat exposure on trauma-related guilt, Kubany (1994) developed a cognitive model of trauma-related guilt that focuses on the reasoning process that leads some veterans to judge their behavior in a harsh or self-depreciative way, and to conclude that their actions and reactions were somehow wrong or inappropriate. The source of guilt veterans may experience is posited to be linked to highly specific experiences during combat in which the veteran may believe that the choices they made were inapt, faulty, or even dishonorable (Glover, 1984; Kubany, 1994; Marx et al., 2010; Nazarov et al., 2015; Park, Mills, & Edmundson, 2012; Williams, 1987). Combat survivors may experience hindsight bias whereby they come to believe that if they had acted differently, then the consequences would not have occurred (e.g., their comrades would be unharmed or alive), and in turn this conviction elicits trauma-related guilt (Park et al., 2012). Veterans may believe a variety of reasons for negatively evaluating their actions, but often times these judgments are based on faulty assumptions (e.g., "I should have known better") or may reflect a failure to recognize that all available choices may have been "bad"; that the "least bad" choice selected may have reflected sound and moral judgment (Kubany, 1994). Hindsight appraisals can lead veterans to believe that somehow, they should have been able to anticipate negative outcomes to their actions in combat and, therefore, should have behaved differently (Kubany, 1994). It is also possible that veterans may hold themselves personally responsible for combat outcomes which in turn elicits feelings of guilt. Although initially guilt may be adaptive following a trauma, as it encourages changes in behavior that elicited the initial distress, trauma-related guilt may ultimately lead to self-condemnation and other mental health concerns (C. J. Bryan, Morrow, Etienne, & Ray-Sannerud, 2013; Hendin & Haas, 1991).

Research has demonstrated a significant connection between trauma-related guilt and mental health outcomes. Trauma-related guilt has been linked with depressive symptoms and suicidal ideation among survivors of different types of trauma, including combat exposure (Briere & Runtz, 1986; Cascardi & O'Leary, 1993; Hendin & Haas, 1991; Nazarov et al., 2015; Roden, 1982). Additionally, trauma-related guilt has been shown to be strongly associated with PTSD. Among Vietnam veterans, severity of trauma-related guilt predicted more PTSD symptoms, particularly reexperiencing and avoidance symptoms (Henning & Frueh, 1997; Kubany et al., 1995). Additionally, combat associated trauma-related guilt is shown to mediate the relationship between atrocity exposure and the development of PTSD and Major Depressive Disorder (MDD) (Brock, 2012; Marx et al., 2010). Across combat eras (e.g., Vietnam War, Post-9/11), trauma-related guilt is a significant predictor of suicide ideation and attempts (C. Bryan et al., 2013; Hendin & Haas, 1991; Nazarov et al., 2015). Further, trauma-related guilt mediated the relationships between depression and PTSD symptom severity and suicidal ideation (C. Bryan et al., 2013; C. Bryan et al., 2015). The components of trauma-related guilt (i.e., global guilt, distress, guilt cognitions), as assessed by the Trauma-Related Guilt Inventory, have been examined for their influence on mental health concerns among veterans. Among a sample of OEF/OIF/OND combat veterans, components of trauma-related guilt (i.e., global guilt, distress, guilt cognitions) were examined as serial mediators of the relationship between PTSD and suicidal ideation (Tripp & Mc-Devitt-Murphy, 2016). Researchers found that the serial mediation chain of guilt cognitions, distress, and global guilt significantly mediated the relationship between PTSD and suicidal ideation.

Moral injury and guilt. Guilt is conceptualized as a primary core symptom of moral injury and may further contribute to the development of secondary outcomes (e.g., substance use,

social isolation; Frankfurt & Frazier, 2015; Jinkerson, 2016; Litz et al., 2009). Generally, guilt has been understood from the viewpoint that the experience of guilt assists in re-orienting one to their value system when they engage in conflicting actions. While guilt of this nature may motivate an individual to seek atonement and resume a morally congruent life, guilt associated with exposure to MIEs may not motivate individuals towards restitution but rather lead to greater demoralization (Jinkerson, 2016). Specifically, individuals who acted as perpetrators of MIEs may justifiably attribute self-blame for the consequences. However, given that their guilt is congruent with the realities of their actions, the type of guilt elicited by perpetrating MIEs may be more debilitating and hinder motivations to make amends, which may further contribute to secondary outcomes of moral injury (e.g., substance use, social isolation; Jinkerson, 2016). Furthermore, given the greater ambiguity associated with modern combat theatres, guilt associated with exposure to MIEs may develop after engaging in a morally ambiguous situation in which discerning right and wrong may not have been objectively possible.

Guilt associated with moral injury is theorized to influence shame, depression, interpersonal issues, loss of trust in self/others/God or World, self-handicapping, and alienation (Jinkerson, 2016; Litz et al., 2009). These additional symptoms are proposed to demotivate the individual further and increase the burden of trauma-related guilt. To date, few studies have examined the relationship between trauma-related guilt and MIEs (C. Bryan et al., 2013; Dennis et al., 2017; Jinkerson & Battles, 2019). Among combat veterans, exposure to MIEs positively predicted trauma-related guilt as assessed by the TRGI (Jinkerson & Battles, 2019). Further, trauma-related guilt mediated the relationship between MIE exposure, depressive symptoms, anxiety, and PTSD symptoms (Jinkerson & Battles, 2019). Among Vietnam War veterans, mediational support was found in which combat-related guilt was a pathway through which

involvement in wartime atrocities (a specific type of MIE) was associated with depression and suicidal ideation (Dennis et al., 2017). Although there is preliminary support for the relationship between trauma-related guilt and MIE exposure, no available research has examined the relationship between MIE exposure, trauma-related guilt, and substance use outcomes.

Purpose of the Present Study

The present study used data from an existing data set collected by the Department of Veterans Affairs (VA) Mid-Atlantic Region (VISN 6) Mental Illness Research, Education, and Clinical Center (MIRECC) Moral Injury Study. The sample consistent of Iraq and Afghanistan combat veterans (N = 285), majority of whom were receiving VA benefits for a service-connected disability (i.e., 70.2%; n = 200). Using an existing data set, the first goal of the present research was to examine the relationship between combat exposure, MIE exposure, hazardous alcohol use, and drug abuse symptoms among Iraq and Afghanistan combat veterans. The second goal of the research was to examine the association of trauma-related guilt in the relationship between combat exposure, MIEs, hazardous alcohol use, and drug abuse symptoms. Given the current study's focus on moral injury, PTSD symptoms were controlled for across all analyses. Participants retrospectively reported on their combat experiences, MIE exposure, trauma-related guilt, and alcohol and drug abuse symptoms.

Demographic variables (see Appendix A) were examined as possible covariates of the associations with both hazardous alcohol use and drug abuse symptoms because patterns of substance use are shown to differ by gender (Kelley, Braitman, et al., 2019; Scott et al., 2010), race/ethnicity (Bray et al., 2009; Jacobson et al., 2008), age (Calhoun et al., 2008; Seal et al., 2011), marital status (Scott et al., 2010), education (Gfroerer, Greenblatt, & Wright, 2011; Patrick, Wrightman, Schoeni, & Schulenberg, 2012), and working status (Patrick et al., 2012).

Additionally, military demographic variables were examined as covariates because substance use is found to differ by military status (e.g., active duty, National Guard, veteran; Seal et al., 2009), branch of service (Baker et al., 2009), era of military service (Kline et al., 2009), and military rank (Bray et al., 2008; Seal et al., 2012). Demographic variables that were found to be significantly associated with hazardous alcohol use and drug abuse symptoms controlled for across all analyses (see *Data Cleaning* for more detailed review).

Purpose 1. To replicate and extend previous research demonstrating a significant relationship between combat exposure, MIEs, hazardous alcohol use, and drug abuse symptoms. Combat theaters and other deployed scenarios place military service members in complex, precarious situations that routinely result in physical and psychological harm (Hoge & Castro, 2006; Hoge et al., 2004). Stressors associated with deployments and combat have been linked to greater alcohol use in military members, in which greater combat exposure was associated with higher levels of binge and heavy drinking (Bray, Brown, & Williams, 2013). Additionally, frequency and severity of combat exposure is associated with greater drug use symptoms (Bray et al., 2010; Kelley et al., 2015). Greater attention is being paid to the implications of moral injury on substance use. Research has consistently demonstrated that exposure to MIEs is associated with greater hazardous alcohol use (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019; Robbins, 2016) and drug abuse symptoms (Battles et al., 2018; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019). Although research has consistently indicated that MIEs are positively associated with alcohol and drug abuse, the available works have been limited to community samples of combat veterans recruited from the general population. Therefore, the present research sought to extend these findings by examining the associations between combat, MIEs, hazardous alcohol use, and

drug abuse symptoms among a sample of predominately VA service-connected, Iraq and Afghanistan combat veterans recruited by the VA.

Utilization of a combat veteran sample recruited by the VA presents a unique opportunity to extend previous research as veterans connected with the VA tend to a higher rate of both physical and mental health concerns (Bagalman, 2013; Nelson, Stakerbaum, & Reiber, 2007; Randall, Kilpatrick, Pendergast, Jones, & Vogel, 1987). The higher rate of physical and mental health concerns is likely due to the VA requiring that veterans have received an honorable discharge (associated with completion of military contract) or were separated due to medical reasons in order to receive care (Department of Veterans Affairs, 2019). These requirements for VA care tend to result in a veteran population that has served more years in the military and/or had a disability that was caused or made worse by active duty service. Additionally, the VA verifies veterans discharge paperwork prior to admission to the VA through review of veterans' military discharge paperwork (i.e., DD-214; Department of Veterans Affairs, 2019). This results in a sample of verified veterans which has been an issue among community samples that rely on participants self-report of military service.

Hypothesis 1. It was hypothesized that combat and MIE exposure would be positively correlated with hazardous alcohol use and drug abuse symptoms such that greater exposure to combat and MIEs would be associated with greater reported hazardous alcohol use and drug abuse symptoms.

Purpose 2. To explore the effects of combat and MIE exposure on drug abuse symptoms. Although there is also growing attention being paid to the relationship between MIE exposure and drug abuse, only four studies have examined the relationship between MIEs and drug abuse symptoms (Battles et al., 2018; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et

al., 2019). Consistently across these four studies, exposure to MIEs was associated with drug abuse symptoms in community samples of combat veterans recruited from the general population. Given the limited research on the associations between MIEs and drug abuse, the current study sought to examine the effects of combat and MIE exposure on drug abuse symptoms in a sample of predominately VA service-connected, Iraq and Afghanistan combat veterans recruited by the VA.

Hypothesis 2. It was hypothesized that, controlling for PTSD symptoms and covariates, combat exposure and MIE exposure would have a positive effect on drug abuse symptoms such that more combat exposure and MIEs would be associated with greater drug abuse symptoms.

Purpose 3. To examine the potential mediating role of MIE exposure on the association between combat exposure and hazardous alcohol use. Exposure to MIEs has been shown to mediate the relationship between combat exposure and hazardous alcohol use (Battles et al., 2018; Battles et al., 2019; Robbins, 2016). Thus, it may be that greater exposure to MIEs are a pathway through which combat is associated with hazardous alcohol use. Although research has demonstrated support for the mediational effects of MIEs, the available research is limited to works by the author's lab. Therefore, the present study sought to extend these findings by examining the relationships in a sample of predominately VA-connected, combat veterans recruited by the VA.

Hypothesis 3. It was hypothesized that, controlling for PTSD symptoms and covariates, MIE exposure would mediate the relationship between combat exposure and hazardous alcohol use such that more combat exposure would be associated with more MIE exposure, which in turn, is associated with greater hazardous alcohol use**.**

Purpose 4. To examine the associations between trauma-related guilt, combat, MIE exposure, and drug abuse symptoms. Trauma-related guilt is shown to have a detrimental impact on service members' and veterans' functioning (Jinkerson & Battles, 2019; Kubany, 1994; Marx et al., 2010; Nazarov et al., 2015; Park et al., 2012; Tripp & Mc-Devitt-Murphy, 2016). Among combat veterans, trauma-related guilt is shown to be significantly related with MIE exposure, depressive symptoms, anxiety symptoms, suicidality, and PTSD symptoms (Dennis et al., 2017; Frankfurt, Frazier, & Engdahl, 2017; Jinkerson & Battles, 2019). Although research has shown that trauma-related guilt is associated with mental health concerns, to the author's knowledge, research has yet to investigate the impact of trauma-related guilt on substance use outcomes. Guilt is also proposed to play a central role in the symptomatology of moral injury (Frankfurt & Frazer, 2015; Jinkerson, 2016; Litz et al., 2009). Although empirical investigations of moral injury are burgeoning, only three studies have examined the relationship between moral injury symptoms and substance use (Battles et al., 2018; Braitman et al., 2018; Kelley, Braitman, et al., 2019). Given that a validated measure of moral injury guilt had not yet been developed at the time of the current study was developed and data were collected, the original study investigators assessed guilt related to moral injury using the Trauma-Related Guilt Inventory (Kubany et al., 1996). To the author's knowledge, no research has examined the associations between MIE exposure, trauma-related guilt, and drug abuse. Given the lack of research on the role of trauma-related guilt, the current research explored the relationship between trauma-related guilt, combat, MIEs, and drug abuse symptoms.

Hypothesis 4a. It was hypothesized that trauma-related guilt would be positively correlated with combat, MIE exposure, and drug abuse symptoms such that greater trauma-

related guilt would be related to more combat and MIE exposure and greater drug abuse symptoms.

Hypothesis 4b. It was hypothesized that, controlling for PTSD symptoms and covariates, trauma-related guilt would have a positive effect on drug abuse symptoms such that greater trauma-related guilt would be associated with more reported drug abuse symptoms.

Purpose 5. To examine trauma-related guilt and its relationship with combat and MIE exposure and hazardous alcohol use. As stated above, trauma-related guilt is shown to have a detrimental impact on service members' and veterans' functioning (Jinkerson & Battles, 2019; Kubany, 1994; Marx et al., 2010; Nazarov et al., 2015; Park et al., 2012; Tripp & Mc-Devitt-Murphy, 2016). However, similar to drug abuse, to the author's knowledge, no research has examined the associations between MIE exposure, trauma-related guilt, and hazardous alcohol use. Given the lack of research on the impact of trauma-related guilt on substance abuse, the current study aimed to explore the associations between trauma-related guilt and hazardous alcohol use.

Hypothesis 5a. It was hypothesized that trauma-related guilt would be positively correlated with hazardous alcohol use such that greater trauma-related guilt would be related to greater hazardous alcohol use.

Hypothesis 5b. It was hypothesized that, after controlling for PTSD symptoms and covariates, trauma-related guilt would individually mediate the relationship between MIE exposure and hazardous alcohol use such that trauma-related guilt would be a pathway through which MIE exposure is associated with hazardous alcohol use.

Hypothesis 5c. It was hypothesized that, controlling for PTSD symptoms and covariates, both MIE exposure and trauma-related guilt would sequentially mediate the relationship between

combat exposure and hazardous alcohol use such both MIE exposure and trauma-related guilt would be pathways through which combat is related to hazardous alcohol use.

CHAPTER II

METHOD

Participants

The final sample included 285 (255 men, 30 women) active duty personnel, National Guard/Reserves (NG/R), and veterans who served post-9/11 in support of Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), and Operation New Dawn (OND) who had experienced at least one warzone deployment of three months or more. All participants were combat veterans which was defined as an individual who attacked enemy combatants, was attacked, or served in a military designated dangerous region. See Tables 1 and 2 for descriptive information on the sample. The current study examined secondary data gathered from Department of Veterans Affairs (VA) Mid-Atlantic Region (VISN 6) Mental Illness Research, Education, and Clinical Center (MIRECC) Moral Injury Study (see Brancu et al., 2017 for detailed review). To participate in the current study, subjects had to have consented to being re-contacted for future research studies as part of their enrollment into the VISN 6 MIRECC Post-Deployment Mental Health (PDMH) Study. Participants who qualified were mailed a letter from the VISN 6 MIRECC and invited to participate in the present study (i.e., Moral Injury Study). VA study staff then contacted participants by phone to inform them about study details, screen for eligibility, and obtain verbal informed consent for those who met study criteria. Once screened and consented, participants received the questionnaires by mail to be completed at home and then returned in a preaddressed, stamped envelope. Participants received $50 via check or electronic funds transfer upon receipt of the completed questionnaires. The survey took approximately 1 to 1.5 hours to complete.

From the 946 veterans invited to participate in the study, 441 veterans enrolled in the study and 315 veterans returned questionnaire packets. Of those 315 participants, 30 did not endorse combat exposure on the Deployment Risk and Resiliency Inventory - 2 Combat Experiences subscale (Vogt, Smith, King, & King, 2012); data for participants who did not endorse any combat experiences were removed from the analyses. This resulted in a final sample size of 285. Most participants were male, Caucasian, married, employed full-time, and veterans. An estimated 70.2% (n = 200) of participants had a disability for which they were receiving VA benefits ("service-connected disability"). On average, participants were 46.09 years of age (SD = 10.41) and had deployed 1.70 times.

Table 1

General Demographic Characteristics of Final Sample (N = 285)

Variable	*N*	%
Sex		
Male	255	89.4%
Female	30	10.6%
Race		
Caucasian	117	41.1%
African-American	110	38.6%
Native American	10	3.5%
Asian	27	9.5%
Pacific Islander	21	7.3%
Marital Status		
Married/Domestic Partner	179	62.8%
Widowed	17	6%
Separated	17	5.6%
Divorced	25	8.8%
Never Married	47	16.5%
Working Status		
Unemployed	77	27.2%
Part-Time	27	9.5%
Full-Time	181	63.3%

Table 2

Military-related Demographic Characteristics of Final Sample (N = 285)

Variable	N	%
Military Status		
Active Duty	12	4.2%
Veterans	177	62.1%
Reserves	7	2.4%
Ready Reserved	26	9.1%
Inactive Ready Reserves	9	3.2%
National Guard	10	3.5%
Inactive National Guard	20	7%
Other	24	8.5%
Military Branch		
Army	86	30.2%
Navy	37	12.9%
Air Force	28	9.8%
Marines	46	16.2%
Reserves	30	10.5%
National Guard	58	20.4%
Era of Service		
Between Korea and Vietnam Wars	1	0.3%
Vietnam War	20	7%
Post-Vietnam War	54	18.9%
Gulf War	101	35.4%
Post-Gulf War	122	42.8%
Operation Enduring Freedom	147	51.5%
Operation Iraqi Freedom	235	82.5%
Operation New Dawn	19	6.7%
Rank		
E-2	10	3.5%
E-3	6	2.1%
E-4	53	18.6%
E-5	61	21.4%
E-6	56	19.6%
E-7	37	13%
E-8	22	7.7%
E-9	4	1.4%
W-1	0	0
W-2	3	1.1%
W-3	0	0
W-4	3	1.1%
W-5	0	0

Table 2 (Completed)

Military-related Demographic Characteristics of Final Sample (N = 285)

Variable		N	%
	O-1	0	0
	O-2	3	1.1%
	O-3	8	2.8%
	O-4	6	2.1%
	O-5	6	2.1%
	O-6	6	2.4%
	O-7	1	0.4%

Note. Reserves branch includes Army, Air Force, Navy, National Guard, and Marines; Era of Service was not mutually exclusive such that percentages do not sum to 100% because some participants served in multiple eras - Between Korea and Vietnam Wars = 1954-1959; Vietnam War = 1960-1975; Post-Vietnam War = 1976-1989; Gulf War = 1990-1991; Post-Gulf War = 1991-2001; Operation Enduring Freedom = 2001-present; Operation Iraqi Freedom = 2001-9/1/2010; Operation New Dawn = 9/1/2010-present.

Procedure

The VA VISN 6 MIRECC Moral Injury Study was completed as a follow-up to the VA VISN 6 MIRECC Post-Deployment Mental Health (PDMH) Study of veterans who served in the U.S. military post-9/11 (see Brancu et al., 2017 for more detail review of study procedures). Participants who agreed to be re-contacted for future studies were mailed a letter from the VA VISN 6 MIRECC and invited to participate in the Moral Injury Study as well as to alert them that they may be contacted by phone by study staff. From the total 3,065 participants who completed the initial PDMH baseline study and agreed to be re-contacted, a total of 2,165 participants were eligible to participant in the Moral Injury Study. Participants who did not serve in a war/operation zone (n = 670) or who were identified to have psychosis (n = 230) during the initial study were excluded from the follow-up study and not mailed a study invitation. Of the 1,725 eligible participants, 1,007 were randomly selected and invited to participant in the Moral

Injury Study. Of these 1,007, only 946 participants provided a valid address or phone number. Of the 946 participants who were sent an invitation letter, 463 participants were not able to be reached by phone. The remaining 483 participants were reached and screened over the phone by VA study staff to ensure they had participated in the initial study and had served in a war/operation zone. Of the 483 contacted, 42 participants declined to participate resulting in 441 participants enrolled in the study. Hardcopies of consent documents and questionnaires, which took approximately 1 to 1.5 hours to complete, were completed and mailed back to investigators. Of the 441 participants enrolled in the study, 315 participants completed and returned study questionnaires. The study had a participation rate of 71.4%. Of these 315 participants, 30 did not endorse combat exposure on the DRRI-2 Combat Experiences subscale. Data from these 30 participants were removed. The final sample size was 285. The study was approved by a VA committee on human subject research at the participating medical center prior to data collection.

Measures

Overview of survey measures. Data analyzed for this study were part of the VA VISN 6 MIRECC Moral Injury Study, a survey of military experiences that focused on pre, peri-, and post-military trauma among veterans who served post-9/11. Questionnaires assessed for combat exposure, MIEs, trauma-related guilt, hazardous alcohol use, and drug abuse symptoms. In addition to the questionnaires outlined below, participants completed demographic questions. They were also provided a study debriefing and information on national and local crisis resources.

Combat exposure. The Deployment Risk and Resiliency Inventory – 2 (DRRI-2; Vogt et al., 2012; see Appendix B) is a multidimensional measure that assesses 17 distinct scales designed to evaluate deployment-related risk and resiliency factors. The DRRI-2 assesses 2

predeployment factors (i.e., Prior Stressors (18 items) and Childhood Family Functioning (12 items)), 12 deployment factors (i.e., Difficult Living and Working Environment (14 items); Combat Experiences (17 items); Aftermath of Battle (13 items); Nuclear, Biological, and Chemical (NBC) exposures (13 items); Perceived Threat (12 items); Preparedness (10 items); Deployment Support from Family and Friends (8 items); Unit Social Support (12 items); General Harassment (8 items); Sexual Harassment (8 items); Concerns about Life and Family Disruptions (15 items); and Family Stressors (14 items)), and 3 postdeployment factors (i.e., Postdeployment Stressors (14 items); Postdeployment Social Support (10 items); and Postdeployment Family Functioning (12 items)). The measures that comprised the DRRI-2 are distinct scales that address different but related factors that may contribute to postdeployment health. The VA VISN 6 MIRECC Moral Injury Study was specifically interested in examining combat-related experiences and therefore only include the Combat Experiences and Aftermath of Battle scales. The current study was explicitly interested in evaluating the impact of combat exposure and therefore the VA Moral Injury Study investigators only granted permission for the current study to examine the Combat Experiences (17 items) scale of the DRRI-2. The Combat Experiences scale measured exposure to combat-related circumstances, such as firing a weapon, being fired on, being attacked or witnessing an attack, encountering friendly fire, and going on special missions and patrols. A sample item was "I was exposed to hostile incoming fire." Responses were rated on a 6-point Likert scale ranging from 1 (*Never*) to 6 (*Daily or Almost Daily*). Items were summed to create a total score with higher scores reflecting greater exposure to combat.

The suite of 17 distinct DRRI-2 scales is the product of a multiyear psychometric project that involved (a) focus groups with Operation Iraqi Freedom/Operation Iraqi Freedom (OEF/OIF) veterans to inform assessment of content validity of original DRRI measure, (b)

examination of item and scale characteristics of revised scales in a national sample of 469 OEF/OIF veterans, and (c) administration of refined scales to a second national sample of 1,046 OEF/OIF veterans to confirm their psychometric quality (Vogt, Proctor, King, King, & Vasterling, 2008; Vogt et al., 2013). The finalized DRRI-2 scales were demonstrated to have strong internal consistency reliability, with the Combat Experiences scale had an alpha coefficient of .90 (Vogt et al., 2008). An additional validity study among a healthy nonclinical sample of 101 discharged Israeli soldiers found high internal consistency ($\alpha = .91$) and strong test-retest reliability (two weeks; $r = .94$) (Maoz, Goldwin, Doreen Lewis, & Bloch, 2016). Criterion validity has also been demonstrated in that DRRI-2 risk factors, including combat exposure, were found to be negatively associated with psychological functioning (Maoz et al., 2016; Vogt et al., 2008; Vogt et al., 2013). Cronbach's alpha for the combat exposure scale for the current study was .93.

Morally injurious experiences. The Moral Injury Questionnaire – Military Version (MIQ-M; Currier, Holland, Drescher, et al., 2015; see Appendix C) was a 20-item measure developed as a screening instrument for assessing levels of possible MIEs in military populations. Items addressed the different domains of MIEs suggested by Drescher et al. (2011). Categories of MIEs assessed by the MIQ-M comprised the following: (a) acts of betrayal (i.e., by peers, leadership, civilians, or self; "Things I saw/experiences in the war left me feeling betrayed or let-down by military/political leaders."; 3 items); (b) acts of disproportionate violence inflicted on others ("I saw/was involved in violence that was out of proportion to the event."; 5 items); (c) incidents involving death or harm to civilians ("I saw/was involved in the death(s) of an innocent in the war."; 4 items); (d) violence within military ranks ("I was sexually assaulted."; 2 items); (e) inability to prevent death or suffering ("I feel guilt over failing to save the life of

someone in the war."; 2 items); and (f) ethical dilemmas/moral conflicts ("I had to make decisions in the war at times when I didn't know the right things to do."; 4 items). Participants were instructed to endorse the frequency with which they had experienced MIEs within the context of their war-zone deployment(s). Response codes were endorsed on a 4-point Likert scale ranging from 1 (*Never*) to 4 (*Often*). In keeping with other stressor-specific measures, the MIQ-M was proposed to be a unidimensional assessment of exposure to MIEs.

Currier, Holland, Drescher, et al. (2015) conducted a confirmatory factor analysis in a community sample of 131 Iraq and/or Afghanistan veterans and a clinical sample of 82 returning veterans. A unidimensional factor structure was demonstrated in both the community sample ($\chi^2(74) = 146.24$, $p < .001$) and the clinical sample ($\chi^2(72) = 75.97$, $p = .35$). CFIs were .83 and .90 and RMSEAs were .07 and .04, respectively, in the community and clinical samples. Additionally, tests of construct validity and clinical utility demonstrated that veterans with PTSD endorsed significantly higher levels of exposure to MIEs, *p*s < .001 (Currier, Holland, Drescher, et al., 2015). MIQ-M scores were associated with greater general combat exposure ($r = .63$), poorer work/social adjustment ($r = .42$), more severe PTSD ($r = .65$) and depressive symptoms ($r = .39$), all *p*s < .001. Four multivariate analyses were conducted in which outcomes (e.g., combat exposure, work/social adjustment, PTSD, and depressive symptoms) were each regressed onto veterans' demographics, military background, general combat exposure, and levels of MIEs (Currier, Holland, Drescher, et al., 2015). Each of the overall models was statistically significant with R^2 ranging from .14 to .48, $F(8, 122) = 2.38$ to 14.16, all *p*s < .05. More specifically, MIQ-M scores were uniquely associated with impairments in work and social functioning ($B = 1.35$, $SE = .33$, $p < .001$), suicide risk ($B = .22$, $SE = .11$, $p < .05$), posttraumatic stress symptoms ($B = .90$, $SE = .13$, $p < .001$), and depressive symptoms ($B = .46$, $SE = .10$, $p < .001$). Prior to planned

analyses, factor loadings were examined in the present study, and, consistent with previous findings (Currier, Holland, Drescher, et al., 2015; Robbins, 2016), item 13 ("I was sexually assaulted") did not significantly load onto the scale and was dropped from further analyses. Cronbach's alpha for the modified MIQ-M in the current study was .90.

Hazardous alcohol use. The Alcohol Use Disorder Identification Test (AUDIT; Saunders, Aasland, Barbor, de la Fuente, & Grant, 1993; see Appendix D) was a 10-item measure used to identify veterans with hazardous and harmful patterns of alcohol consumption. It evaluated the amount and frequency of alcohol use, impairment in controlling drinking, and alcohol consequences (e.g., alcohol-related injury). Most items are assessed for the previous 12 months. AUDIT items comprised subscales including: (a) Alcohol Consumption (items 1-3); (b) Alcohol Dependence (items 4-6); and (c) Alcohol-related Consequences (items 7-10). A sample item was: "How often do you have six or more drinks on one occasion?" Most AUDIT items had response options corresponding to the nature of the specific question, but all response options ranged from 0 to 4, with higher scores indicating more problematic alcohol use. Two AUDIT items (e.g., "Have you or someone else been injured because of your drinking?"; "Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?") had response options including "No" (scored 0), "Yes, but not in the last year" (scored 2), and "Yes, during the last year" (scored 4).

Several factor analytic studies have been conducted on the AUDIT and demonstrated that the AUDIT consists of two (i.e., Alcohol Consumption & Alcohol-related Consequences; Karno, Granholm, & Lin, 2000; Maisto, Conigilaro, McNeil, Kraemer, & Kelley, 2000; Medina-Mora, Carreno, & de la Fuente, 1998; O'Hare & Sherrer, 1999) or three (i.e., Alcohol Consumption, Alcohol Dependence, and Alcohol-related Consequences; El-Bassel, Schilling, Ivanoff, Chen, &

Hanson, 1998; Skipsey, Burleson, & Kranzler 1997) latent factors corresponding with the original subscales. These latent factors are shown to collectively represent hazardous alcohol use with higher scores reflecting greater risk (Barbor, Biddle-Higgins, Saunders, & Monteiro, 2001; Maisto et al., 2000; Reinert & Allen, 2002; Saunders et al., 1993). Therefore, in the current study, the AUDIT was examined as a latent variable composed of the 3 original subscales. Composite scores for each of the AUDIT subscales (i.e., Alcohol Consumption (items 1-3), Alcohol Dependence (items 4-6), and Alcohol-related Consequences (items 7-10) by summing item scores. Cronbach's alphas were as follows: Alcohol Consumption subscale = .78; Alcohol Dependence subscale = .78; Alcohol-related Consequences = .77; the alpha for the overall AUDIT was .87.

Considerable evidence of reliability and validity has accumulated through numerous studies of the AUDIT (Maisto et al., 2000). Cross national investigation of the reliability and validity of the AUDIT yielded an overall Cronbach alpha of .93 (Saunders et al., 1993). Results from each country (e.g., Australia, Bulgaria, Kenya, Norway, and USA) were compared and relatively little variation between found between countries resulting in Cronbach's alphas ranging from .80 to .98 (Saunders et al., 1993). AUDIT scores were also compared to an external reference group of individuals with known alcohol dependence. Results indicate that 99% of individuals with an alcohol use disorder had an overall AUDIT score of 8 or more (Saunders et al., 1993). In a sample of 264 veterans, an AUDIT questions were found to be highly specific (90 to 93%) and moderately sensitive (54 to 79%) (Bradley et al., 1998). Kendall's Tau-b correlations between baseline AUDIT Alcohol Consumption scores and AUDIT Alcohol Consumption scores collected at a three-month follow-up ranged from .65 to .85, among veterans who indicated they had not changed their drinking (Bradley et al., 1998). AUDIT

consumption questions had a Guyatt responsiveness statistic of 1.04 for detecting change of 7 drinks/week that suggests changes in AUDIT scores have excellent responsiveness to change in actual alcohol use. Furthermore, the AUDIT is highly correlated with other measures of alcohol use (Bradley et al., 1998). For instance, Bohn, Barbor, and Kranzler (1995) demonstrated a significant correlation, r = .88, between the Michigan Alcoholism Screening Test (Skinner, 1979) and the AUDIT (Bohn et al., 1995). Rigmaiden, Pistorello, Johnson, Mar, and Veach (1995) compared with AUDIT with a 4-item alcohol screening questionnaire (i.e., CAGE questionnaire ("Cut down on drinking", "Annoyed you by criticizing your drinking", "Guilty about your drinking", and "Eye opener about your drinking"); Mayfield, McLeod, & Hall, 1974). Among a sample of ambulatory care patients, 88% who scored positive on the CAGE also exceeded the AUDIT increased risk levels.

Drug abuse symptoms. Drug abuse symptoms were measured using the Drug Abuse Screening Test (DAST-20; Skinner, 1982; see Appendix E). The DAST-20 was a modified version of the original DAST which was comprised of 28 items and is designed as a screening instrument for drug abuse symptoms. The DAST-20 contained 20 items assessing problematic drug use including abuse of prescription drugs, ability to get through the week without using drugs, blackouts or flashbacks resulting from drug use, and various negative social, family, and economic consequences of drug use (for a comprehensive review, see Yudko, Lozhkina, & Fouts, 2007). Each item was scored on a 2-point response scale (1 = *yes*, 0 = *no*). An affirmative response was awarded one point; two items are reverse scored, thus a negative response (no) is awarded one point. Previous research has demonstrated good internal consistency (Saltstone, Halliwell, & Hayslip 1994; Skinner, 1982). Two-week test-retest reliability in a sample of psychiatric patients (N = 45) was .78 (Cocco & Carey, 1998).

Additionally, the DAST-20 has shown strong concurrent validity with the original DAST, DAST-10, and other alcohol, drug and psychiatric indices (Cocco & Carey, 1998; Skinner, 1982) as well as high face validity (Skinner, 1982). Among a sample of psychiatric outpatients, a significant relationship was found between scores on the DAST-20 and Addiction Severity Index-Drug Composite Score, Clinician Rating Scale for Drug Use, and Addiction Severity Index – Alcohol Composite Score (r = .42, r = .40, r = .33) (Cocco & Carey, 1998). The DAST-20 was also found to be significantly correlated with depression, anxiety, interpersonal problems, and psychosis (Cocco & Carey, 1998; Gavin, Ross, & Skinner, 1989). Although previous research had demonstrated strong validity and reliability of the DAST, no research has examined the validity of the DAST with a veteran sample. Although no validation studies with a veteran sample has been conducted, the DAST is a widely used measure to examine veteran drug abuse symptoms with internal reliability scores ranging from .72-.81 (Battles et al., 2018; Braitman et al., 2018; Held, Boley, Karnik, Pollack, & Zalta, 2018; Kelley, Braitman, et al, 2019). Further, as expected, researchers have found the DAST to be positively correlated with trauma exposure, depression, PTSD symptoms, suicidality, and alcohol misuse (Battles et al., 2018; Braitman et al., 2018).

The DAST total score orders individuals along a continuum reflecting their degree of problems or consequences related to drug abuse with higher scores reflecting a higher level of drug abuse symptoms (Skinner, 1982). In the present study, there were 23 scores that were more than three standard deviations above the mean. Given that relatively few participants endorsed any symptoms of drug abuse (n = 34), all participants who endorsed one or more drug abuse symptoms were labeled as outliers. For this reason, a decision was made to analyze drug abuse symptoms as a dichotomous variable. Thus, scores for drug abuse symptoms were coded as 0

(no drug abuse symptom endorsement) and 1 (endorsement of one or more drug abuse symptoms). Cronbach's alpha in the present study was .80.

Trauma-related guilt. The Trauma-Related Guilt Inventory (TRGI; Kubany et al., 1996; see Appendix F) was a 32-item self-report inventory that measures guilt-related beliefs following a traumatic event. The questionnaire contained three scales and three subscales. The scales included Global Guilt (i.e., frequency, intensity, and overall severity of guilt; "I experience intense guilt that relates to what happened"; 4 items), Distress (i.e., pain and negative impact caused by the trauma; "I am still distressed about what happened"; 6 items), and Guilt Cognitions (i.e., cognitive factors associated with guilt; "I could have prevented what happened"; 22 items). The three subscales correspond with the cognitive factors and include Hindsight-Bias/Responsibility (i.e., perceived responsibility for events; "I am responsible for causing what happened"; 7 items), Wrongdoing (i.e., perceived violation of personal moral standard; "I had some feelings that I should not have had"; 5 items), and Lack of Justification (i.e., belief about whether actions were warranted; "What I did was completely justified"; 4 items). All responses were scored on a 5-point Likert scale ranging from 0 to 5; different response options were available varying by the item. For example, item 1 ("I could have prevented what happened.") is scored 0 (*Not at all true*) to 5 (*Extremely true*), whereas item 2 ("I am still distressed about what happened.") is scored 0 (*Never true*) to 5 (*Always true*). Seven items were reverse scored (i.e., items 4, 8, 12, 17, 18, 22, and 25). Responses from each subscale yielded continuous scores, in which higher scores indicate high levels of trauma-related guilt. Internal consistency for Global Guilt, Guilt Cognitions, and Distress scales were good with alphas of .90, .86, and .86, respectively (Kubany et al., 1996). Internal consistency for the various subscales ranged from good (Hindsight-Bias/Responsibility, $\alpha = .82$; Wrongdoing, $\alpha = .75$) to acceptable (Lack of

Justification, α = .67). Test-retest reliability (interval ranging from 36 weeks) has also been measured as good (*r*s = 0.73 – 0.86; Kubany et al., 1996). Among a sample of Vietnam combat veterans, internal consistency for all scales and subscales ranged from acceptable to good (α = .66 - .94; Kubany et al., 1996) as well as one-week temporal stability was found to be good (*r*s = 0.73 – 0.86). Veterans' scores on each of the TRGI scales/subscales were highly correlated with scores on trait guilt, PTSD, depression, self-esteem, trait shame, and social anxiety/avoidance.

Initially, composite scores for trauma-related guilt were created for each subscale (i.e., Global Guilt, Distress, Guilty Cognitions, Hindsight Bias/Responsibility, Wrongdoing, and Lack of Justification) following scoring procedures recommended by Kubany (1994). However, subscales were determined to be collinear as determined by a VIF score greater than 5 and tolerance less than .10. To address multicollinearity, trauma-related guilt was examined as a latent variable given that collinearities indicate the presence of a single underlying variable (Graham, 2003; Tabachnick & Fidell, 1996). Domain representative parceling (Hagtvet & Nasser, 2004; Hall, Snell, & Singer Foust, 1999; Kishton & Widaman, 1994; Little, Rhemtulla, Gibson, & Schoemann, 2013) was used to create parcels (i.e., latent indicator) for trauma-related guilt. Justification for the selection of domain representative parceling is discussed in detail below in the *Data Cleaning* section. Cronbach's alpha for this study was .95.

PTSD Symptoms. The Davidson Trauma Scale (DTS; Davidson et al., 1997; see Appendix G) was a 17-item self-report measure used to assess PTSD symptoms as described in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revised (DSM-IV-TR; American Psychiatric Association, 2000). Respondents were asked to identify the trauma that was most distressing to them and to rate, in the past week, how much difficulty (i.e., frequency and severity) they had with each symptom. The DTS contained three subscales: (1)

intrusive reexperiencing (i.e., “Painful images, memories, or thoughts of the event”; 4 items), (b) avoidance/numbing (i.e., “Avoiding any thoughts or feelings about the event”; 7 items), and (c) hyperarousal (i.e., “Felt on edge, been easily distracted, or had to stay ‘on guard’”; 6 items; Davidson et al., 1997). Symptom frequency items were rated on a 5-point Likert scale ranging from 0 (*Not at all*) to 4 (*Every day*). Similarly, symptom severity items were rated on a 5-point Likert scale ranging from 0 (*Not at all*) to 4 (*Extremely distressing*).

Initial psychometric assessment demonstrated that the DTS has good internal consistency (Cronbach’s alpha = .99), convergent validity (compared to Clinician Administered PTSD Scale; r = .78), divergent validity (compared to the Eysenck Personality Inventory Extroversion subscale; r = .04), and concurrent validity (compared to the Semi-Structured Clinical Interview; t = 9.37). The highest efficiency was found at a total score of 40; area under the curve (±standard error) was .88 (±.02). Further, the measure showed good test-retest reliability with a 2-week interval (r = .86; Davidson et al., 1997). Davidson, Tharwani, and Connor (2002) demonstrated that the DTS is sensitive to treatment effects of selective serotonin reuptake inhibitors (SSRIs) for PTSD symptoms. Researchers have also investigated the validity of the DTS among military members and found good internal consistency (alpha = .97; McDonald, Beckham, Morey, & Calhoun, 2009). Additionally, analysis of variance demonstrated diagnostic group (diagnoses determined by the Structured Clinical Interview for DSM-IV-TR) differences on the DTS total score, supporting the concurrent validity of the DTS. Participants diagnosed with PTSD (M = 79.6) scored significantly higher on the DTS than participants with no diagnosis (M = 14.7) or those with a diagnosis other than PTSD (M = 37.6). Additionally, modest convergent validity was found with Symptom Checklist-90-R (SCL-90-R) anxiety-related subscales (obsessive-compulsive, r = .77; anxiety, r = .73). However, the DTS was also found to have modest

correlations with other scales on the SCL-90-R (i.e., depression (r = .69), psychosis (r = .60), and hostility subscales (r = .60). To examine the independent ability of all the SCL-90-R subscales to predict DTS scores, a multiple regression was conducted (McDonald et al., 2009). The SCL-90-R subscales accounted for 62% of the variance in the DTS, $F(9,139) = 27.8$, $p < 0.001$. The obsessive-compulsive subscale was the only scale found to be a significant predictor of DTS total scores after accounting for variance contributed by other subscales (McDonald et al., 2009). Additionally, the anxiety subscale accounted for the second largest among of variance, however, it was just beyond the significance threshold ($p = 0.06$). These findings suggest that the DTS shares a unique association with other measures of anxiety that it does not share with other measures of psychopathology (e.g., depression, psychosis) which provides support for divergent validity. Cronbach's alpha for the DTS total score in this study was .98.

CHAPTER III

RESULTS

Power Analyses

Power analysis was conducted using Monte Carlo simulation, following the method described by Muthén & Muthén, 2002. In this method, a population was simulated in which the effect in question (i.e., sequential mediation effect of MIEs and trauma-related guilt on the combat-alcohol use relationship) generates numerous samples (at least 1000) that have comparable size and variance structure of the actual data. The proportion of times the simulated effect is detected in the random sample is the statistical power to detect the effect from a given sample size. For this study, the population parameters (estimates for fixed effects, and standard deviations for random and fixed effects) were estimated based on previous research regarding the relationships between combat, MIEs, trauma-related guilt, and substance use. Parameter estimates were run as the following effect sizes: 1) hazardous alcohol use on trauma-related guilt (0.15); 2) hazardous alcohol use on combat exposure (0.30); 3) trauma-related guilt on MIEs (0.15); and 4) MIEs on combat exposure (0.30). Separate simulations were conducted for drug abuse symptoms and the following effect sizes were used: 1) drug abuse symptoms on trauma-related guilt (0.15); 2) drug abuse symptoms on combat exposure (0.30); 3) trauma-related guilt on MIEs (0.15); and 4) MIEs on combat exposure (0.30). Means for all variables were set to 0. Variance of combat exposure (predictor) was set at 0.50. Residual variances were set as: MIEs (mediator; 0.40), trauma-related guilt (mediator; 0.40), hazardous alcohol use (outcome; 0.50), and drug abuse symptoms (outcome; 0.40). Using normal distributions with these population parameters and no missing data, 10,000 data sets with $N = 285$ and the same items as in the present study were simulated (run separately for hazardous alcohol use and drug abuse

symptoms). A sample size of 285 was found to have sufficient power (0.90-0.94) to be able to reject the hypothesis that there is no relationship between combat exposure, MIEs, trauma-related guilt, and substance use.

Data Cleaning and Preliminary Analyses

All analyses were conducted using SPSS 25 (IBM Corp., 2017) and Mplus version 8.0 (Muthén & Muthén, 1998-2017). Data were first examined for missing values, outliers, skewness, and kurtosis. Although 315 participants completed and returned study materials, the final sample was composed of 285 respondents who had experienced at least one combat experience as measured by the DRRI-2 Combat Experiences subscale. Prior to determining how to address missing data, data were inspected for missingness. Missing data were found on the Trauma-related Guilt Inventory (TRGI), Davidson Trauma Scale (DTS), and the Deployment Risk and Resiliency Inventory – 2 (DRRI-2). For the TRGI, missing data accounted for 3.2% of total responses. For the DTS, missing data accounted for 1.4% of total responses. For the DRRI-2 combat experiences scale, missing data account for 7.7% of total responses. As recommended by Schlomer, Bauman, and Card (2010), Little's (1988) test was conducted to determine if the data were missing completely at random (MCAR). Results indicated data were MCAR, thus, missing data were addressed through maximum likelihood estimation.

Composite scores were then created for combat exposure and MIEs by creating summed item scores. Composite scores for each of the AUDIT subscales (i.e., Alcohol Consumption (items 1-3), Alcohol Dependence (items 4-6), and Alcohol-related Consequences (items 7-10) by summing item scores. Summed AUDIT subscales were combined to create summed total AUDIT scores. Initially, a scale score for drug abuse symptoms was calculated. However, normality issues were found in the Drug Abuse Symptom Test (DAST-20). Drug abuse

symptoms were transformed into a dichotomous variable consisting of no drug abuse symptoms (scored 0) and one or more drug abuse symptoms (scored 1). Dichotomizing the DAST-20 was selected for several reasons. First, out of the sample's 285 participants only 34 (11.93%) endorsed any drug abuse symptoms. Of those 34 participants, the majority were labeled as outliers (see below for more details). Winsorizing was first explored however proved ineffectual at addressing the issues with normality. The option of dichotomizing drug abuse symptoms was then evaluated as it would correct for the issues with non-normality (DeCoster, Iselin, & Gallucci, 2009), aid in the interpretation of the findings (DeCoster, Iselin, & Gallucci, 2009), and does not cause a decrease in the measured strength of the associations (Farrington & Loeber, 2000). Given available research supporting the dichotomization of an outcome variable, the current study elected to dichotomize the DAST-20.

Additionally, composite scores for trauma-related guilt were initially created for each subscale (i.e., Global Guilt, Distress, Guilty Cognitions, Hindsight Bias/Responsibility, Wrongdoing, and Lack of Justification) following scoring procedures recommended by Kubany (1994). However, subscales were determined to be collinear as determined by a VIF score greater than 5 and tolerance less than .10. To address multicollinearity, trauma-related guilt was examined as a latent variable given that collinearities indicate the presence of a single underlying variable (Graham, 2003; Tabachnick & Fidell, 1996). Additionally, latent variable methods tend to generate models with better fit and parameter estimates that are less attenuated (Coffman & MacCallum, 2005; Cole, Perkins, & Zelkowitz, 2016). Domain representative parceling (Hagtvet & Nasser, 2004; Hall et al., 1999; Kishton & Widaman, 1994; Little et al., 2013) was used to create parcels (i.e., latent indicator) for trauma-related guilt.

A parcel is “an aggregate-level indicator comprised of the sum (or average) of two or more items, responses, or behaviors” (Little, Cunningham, Shadar, & Widaman, 2002, p. 152), which can then be used as an indicator of a factor in a latent variable analysis. Parceling tends to be preferable to using item scores as parcels have higher reliability, greater communality, higher ratio of common-to-unique factor variance, and lower likelihood of distributional violations (Cole et al., 2016; Hall et al., 1999; Little et al., 2013). Modeling with parcels has also been shown to have fewer parameter estimates, lower indicator-to-sample size ratio, lower likelihood of correlated residuals and dual factor loadings, and reduced sources of sampling error (for review, see Little et al., 2013). Additionally, parcels can clarify representations of multidimensional constructs (Graham, 2004; Hall et al., 1999; Little et al., 2013).

The domain-representative strategy, also known as the ‘*distributed uniqueness strategy*’, is a form of heterogeneous parceling that is defined by combining items that do not share specific variance (Cole et al., 2016; Hagtvet & Nasser, 2004; Hall et al., 1999; Kishton & Widaman, 1994; Little et al., 2013). More specifically, domain-representative parcels are created by aggregating items with shared residual covariance into separate item parcels (Hagtvet & Nasser, 2004; Hall et al., 1999). Domain-representative parceling is shown to be beneficial as it produces better model convergence, fewer out-of-range parameter estimates, and more reliable structural coefficients (Cole et al., 2016; Matsunaga, 2008). Additionally, domain-representative parcels share variance due to both the higher-order factor and specific subfactors which allowed for information about the subfactors to be embedded in the higher order factor (Bandalos & Finney, 2001; Cole et al., 2016). Following analytic procedure illustrated by Hagtvet and Nasser (2004), item fit was examined using exploratory factor analyses (EFA) to determine the “unmodeled secondary constructs” (Hall et al., 1999). Factor structure aids in the development

of parcels by providing a preliminary analysis of item relations. Parcels are then formed using the domain-representative approach such that item residual covariances are examined and items with shared residual covariance are separated into different parcels.

Initial EFA of the Trauma-related Guilt Inventory (TRGI) revealed a six-factor solution provided the best fit which is consistent with previous research (Kubany et al., 1996). However, use of six parcels is not recommended as extraneous parcels can lower reliability of fit indices (Bollen, 1989; Hall et al., 1999). Researchers argue that each construct of an SEM model should be defined by a just-identified measurement space, and as such three indicators (parcels) per construct is recommended (Bollen, 1989; Hall et al., 1999; Little et al., 2002; Little et al., 2013). The use of three parcels for the TRGI also made conceptual sense given that the TRGI is comprised of three larger scales (i.e., Global Guilt, Distress, and Guilty Cognitions). Confirmatory factor analysis (CFA) was then conducted to evaluate findings from initial EFA. Consistent with EFA, the CFA revealed that a six-factor solution provided the best fit. A three-factor solution was then examined to determine if constraining the number of factors still produced good fit. CFA revealed that the three-factor solution still produced good fit and results were consistent with those found in the EFA.

Next, residual covariances were examined for all items on the TRGI; items that shared residual covariances were separated into different parcels. The trauma-related guilt parcels contained the following items: (1) Items 1, 4, 5, 6, 11, 13, 20, 21, 23, 30, 32; (2) Items 2, 7, 8, 14, 15, 17, 22, 24, 27, 28; (3) Items 3, 9, 12, 16, 18, 19, 25, 26, 29, 31. The content of parcel 1 items included item 1 (“I could have prevented what happened.”), 4 (“What I did was completely justified.” – reverse coded), 5 (“I was responsible for causing what happened.”), 6 (“What happened causes me emotional pain.”), 11 (“What I did was inconsistent with my beliefs.”), 13

(“I experience intense guilt that relates to what happened.”), 20 (“What happened causes a lot of pain and suffering.”), 21 (“I should have had certain feelings that I did not have.”), 23 (“I blame myself for something I did, thought, or felt.”), 30 (“I should have done something that I did not do.”), and 32 (“I didn't do anything wrong.” – reverse coded). Parcel 2 contained the following content: item 2 (“I am still distressed about what happened.”), 7 (“I did something that went against my values.”), 8 (“What I did made sense.” – reverse coded), 14 (“I should have known better.”), 15 (“I experience severe emotional distress when I think about what happened.”), 17 (“I had good reasons for doing what I did.” – reverse coded), 22 (“Indicate the intensity or severity of guilt that you typically experience about the event(s).”), 24 (“When I am reminded of the event(s), I have strong physical reactions such as sweating, tense muscles, dry mouth, etc.”), 27 (“What I did was not justified in any way.”), and 28 (“I violated personal standards of right and wrong.”). Finally, parcel 3 contained the following content: item 3 (“I had some feelings that I should not have had.”), 9 (“I knew better than to do what I did.”), 12 (“If I knew today – only what I knew when the event(s) occurred – I would do exactly the same thing.”), 16 (“I had some thoughts or beliefs that I should not have had.”), 18 (“Indicate how frequently you experience guilt that relates to what happened.”), 19 (“I blame myself for what happened.”), 25 (“Overall, how guilty do you feel about the event(s)?”), 26 (“I hold myself responsible for what happened.”), 29 (“I did something that I should not have done.”), and 31 (“What I did was unforgivable.”).

Next, for each of the continuous variables, univariate outliers were assessed via boxplots. For the AUDIT subscales, the Alcohol Dependence subscale contained 20 scores that were found to be more than three standard deviations above the mean; the Alcohol-related Consequences subscale contained 13 outliers. The AUDIT Alcohol Dependence subscale outliers were

Winsorized (Cox, 2006) from 2, 2, 2, 2, 2, 2, 3, 3, 3, 4, 4, 4, 5, 5, 7, 7, 7, 7, 8, and 8 to 2 which is one point higher than the highest extreme score (i.e., 1). The AUDIT Alcohol-related Consequences subscale outliers were Winsorized (Cox, 2006) from 5, 5, 5, 5, 5, 5, 6, 7, 7, 7, 8, 8, and 9 to 5 which is one point higher than the highest extreme score (i.e., 4). For the Drug Abuse Screening Test (DAST-20) composite measure, there were 23 scores that were more than three standard deviations above the mean. Given the relatively few participants who endorsed any symptoms of drug use (n = 34; 11.93%), all outliers were those participants who endorsed one or more drug abuse symptoms. Due to the labeling of substance use endorsers as outliers and available research supporting the dichotomization of a continuous outcome variable under the present conditions (DeCoster, Iselin, & Gallucci, 2009), a decision was made to analyze drug abuse symptoms as a dichotomous variable. Thus, scores for drug abuse symptoms were coded as 0 (no drug abuse symptom endorsement) and 1 (endorsement of one or more drug abuse symptoms). There were no outliers on the combat exposure or MIEs composite measures nor on the trauma-related guilt parcels. Mahalanobis distance was evaluated to assess for multivariate outliers and none were found. Skewness and kurtosis were examined for all variables via the skewness option in the SPSS descriptive variable section (IBM Corp., 2017). All variables were below 20.00 for kurtosis (Mardia, 1974) indicating they were not kurtotic. When checking for skewness, all variables were below 3.0.

Covariates and justification for controlling covariates. Covariates were examined prior to analyses. Demographic variables (see Appendix A) were examined as possible covariates of the associations with both hazardous alcohol use scores and drug abuse symptom scores because substance use patterns are shown to differ by gender (Kelley, Braitman, et al., 2019; Scott et al., 2010), race/ethnicity (Bray et al., 2009; Jacobson et al., 2008), age (Calhoun et

al., 2008; Seal et al., 2011), marital status (Scott et al., 2010), education (Gfroerer, Greenblatt, & Wright, 2011; Patrick, Wrightman, Schoeni, & Schulenberg, 2012), and working status (Patrick et al., 2012). Additionally, military demographic variables were examined as covariates because substance use is found to differ by military status (e.g., active duty, National Guard, veteran; Seal et al., 2009), branch of service (Baker et al., 2009), era of military service (Kline et al., 2009), military rank (Bray et al., 2008; Seal et al., 2012), and number of deployments (Bray et al., 2009; Bray et al., 2013).

Hazardous alcohol use. For hazardous alcohol use, covariates were examined using a combination of Pearson's product-moment (two continuous variables) and point-biserial (one continuous variable and one dichotomous variable) correlation (see Table 3). The following variables were found to be significantly associated with hazardous alcohol use: PTSD symptoms (measured as a summed continuous total score), race (dummy coded: 1 = *Caucasian*, *n* = 158; 0 = A*ll other race categories*, *n* = 127), age (continuous variable ranging from 25 to 72 years (*M* = 46.10 years, *SD* = 10.41)), and military rank (continuous variable ranging from E-2 (i.e., Private, Private First Class, Airman, Seaman Apprentice) to O-7 (i.e., Brigadier General, Rear Admiral Lower Half). Contrary to expectations, the number of deployments participants experienced were not significantly associated with hazardous alcohol use as determined by a non-significant Pearson's product-moment correlation ($r = -.05$, $p = .42$).

PTSD symptoms may co-occur with moral injury as events that lead to one may also contribute to another (Nieuwsma et al., 2015). Given the potential for co-occurrence, previous research demonstrating that PTSD symptoms are related to hazardous alcohol use (Bonn-Miller, Vujanovic, & Drescher, 2011; Bonn-Miller, Vujanovic, Feldner, et al., 2007; Bremner et al., 1996), and current findings of a positive correlation, the present study determined it was

necessary to control for PTSD symptom scores across all hazardous alcohol use analyses. Age was also found to be significantly correlated with hazardous alcohol use scores. Previous research has shown that age is associated with alcohol and drug abuse, such that younger veterans (e.g., < 25-years-old) tend to report greater hazardous alcohol use and drug abuse symptoms compared to older veterans (Bray & Hourani, 2007; Calhoun et al., 2008; Jacobson et al., 2008; Seal et al., 2011). Therefore, the study determined it was important to control for age as a covariate across all hazardous alcohol use analyses. The current investigation found that participants' military rank was significantly associated with hazardous alcohol use scores. These findings, coupled with previous research showing higher rates of alcohol abuse among lower ranking, enlisted personnel (Bray et al., 2008; Seal et al., 2012), informed the current study's control of military rank as a covariate across all hazardous alcohol use analyses.

Additionally, race was significantly correlated with hazardous alcohol use scores. Of note, the original item assessing race on the demographic form (see item 6, Appendix A) instructed participants to identify their race based on six categories (i.e., *Caucasian*, *African American*, *American Indian or Alaska Native*, *Asian*, *Native Hawaiian or Other Pacific Islander*, or *Other*). An additional item (item 5) asked participants to identify their ethnicity based on two categories (i.e., *Hispanic or Latino* or *Not Hispanic or Latino*). The current investigation maintained the original study's categorization of race and ethnicity as separate variables. Examining racial difference was not a stated objective of the present research and, therefore, to aid the interpretation of the findings, the author dummy coded race such that 1 represented *Caucasian* participants and 0 represented participants of *All other race categories* (i.e., *African American*, *American Indian or Alaska Native*, *Asian*, *Native Hawaiian or Other Pacific Islander*, or *Other*). The dummy coded race variable was found to be significantly correlated with

hazardous alcohol use scores. Ethnicity, however, was not significantly correlated with either hazardous alcohol use scores or drug abuse symptom scores. Given the present correlational findings and previous research demonstrating that race is significantly associated with alcohol abuse (e.g., higher rates of hazardous drinking among non-Hispanic Caucasian service members; Bray et al., 2009; Jacobson et al., 2008), the present investigation determined it was necessary to control for race across all hazardous alcohol use analyses.

Drug abuse symptoms. For drug abuse symptoms, covariates were examined using a combination of point-biserial (one continuous variable and one dichotomous variable) and Spearman's Rho (two dichotomous variables) correlation (see Table 3). The following were found to be significantly associated with drug abuse symptoms: age (continuous variable ranging from 25 to 72 years (M = 46.10 years, SD = 10.41)), current military status (dummy coded: 1 = *Discharged*, n = 130; 0 = *All other statuses*, n = 155), and military rank (continuous variable ranging from E-2 (i.e., Private, Private First Class, Airman, Seaman Apprentice) to O-7 (i.e., Brigadier General, Rear Admiral Lower Half). Contrary to expectations, the number of deployments a combat veteran experienced was not significantly associated with drug abuse symptoms as determined by both a non-significant point-biserial correlation (r = .03, p = .62)and independent samples t-test (t(279) = -0.48, p = .62).

Similar to hazardous alcohol use, age is demonstrated to be significantly associated with drug abuse symptom scores such that younger individuals tend to report higher drug abuse symptom scores (Grant & Dawson, 1998; Shipherd et al., 2005). Based on previous research and the present correlational findings, the current investigation felt it was necessary to control for age across all drug abuse symptom analyses. Participant's current military status (dummy coded: 1 = *discharged*; 0 = *all other statuses*) was found to be correlated with drug abuse symptom scores

such that those who were separated from the military were more likely to endorse one or more drug abuse symptom. These findings are consistent with previous research indicating that military personnel who have discharged from the military are more likely to report drug abuse symptom scores (Seal et al., 2009). Based on previous research and current findings, the present investigation determined it appropriate to control for military status across all drug abuse symptom analyses. Additionally, consistent with previous research (Bray et al., 2008; Seal et al., 2012), military rank was found to be significantly associated with drug abuse symptom scores such that lower ranking, enlisted individuals tend to report higher drug abuse symptom scores compared to higher ranking, officers. Based on current and previous findings, the present study decided to control for military rank across all drug abuse symptom analyses. Although PTSD symptom scores were not significantly correlated with drug abuse symptoms scores, it was still controlled for across drug abuse symptom analyses due to the strong association between combat scores, MIE scores, and PTSD symptom scores.

Table 3

Correlations between Study Variables and Covariates

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Combat	-														
2. MIEs	**.62****	-													
3. Trauma Guilt 1	**.27****	**.53****	-												
4. Trauma Guilt 2	**.26****	**.53****	**.88****	-											
5. Trauma Guilt 3	**.29****	**.54****	**.90****	**.86****	-										
6. Total Alcohol	.08	**.17****	**.13***	**.14***	**.14***	-									
7. Consumption	.05	**.17****	.06	.08	.09	**.94***	-								
8. Dependence	**.13***	**.22****	**.22****	**.20****	**.21****	**.79***	**.59****	-							
9. Consequences	.09	**.21****	**.16****	**.16****	**.15***	**.87***	**.65****	**.76****	-						
10. Drug Abuse Sx	.05	**.18****	.09	**.13***	.08	**.20***	**.18****	**.16****	**.19****	-					
11. PTSD Sx	**.29****	**.45****	**.40****	**.44***	**.38****	**.17***	.05	**.19****	**.17****	.11	-				
12. Race	.30	-.10	**-.20****	**-.25****	**-.25****	**-.13***	**-.10**	**-.19****	-.12	.03	**-.15****	-			
13. Military Status	.09	**.13***	.04	.04	.02	.03	.01	.01	.08	**.19****	**.13***	-.02	-		
14. Rank	**-.14***	**-.12***	-.10	-.11	-.07	-.10	-.10	**-.12***	-.07	**-.20****	**-.14***	.03	.10	-	
15. Age	**-.17****	-.05	.03	.02	.04	-.12	**-.13***	-.09	-.06	**-.17****	.03	**-.13***	**-.18****	.08	-

Note. *N* = 285; Combat = Deployment Risk and Resiliency Scale – Combat Experiences subscale (continuous); MIEs = Morally Injurious Experiences = Moral Injury Questionnaire – Military version (modified, continuous); Trauma Guilt 1-3 = Trauma-related Guilt domain-representative parcels, Trauma-related Guilt Inventory (continuous); Total Alcohol = Alcohol Use Disorder Identification Test summed total score (continuous); Consumption = Alcohol Use Disorder Identification Test items 1-3 (continuous); Dependence = Alcohol Dependence, Alcohol Use Disorder Identification Test items 4-6 (continuous); Consequences = Alcohol-related Consequences, Alcohol Use Disorder Identification Test items 7-10 (continuous); Drug Abuse Sx = Drug Abuse Symptoms, Drug Abuse Screening Test (dichotomous); PTSD Sx = Posttraumatic Stress Disorder Symptoms, Davidson Trauma Scale (continuous); Race was dummy coded (Caucasian = 1; All other race categories = 0); Military Status was dummy coded (Discharged = 1; Other Military Statuses = 0); Rank was measured continuously ranging from E-2 (i.e., Private, Private First Class, Airman, Seaman Apprentice) to O-7 (i.e., Brigadier General, Rear Admiral Lower Half); Age was measured continuously with age ranging from 25 to 72 years (*M* = 46.10 years, *SD* = 10.41). Pearson product-moment correlations were conducted for associations between two continuous variables, point-biserial correlations were conducted for associations consisting of one continuous variable and one dichotomous variable, and Spearman correlations were conducted for two dichotomous variables. *p<.05 **p<.01.

Model Specification

Path analyses were originally proposed to examine drug abuse symptoms. However, due to normality issues, drug abuse symptom scores were transformed into a dichotomous variable with 0 = *no drug abuse symptoms* and 1 = one or more *drug abuse symptoms endorsement*. Limitations in the drug abuse symptom data rendered it statistically inappropriate to conduct traditional path analyses models because dichotomous outcomes would result in different scaling of coefficients (Kenny, 2018). Logistic regression and categorical Structural Equation Modeling (SEM) were compared to determine appropriateness for current study. Previous research has found that model fit statistics, particularly RMSEA, in categorical SEM are highly dependent on the number of categories in the outcome variable such that fewer categories tend to have a more negative effect on fit statistics (Monroe & Cai, 2016). Additionally, logistic regression and categorical SEM are found to detect significant associations at comparable rates when analyzing dichotomous data (Ramakrishnan, Meyer, Goldberg, & Henderson, 1996). However, logistic regression is shown to perform better at detecting significant effects compared to categorical SEM when the effects are small, as predicted in the current study (Ramakrishnan et al., 1996). Therefore, hierarchical logistic regression was selected and conducted using SPSS Version 25 (IBM Corp, 2017) to examine combat exposure scores, MIE exposure scores, and trauma-related guilt scores as predictors of drug abuse symptom scores. Drug abuse symptom scores were regressed on combat exposure scores, MIE exposure scores, and trauma-related guilt scores, controlling for PTSD symptom scores (total score - continuous variable), current military status (dummy coded: 1 = *discharged*; 0 = *all other military statuses*), military rank (continuous variable), and age (continuous variable). Trauma-related guilt was modeled as a latent variable

comprised of domain-representative parcels to reduce the effect of multicollinearity (Pourhoseingholi, Mehrabi, Alavi-Majd, & Yavari, 2008). Statistical significance was determined by both p-values less than .05 and 95% bias-corrected bootstrapped confidence intervals that do not contain zero.

Structural equation modeling (SEM) was conducted in Mplus Version 8.0 (Muthén & Muthén, 1998-2017) to examine the effects combat exposure scores on hazardous alcohol use scores and whether MIE exposure scores and trauma-related guilt scores mediated the association between combat exposure scores and hazardous alcohol use scores. For reference, mediation occurs when a third variable that links a cause and an effect ("why" and "how" the independent variable [IV] predicts the dependent variable [DV]; Kenny, 2018). Hazardous alcohol use was examined as a latent variable composed of the original indicators (i.e., Alcohol Consumption, Alcohol Dependence, and Alcohol-related Consequences). Across all mediation analyses PTSD symptom scores (total score - continuous variable), race (dummy coded: 1 = *Caucasian*; 0 = *All other race categories*), military rank (continuous variable), and age (continuous variable) were controlled for. Given that the $\chi 2$ test statistic is sensitive to sample size (Schermelleh-Engel, Moosbrugger, & Müller, 2003), the author used model fit criteria suggested by Hu and Bentler (1999) to evaluate overall model fit, including the comparative fit index (CFI) > .95, Tucker-Lewis Index (TLI) > .95, root mean square error of approximation (RMSEA) < .06, and standardized root mean square residual (SRMR) < .08. Total, direct, and indirect effects of each predictor variable on outcomes were examined using bias-corrected bootstrapped estimates (Efron & Tibshirani, 1993) based on 10,000 bootstrapped samples, which provides a powerful test of mediation (Erceg-Hurn & Mirosevich, 2008). Statistical significance

was determined by 95% bias-corrected bootstrapped confidence intervals that do not contain zero. Indicator variables utilized different scoring systems therefore standardized values are reported.

Statistical Analyses for Study Aims

Descriptive statistics and reliability coefficients among study variables are presented in Table 4. Of note, most respondents (90.5%; *n* = 258) endorsed exposure to at least one MIE and, on average, participants reported that they had experienced nine MIEs. Additionally, 11.93% (*n* = 34) of the sample endorsed one or more drug abuse symptoms, whereas 82.5% of the sample endorsed alcohol use.

Table 4

Descriptive Statistics for Study Measures

Measure	M (SD)	Range*	Skewness (SE)	Kurtosis (SE)	Reliability
DRRI-2	31.61 (15.35)	67 [16, 83]	1.32 (.14)	1.20 (.29)	.93
MIQ-M	29.45 (9.51)	40 [19, 59]	1.13 (.14)	0.64 (.29)	.90
TRGI	3.22 (2.26)	10 [0, 10]	0.63 (.14)	0.40 (.29)	.95
AUDIT	5.66 (5.61)	29 [0, 29]	1.05 (.14)	0.21 (.29)	.87
Consumption	3.11 (2.77)	12 [0, 12]	0.86 (.14)	0.02 (.29)	.79
Dependence	0.40 (0.75)	2 [0, 2]	1.48 (.14)	0.44 (.29)	.78
Consequences	0.96 (1.60)	5 [0, 5]	1.56 (.14)	1.02 (.29)	.78
DAST	0.12 (0.32)	1 [0, 1]	2.30 (.14)	3.60 (.29)	.81
PTSD	45.63 (40.63)	135 [0, 135]	0.46 (.14)	1.05 (.28)	.98

Note. $N = 285$; * Range represents the range of scores for study participants and includes the [Min/Max]; DRRI-2 = Deployment Risk and Resiliency Inventory – 2 – Combat Experiences subscale; MIQ-M = Moral Injury Questionnaire – Military version (modified); TRGI = Trauma-related Guilt Inventory, latent variable comprised of domain-representative parcels; AUDIT = Alcohol Use Disorder Identification Test; Consumption = AUDIT Alcohol Consumption subscale (items 1-3); Dependence = AUDIT Alcohol Dependence subscale (items 4-6); Consequences = AUDIT Alcohol-related Consequences (items 7-10); DAST = Drug Abuse Screening Test – Dichotomous variable (0 = no drug abuse symptoms; 1 = one or more drug abuse symptoms); PTSD = Davidson Trauma Scale.

Purpose 1. Aim 1 was to replicate and extend previous research demonstrating a significant relationship between combat exposure, MIEs, hazardous alcohol use, and drug abuse symptoms.

Hypothesis 1. It was hypothesized that combat exposure and MIE exposure would be positively correlated with hazardous alcohol use and drug abuse symptoms such that more combat exposure and MIEs would be associated with greater hazardous alcohol use and drug abuse symptoms.

Findings. Pearson product-moment correlations were conducted in order to observe the relationships between the continuous variables of interest (i.e., combat exposure scores, MIE exposure scores, and hazardous alcohol use scores). Point-biserial correlations were conducted to observe the associations between continuous predictors and drug abuse symptom scores. Correlations between study variables and covariates are presented in Table 3. As expected, MIE scores were positively correlated with combat exposure scores, hazardous alcohol use scores, and drug abuse symptom scores. However, combat exposure scores were only significantly correlated with Alcohol Dependence scores such that higher combat exposure scores were associated with greater Alcohol Dependence scores. Given that indirect effects may be present even when significant total effects are not present (Hayes, 2018; MacKinnon, Krull, & Lockwood, 2000; Shrout & Bolger, 2002), mediational analyses were conducted controlling for relevant covariates.

Purpose 2. Aim 2 was to explore the effects of combat and MIE exposure on drug abuse symptoms.

Hypothesis 2. It was hypothesized that, controlling for PTSD symptoms and covariates, combat exposure and MIE exposure would have a positive effect on drug abuse symptoms such that more combat exposure and MIE exposure would be associated with more drug abuse symptoms.

Findings. The relationship between combat exposure scores, MIE exposure scores, and drug abuse symptom scores, which were scored dichotomously, was assessed via hierarchical logistic regression. Drug abuse symptom scores were regressed on combat exposure scores, MIE scores, PTSD symptom scores, military status, military rank, and age. Consistent with the

hypothesis, MIE exposure scores had a positive effect on drug abuse symptom scores such that those with higher MIE exposure scores were more likely to endorse one or more drug abuse symptom scores, $\beta = 0.06$, SE = 0.03, $p = .020$, odds ratio [OR] = 1.06, 95% CI [1.01, 1.12], controlling for PTSD symptom scores, military status, military rank, and age (see Table 5). The odds of endorsing one or more drug abuse symptoms was higher for those exposed to MIEs such that, for every 1-unit increase in exposure to MIEs, the odds of endorsing one or more drug abuse symptoms increases by 1.06 times or, in other words, by 6%. Additionally, after controlling for PTSD symptom scores and other covariates, participants' military rank was significantly associated with drug abuse symptom scores such that those with a lower rank (e.g., Private, Private First Class, Airman, Seaman Apprentice) were more likely to endorse one or more drug abuse symptom scores.

Table 5

Results of Hierarchical Logistic Regression Examining Associations between Dichotomous Drug Abuse Symptoms, Combat Exposure, and Morally Injurious Experiences Controlling for PTSD Symptoms, Military Status, Rank, and Age

Drug Abuse Symptoms	*β*	*SE*(*β*)	*p*	OR	95% CI
Step 1					
PTSD Sx	-0.53	0.40	.179	0.59	[0.27, 1.27]
Military Status	-0.74	0.42	.079	0.48	[0.21, 1.09]
Rank	**-0.31**	**0.13**	**.019***	**0.74**	**[0.57, 0.95]**
Age	-0.01	0.02	.576	1.00	[0.94, 1.03]
Step 2					
Combat	-0.03	0.02	.122	0.98	[0.94, 1.01]
MIEs	**0.06**	**0.03**	**.020***	**1.06**	**[1.01, 1.12]**

Note. *N* = 285; Drug abuse symptoms = Drug Abuse Screening Test (dichotomous); Combat = Deployment Risk and Resiliency Inventory – 2 – Combat Experiences subscale; MIEs = Morally Injurious Experiences = Moral Injury Questionnaire – Military version (modified); PTSD Sx = Davidson Trauma Scale (total score - continuous); Military Status was dummy coded (Discharged = 1; Other Military Statuses = 0); Rank was measured continuously ranging from E-2 (i.e., Private, Private First Class, Airman, Seaman Apprentice) to O-7 (i.e., Brigadier General, Rear Admiral Lower Half); Age was measured continuously with age ranging from 25 to 72 years (*M* = 46.10 years, *SD* = 10.41).
*$p<.05$.

Purpose 3. Aim 3 was to examine the potential mediating role of MIE exposure on the association between combat exposure and hazardous alcohol use.

Hypothesis 3. It was hypothesized that, controlling for PTSD symptoms and covariates, MIE exposure would mediate the relationship between combat exposure and hazardous alcohol use such that higher combat exposure would be associated with higher MIE exposure, which in turn, is associated with greater hazardous alcohol use**.**

Findings. First, the relationship between combat exposure scores, MIE scores, and hazardous alcohol use scores were assessed via hierarchical linear regression. Hazardous alcohol use scores were regressed on combat exposure scores and MIE scores, controlling for PTSD

symptom scores, race, military rank, and age. Consistent with the hypothesis, MIE exposure scores had a positive effect on hazardous alcohol use scores after controlling for PTSD symptom scores and covariates (see Table 6).

Table 6

Results of Hierarchical Linear Regression Examining Associations between Hazardous Alcohol Use, Combat Exposure, and Morally Injurious Experiences Controlling for PTSD Symptoms, Race, Rank, and Age

Hazardous Alcohol Use	*B*	*SE*(*B*)	*β*	CI	R^2	ΔR^2
Step 1					**0.06**	**0.06***
PTSD Sx	0.02	0.01	0.14	[0.01, 0.03]		
Race	**-1.27**	**0.56**	**-0.14**	**[-2.37, -0.17]**		
Rank	0.01	0.07	0.01	[-0.14, 0.14]		
Age	**-0.06**	**0.03**	**-0.15**	**[-0.12, -0.01]**		
Step 2					0.07	0.01
Combat	-0.02	0.02	-0.07	[-0.06, 0.02]		
MIEs	**0.07**	**0.04**	**0.16**	**[0.00, 0.15]**		

Note. N = 285; Hazardous Alcohol Use = Alcohol Use Disorder Identification Test, latent variable composed of Alcohol Consumption, Alcohol Dependence, and Alcohol-related Consequences; Combat = Deployment Risk and Resiliency Scale – 2 – Combat Experiences subscale; MIEs = Morally Injurious Experiences = Moral Injury Questionnaire – Military version (modified); PTSD Sx = Davidson Trauma Scale (total score - continuous); Race was dummy coded (Caucasian = 1; All other race categories = 0); Rank was measured continuously with ranking ranging from E-2 (i.e., Private, Private First Class, Airman, Seaman Apprentice) to O-7 (i.e., Brigadier General, Rear Admiral Lower Half); Age was measured continuously with age ranging from 25 to 72 years (M = 46.10 years, SD = 10.41).
*p<.05.

In order to ascertain whether MIE scores mediate the relationship between combat exposure scores and hazardous alcohol use scores, a structural equation modeling (SEM) was conducted utilizing Mplus Version 8.0 (Muthén & Muthén, 1998-2017). In this model, model fit

was determined to be good, $\chi 2(12) = 15.93$, $p = .194$, CFI = 0.994, TLI = 0.984, RMSEA = 0.035 (90% CI [0.000, 0.075]), SRMR = 0.026 (Hu & Bentler, 1999).

Direct Effects. A series of significant direct effect pathways were detected within this model (see Table 7 for complete results; see Figure 1 for graphical representation). Of note, MIE scores were significantly and positively associated to hazardous alcohol use scores, $\beta = 0.20$, $SE = 0.09$, $p = .041$. There was also a significant direct effect between combat exposure scores and MIE scores, $\beta = 0.55$, $SE = 0.05$, $p = .001$. However, there was no significant direct effect between combat exposure scores and hazardous alcohol use scores, $\beta = -0.04$, $SE = 0.08$, $p = .667$. Additionally, there was a significant negative direct effect between participants' racial identity and hazardous alcohol use scores, $\beta = -0.17$, $SE = 0.05$, $p = .009$, such that those who identified as persons of color were more likely to endorse greater hazardous alcohol use scores. Additionally, PTSD symptoms scores had a significant positive direct effect with both MIE scores and combat exposure scores, which is not shown in Figure 1.

Indirect Effects. In order to assess mediational effects, indirect effects were tested using 95% bias-corrected bootstrapped standard errors. Results indicated that MIE scores mediated the relationship between combat exposure scores and hazardous alcohol use scores, $\beta = 0.11$ $SE = 0.06$, $p = .041$, 95% CI [0.01, 0.23]. Results provided support for hypothesis three (see Table 8).

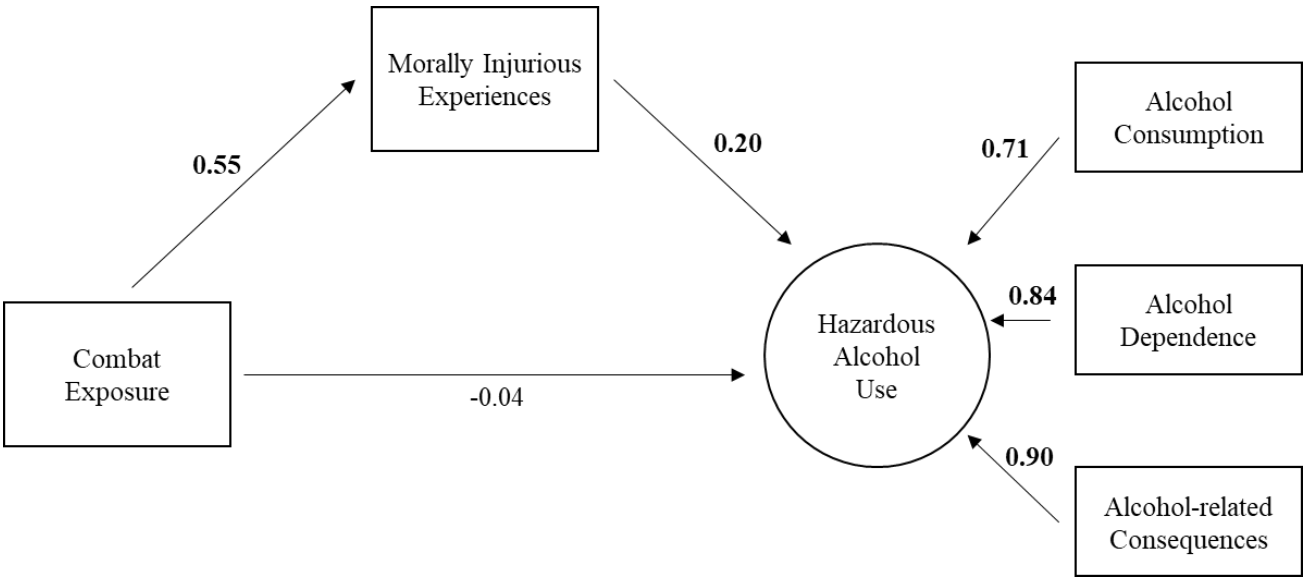

Figure 1. Direct effects of the mediation of the relations between combat exposure, morally injurious experiences, and hazardous alcohol use. Standardized path coefficients are shown.

Table 7

Model Predicting Hazardous Alcohol Use from Combat Exposure and Morally Injurious Experiences Controlling for PTSD Symptoms, Race, Rank, and Age

Regression and Predictors	*β*	*SE*	*p*	*CI*
Combat R^2 =.12				
PTSD Sx	**0.30**	**0.05**	**.001*** **	**[0.19, 0.40]**
Race	0.04	0.06	.531	[-0.06, 0.18]
Rank	-0.04	0.05	.723	[-0.14, 0.06]
Age	**-0.16**	**0.06**	**.017***	**[-0.28, -0.03]**
MIEs R^2 =.49				
PTSD Sx	**0.29**	**0.05**	**.001*** **	**[0.19, 0.40]**
Race	-0.06	0.05	.230	[-0.11, 0.04]
Rank	-0.02	0.05	.723	[-0.11, 0.09]
Age	0.02	0.06	.695	[-0.08, 0.14]
Combat	**0.55**	**0.05**	**.001*** **	**[0.42, 0.64]**
Hazardous Alcohol Use R^2 =.10				
PTSD Sx	0.08	0.08	.290	[-0.07, 0.23]
Race	**-0.17**	**0.07**	**.010****	**[-0.29, -0.04]**
Rank	0.02	0.06	.751	[-0.09, 0.14]
Age	**-0.13**	**0.06**	**.033***	**[-0.25, -0.01]**
Combat	-0.04	0.08	.667	[-0.18, 0.13]
MIEs	**0.20**	**0.10**	**.041***	**[0.02, 0.40]**

Note. *N* = 285; Hazardous Alcohol Use = Alcohol Use Disorder Identification Test, latent variable composed of Alcohol Consumption, Alcohol Dependence, and Alcohol-related Consequences; Combat = Deployment Risk and Resiliency Inventory – 2 – Combat Experiences subscale; MIEs = Morally Injurious Experiences = Moral Injury Questionnaire – Military version (modified); PTSD Sx = Davidson Trauma Scale (total score - continuous); Race was dummy coded (Caucasian = 1; All other race categories = 0); Rank was measured continuously with ranking ranging from E-2 (i.e., Private, Private First Class, Airman, Seaman Apprentice) to O-7 (i.e., Brigadier General, Rear Admiral Lower Half); Age was measured continuously with age ranging from 25 to 72 years (*M* = 46.10 years, *SD* = 10.41).
*p<.05, **p<.01, ***p<.001.

Table 8

Indirect Effect of Combat Exposure on Hazardous Alcohol Use via Morally Injurious Experiences Controlling for PTSD Symptoms, Race, Rank, and Age

Hazardous Alcohol Use	*β*	*SE*	*p*	*CI*
Total Effect	0.07	0.08	.321	[-0.07, 0.23]
Total Indirect	**0.11**	**0.06**	**.049***	**[0.01, 0.23]**
Direct Effect	-0.04	0.08	.667	[-0.18, 0.13]
Specific Indirect Effects				
Morally Injurious Experiences	**0.11**	**0.06**	**.049***	**[0.01, 0.23]**

Note. *N* = 285; Hazardous Alcohol Use = Alcohol Use Disorder Identification Test, latent variable composed of Alcohol Consumption, Alcohol Dependence, and Alcohol-related Consequences; Combat = Deployment Risk and Resiliency Inventory – 2 – Combat Experiences subscale; Morally Injurious Experiences = Moral Injury Questionnaire – Military version (modified).
*p<.05.

Purpose 4. Aim 4 was to examine the associations between trauma-related guilt, combat exposure, MIE exposure, and drug abuse symptoms.

Hypothesis 4a. It was hypothesized that trauma-related guilt would be positively correlated with combat exposure, MIE exposure, and drug abuse symptoms such that higher trauma-related guilt would be related to more combat exposure, MIE exposure, and drug abuse symptoms.

Findings. Point-biserial correlations were conducted to observe the associations between continuous predictors and dichotomous drug abuse symptom scores. Correlations between study variables and covariates are presented in Table 3. As expected, trauma-related guilt parceled scores were positively correlated with combat exposure scores and MIE exposure scores. Surprisingly, only scores on one trauma-related guilt parcel (parcel two) were positively correlated with drug abuse symptom scores.

Hypothesis 4b. It was hypothesized that, controlling for PTSD symptoms and covariates, trauma-related guilt would have a positive effect on drug abuse symptoms such that higher trauma-related guilt would be associated with more reported drug abuse symptoms.

Findings. The relationship between combat exposure scores, MIE scores, trauma-related guilt scores, and drug abuse symptom scores (dichotomous) were assessed via hierarchical logistic regression. Drug abuse symptom scores were regressed on combat exposure scores, MIE scores, trauma-related guilt scores, PTSD symptom scores, military status, rank, and age. Consistent with the hypothesis, after controlling for PTSD symptom scores, military status, military rank, and age, MIE scores had a positive effect on drug abuse symptom scores such that those with higher MIE exposure scores were more likely to endorse one or more drug abuse symptom scores, $\beta = 0.06$, SE = 0.03, $p = .044$, odds ratio [OR] = 1.06, 95% CI [1.00, 1.13] (see Table 9). The odds of endorsing one or more drug abuse symptoms were higher for those exposed to MIEs such that, as for each addition MIE experienced, the odds of endorsing one or more drug abuse symptoms increased by 1.06 times or 6%. Neither trauma-related guilt scores nor combat exposure scores had a significant effect on drug abuse symptom scores. After adjusting for other variables of interest, rank had a significant effect on drug abuse symptom scores such that the odds of endorsing one or more drug abuse symptoms were higher for participants of enlisted rank, $\beta = -0.29$, SE = 0.13, $p = .025$, OR = 0.75, 95% CI [0.58, 0.96].

Table 9

Results of Hierarchical Logistic Regression Examining Associations between Dichotomous Drug Abuse Symptoms, Combat Exposure, Morally Injurious Experiences, and Trauma-related Guilt Controlling for PTSD Symptoms, Military Status, Rank, and Age

Drug Abuse Symptoms	*β*	*SE*(*β*)	*p*	OR	95% CI
Step 1					
PTSD Sx	-0.53	0.40	.179	0.59	[0.27, 1.27]
Military Status	-0.74	0.42	.079	0.48	[0.21, 1.09]
Rank	**-0.31**	**0.13**	**.019***	**0.74**	**[0.57, 0.95]**
Age	-0.01	0.02	.576	0.99	[0.94, 1.03]
Step 2					
Combat	-0.03	0.02	.125	0.98	[0.94, 1.01]
MIEs	**0.06**	**0.03**	**.044***	**1.06**	**[1.00, 1.13]**
Trauma-related Guilt	-0.01	0.11	.964	1.00	[0.80, 1.24]

Note. *N* = 285; Drug abuse symptoms = Drug Abuse Screening Test (dichotomous); Combat = Deployment Risk and Resiliency Inventory – 2 – Combat Experiences subscale; MIEs = Morally Injurious Experiences = Moral Injury Questionnaire – Military version (modified); Trauma-related Guilt = Trauma-related Guilt Inventory, latent variable comprised of domain-representative parcels; PTSD Sx = Davidson Trauma Scale (total score - continuous); Military Status was dummy coded (Discharged = 1; Others = 0); Rank was measured continuously ranging from E-2 (i.e., Private, Private First Class, Airman, Seaman Apprentice) to O-7 (i.e., Brigadier General, Rear Admiral Lower Half); Age was measured continuously ranging from 25 to 72 years (*M* = 46.10 years, *SD* = 10.41).
*$p<.05$.

Purpose 5. Aim 5 was to examine trauma-related guilt and its relationship with combat exposure, MIE exposure, and hazardous alcohol use.

Hypothesis 5a. It was hypothesized that trauma-related guilt would be positively correlated with combat exposure, MIEs, and hazardous alcohol use such that higher trauma-related guilt would be related to more exposure to combat and MIEs, and greater hazardous alcohol use.

Findings. Pearson product-moment correlations were conducted. Correlations between study variables and covariates are presented in Table 3. As expected, trauma-related guilt scores

were positively correlated with combat exposure scores and MIE exposure scores. Interestingly, trauma-related guilt scores were positively correlated with Alcohol Dependence scores and Alcohol-related Consequence scores but were not correlated with Alcohol Consumption scores.

Hypothesis 5b. It was hypothesized that, after controlling for PTSD symptoms and covariates, trauma-related guilt would individually mediate the relationship between MIE exposure and hazardous alcohol use such that trauma-related guilt would be a pathway through which MIE exposure was associated with hazardous alcohol use.

Findings. First, the relationship between MIE scores, trauma-related guilt scores, and hazardous alcohol use scores were assessed via hierarchical linear regression. Hazardous alcohol use scores were regressed on MIE scores and trauma-related guilt scores, controlling for PTSD symptom scores, race, military rank, and age. Contrary to the expectations, neither trauma-related guilt scores, $\beta = 0.08$, $SE = 0.15$, $p = .586$, partial $r^2 = .033$, nor MIE scores, $\beta = 0.05$, $SE = 0.04$, $p = .159$, partial $r^2 = .084$, were associated with hazardous alcohol use scores after controlling for PTSD symptom scores, race, military rank, and age (see Table 10). Although study variables of interest did not have a significant effect on hazardous alcohol use scores, participants' race and age did have a significant effect on hazardous alcohol use scores after accounting for MIE scores, trauma-related guilt scores, and PTSD symptom scores. Given that indirect effects may be present even when significant total effects are not present (Hayes, 2018; MacKinnon et al., 2000; Shrout & Bolger, 2002), mediational analyses were conducted controlling for relevant covariates.

Table 10

Results of Hierarchical Linear Regression Examining Associations between Hazardous Alcohol Use, Morally Injurious Experiences, and Trauma-related Guilt Controlling for PTSD Symptoms, Race, Rank, and Age

Hazardous Alcohol Use	*B*	*SE*(*B*)	*β*	CI	R^2	ΔR^2
Step 1					**0.05**	**0.05***
PTSD Sx	0.97	0.54	0.11	[-0.11, 2.04]		
Race	**-1.29**	**0.56**	**-0.14**	**[-2.39, -0.18]**		
Rank	-0.01	0.07	-0.01	[-0.15, 0.13]		
Age	**-0.06**	**0.03**	**-0.14**	**[-0.12, -0.01]**		
Step 2					0.06	0.01
MIEs	0.05	0.04	0.11	[-0.02, 0.12]		
Trauma-related Guilt	0.08	0.15	0.04	[-0.21, 0.38]		

Note. *N* = 285; Hazardous Alcohol Use = Alcohol Use Disorder Identification Test, latent variable composed of Alcohol Consumption, Alcohol Dependence, and Alcohol-related Consequences; MIEs = Morally Injurious Experiences = Moral Injury Questionnaire – Military version (modified); Trauma-related Guilt = Trauma-related Guilt Inventory, latent variable comprised of domain-representative parcels; PTSD Sx = Davidson Trauma Scale (total score - continuous); Race was dummy coded (Caucasian = 1; All other race categories = 0); Rank was measured continuously ranging from E-2 (i.e., Private, Private First Class, Airman, Seaman Apprentice) to O-7 (i.e., Brigadier General, Rear Admiral Lower Half); Age was measured continuously ranging from 25 to 72 years (*M* = 46.10 years, *SD* = 10.41).
*p<.05.

In order to ascertain whether trauma-related guilt scores mediate the relationship between MIE scores and hazardous alcohol use scores, SEM was conducted utilizing Mplus Version 8.0 (Muthén & Muthén, 1998-2017). In this model, model fit was determined to be good, $\chi 2(28)$ = 40.33, p = .062, CFI = 0.991, TLI = 0.985, RMSEA = 0.040 (90% CI [0.000, 0.066]), SRMR = 0.029 (Hu & Bentler, 1999).

Direct Effects. Only one significant direct effect pathway was detected within this model (see Table 11 for complete results; see Figure 2 for graphical representation). There was a significant positive direct effect between MIE scores and trauma-related guilt scores, β = 0.49,

SE = 0.06, *p* = .001. However, no significant direct effects were found between trauma-related guilt scores and hazardous alcohol use scores, β = 0.01, *SE* = 0.09, *p* = .909. Similarly, MIE scores did not demonstrate a significant direct effect on hazardous alcohol use scores, β = 0.18, *SE* = 0.10, *p* = .064. Although direct effects were not found between study variables of interest, race had a significant negative direct effect on both trauma-related guilt scores, β = -0.15, *SE* = 0.05, *p* = .001, and hazardous alcohol use scores, β = -0.17, *SE* = 0.05, *p* = .009, such that participants who identified as persons of color were more likely to report higher trauma-related guilt scores and hazardous alcohol use scores. Additionally, PTSD symptom scores had a significant positive direct effect on both MIE scores, β = 0.46, *SE* = 0.05, *p* = .001, and trauma-related guilt scores, β = 0.17, *SE* = 0.06, *p* = .001.

Indirect Effects. In order to assess mediational effects, indirect effects were tested using 95% bias-corrected bootstrapped standard errors. Results indicated that trauma-related guilt scores did not mediate the relationship between MIE scores and hazardous alcohol use scores, β = 0.01, *SE* = 0.04, *p* = .910, 95% CI [-0.08, 0.09]. Although there were no significant indirect effects, the overall model total effect was significant, β = 0.18, *SE* = 0.08, *p* = .031, 95% CI [0.02, 0.36]. Results do not provide support for hypothesis b (see Table 12).

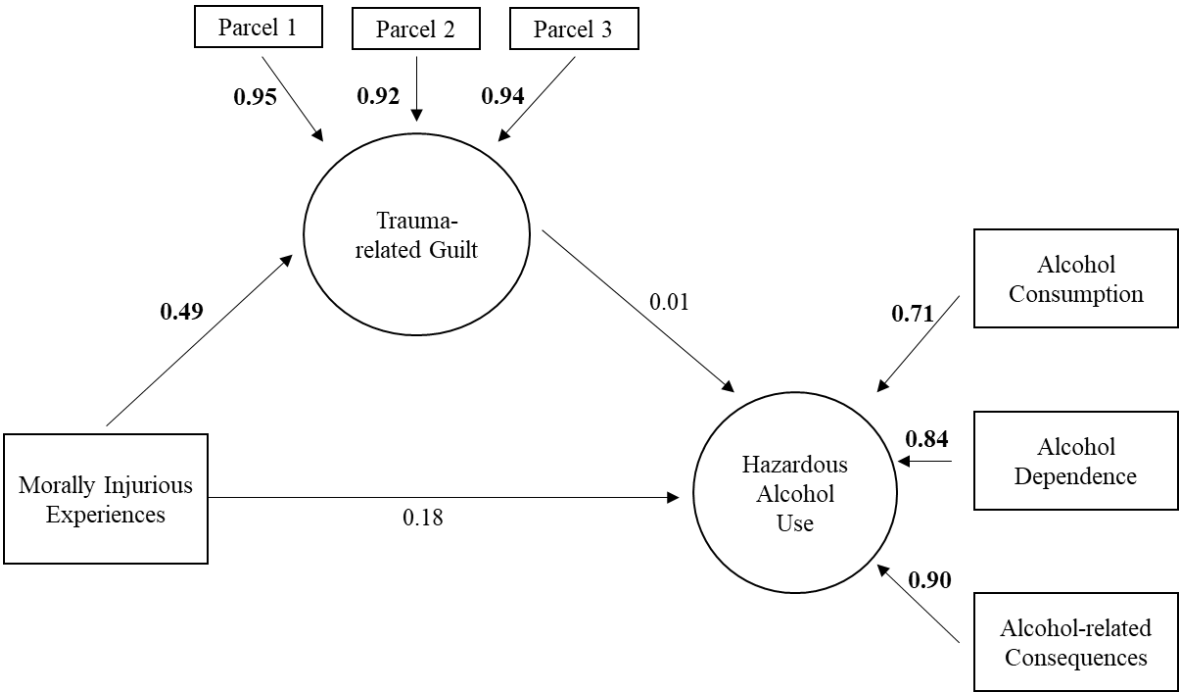

Figure 2. Direct effects of the mediation of the relations between morally injurious experiences, trauma-related guilt, and hazardous alcohol use. Standardized path coefficients are shown.

Table 11

Model Predicting Hazardous Alcohol Use from Morally Injurious Experiences and Trauma-related Guilt Controlling for PTSD Symptoms, Race, Rank, and Age

Regression and Predictors	*β*	*SE*	*p*	*CI*
MIEs R^2 =.22				
PTSD Sx	**0.46**	**0.05**	**.001*** **	**[0.35, 0.55]**
Race	-0.02	0.06	.721	[-0.14, 0.09]
Rank	-0.04	0.06	.475	[-0.15, 0.08]
Age	-0.06	0.07	.382	[-0.20, 0.08]
Trauma-related Guilt R^2 =.39				
PTSD Sx	**0.17**	**0.06**	**.001*** **	**[0.05, 0.29]**
Race	**-0.15**	**0.05**	**.004****	**[-0.25, -0.05]**
Rank	0.01	0.07	.930	[-0.12, 0.15]
Age	0.02	0.06	.695	[-0.10, 0.14]
MIEs	**0.49**	**0.06**	**.001*** **	**[0.37, 0.60]**
Hazardous Alcohol Use R^2 =.10				
PTSD Sx	0.08	0.08	.339	[-0.07, 0.23]
Race	**-0.17**	**0.07**	**.009****	**[-0.30, -0.04]**
Rank	0.02	0.06	.743	[-0.09, 0.14]
Age	-0.14	0.07	.059	[-0.27, 0.01]
MIEs	0.18	0.10	.064	[-0.01, 0.37]
Trauma-related Guilt	0.01	0.09	.909	[-0.16, 0.18]

Note. *N* = 285; Hazardous Alcohol Use = Alcohol Use Disorder Identification Test, latent variable composed of Alcohol Consumption, Alcohol Dependence, and Alcohol-related Consequences; MIEs = potentially Morally Injurious Experiences = Moral Injury Questionnaire – Military version (modified); Trauma-related Guilt = Trauma-related Guilt Inventory, latent variable comprised of domain-representative parcels; PTSD Sx = Davidson Trauma Scale (total score - continuous); Race was dummy coded (Caucasian = 1; All other race categories = 0); Rank was measured continuously with ranking ranging from E-2 (i.e., Private, Private First Class, Airman, Seaman Apprentice) to O-7 (i.e., Brigadier General, Rear Admiral Lower Half); Age was measured continuously with age ranging from 25 to 72 years (*M* = 46.10 years, *SD* = 10.41).
**p<.01 ***p<.001.

Table 12

Indirect Effect of Morally Injurious Experiences on Hazardous Alcohol Use via Trauma-related Guilt Controlling for PTSD Symptoms, Race, Rank, and Age

Hazardous Alcohol Use	*β*	*SE*	*p*	*CI*
Total Effect	**0.18**	**0.08**	**.031***	**[0.02, 0.36]**
Total Indirect	0.01	0.04	.910	[-0.08, 0.09]
Direct Effect	0.18	0.09	.064	[-0.01, 0.37]
Specific Indirect Effects				
Trauma-related Guilt	0.01	0.04	.910	[-0.08, 0.09]

Note. *N* = 285; Hazardous Alcohol Use = Alcohol Use Disorder Identification Test, latent variable composed of Alcohol Consumption, Alcohol Dependence, and Alcohol-related Consequences; MIEs = potentially Morally Injurious Experiences = Moral Injury Questionnaire – Military version (modified); Trauma-related Guilt = Trauma-related Guilt Inventory, latent variable comprised of domain-representative parcels.
*p<.05.

Hypothesis 5c. It was hypothesized that, controlling for PTSD symptom and covariates, both MIE exposure and trauma-related guilt would sequentially mediate the relationship between combat exposure and hazardous alcohol use such both MIE exposure and trauma-related guilt would be pathways through which combat exposure is related to hazardous alcohol use.

Findings. First, the relationship between combat exposure scores, MIE scores, trauma-related guilt scores, and hazardous alcohol use scores was assessed via hierarchical linear regression. Hazardous alcohol use scores were regressed on combat exposure scores, MIE scores, and trauma-related guilt scores, controlling for PTSD symptom scores, race, military rank, and age. Surprisingly, MIE scores were not associated with hazardous alcohol use scores, β = 0.06, *SE* = 0.04, p = .143, partial r^2 = .088, after accounting for PTSD symptom scores, race, military rank, and age. Additionally, both combat exposure scores and trauma-related guilt

scores were not significantly associated with hazardous alcohol use scores (see Table 13 for complete results). Although study variables of interest did not have a significant effect on hazardous alcohol use scores, participants' race and age did have a significant effect on hazardous alcohol use scores even when accounting for combat exposure scores, MIE scores, trauma-related guilt scores, PTSD symptom scores, and covariates. Due to the nonsignificant findings regarding the paths between MIE scores, trauma-related guilt scores, and hazardous alcohol use scores within the previous regression analyses, the overall sequential mediation was not conducted.

Table 13

Results of Hierarchical Linear Regression Examining Associations between Hazardous Alcohol Use, Combat Exposure, Morally Injurious Experiences, and Trauma-related Guilt Controlling for PTSD Symptoms, Race, Rank, and Age

Hazardous Alcohol Use	*B*	*SE*(*B*)	*β*	*p*	R^2	ΔR^2
Step 1					**0.05**	**0.05****
PTSD Sx	0.98	0.55	0.11	.078		
Race	**-1.29**	**0.56**	**-0.14**	**.023***		
Rank	-0.01	0.07	-0.01	.858		
Age	**-0.06**	**0.03**	**-0.14**	**.041***		
Step 2					0.06	0.02
Combat Exposure	-0.01	0.02	-0.04	.594		
MIEs	0.06	0.04	0.13	.143		
Trauma-related Guilt	0.08	0.15	0.04	.614		

Note. N = 285; Hazardous Alcohol Use = Alcohol Use Disorder Identification Test, latent variable composed of Alcohol Consumption, Alcohol Dependence, and Alcohol-related Consequences; Combat Exposure = Deployment Risk and Resiliency Inventory – Combat Experiences subscale; MIEs = Morally Injurious Experiences = Moral Injury Questionnaire – Military version (modified); Trauma-related Guilt = Trauma-related Guilt Inventory, latent variable comprised of domain-representative parcels; PTSD Sx = Davidson Trauma Scale (total score - continuous); Race was dummy coded (Caucasian = 1; All other race categories = 0); Rank was measured continuously ranging from E-2 (i.e., Private, Private First Class, Airman, Seaman Apprentice) to O-7 (i.e., Brigadier General, Rear Admiral Lower Half); Age was measured continuously ranging from 25 to 72 years (M = 46.10 years, SD = 10.41). *p<.05 **p<.01.

CHAPTER IV

DISCUSSION

Exposure to MIEs has a significant effect on alcohol and drug abuse among combat veterans (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019; Robbins, 2016). To date, the extent of our knowledge on MIEs and substance use have been limited to community sample of veterans. In contrast, the present study utilized a sample of recent-era combat veterans recruited through the VA, most of whom reported a service-connected disability. Substance use is believed to be impacted by trauma-related guilt as it is conceptualized as a core symptom of moral injury through which secondary outcomes, such as substance abuse, develop (C. J. Bryan et al., 2017; Jinkerson, 2016; Jinkerson & Battles, 2019; Litz et al., 2009). Although, trauma-related guilt is shown to have a detrimental impact on veterans' well-being (Jinkerson & Battles, 2019; Kubany, 1994; Marx et al., 2010; Nazarov et al., 2015; Park et al., 2012; Tripp & Mc-Devitt-Murphy, 2016), to the author's knowledge, research has not examined the impact of both MIEs and trauma-related guilt on alcohol use and drug abuse symptoms. The current study sought to address gaps in our knowledge on the relationships between MIE exposure, trauma-related guilt, and alcohol use and drug abuse symptoms with a sample of Iraq and Afghanistan combat veterans, the majority of whom were receiving VA benefits for a service-connected disability (i.e., 70.2% (n = 200) and who were recruited by the Department of Veterans Affairs. Specifically, the current study aimed to (1) replicate and extend previous research demonstrating a significant relationship between combat exposure, MIEs, hazardous alcohol use, and drug abuse symptoms, (2) explore the effects of combat and MIE exposure on drug abuse symptoms, (3) examine the potential

mediating role of MIE exposure on the association between combat exposure and hazardous alcohol use, (4) examine the effects of trauma-related guilt on combat, MIE exposure, and drug abuse symptoms, and (5) examine the both individual mediating role of trauma-related guilt and the sequential mediating role of MIEs and trauma-related guilt on the associations between combat exposure and hazardous alcohol use.

Prior to elaborating on the findings as they relate to the study aims, it is important to note that participants in the current study had considerable combat and MIE exposure. The current study sample consisted entirely of combat exposed veterans which differed from previous studies that included mixed samples of both combat and non-combat veterans. Of note, most participants in the current study reported being exposed to hostile income fire (85.3%; *n* = 243) and over one-third endorsed firing a weapon at enemy combatants (38.9%; *n* = 111). Roughly half of all respondents endorsed being in a vehicle or a part of a convoy that was attacked (51.9%; *n* = 148) as well as endorsed witnessing someone from their unit or an ally unit being seriously wounded or killed (54.0%; *n* = 154). Rates of combat exposure in the current study were significantly higher than other community sample studies whose combat exposure ranged from 54.4% to 69% (Bray et al., 2009; Bray et al., 2013; Kelley et al., 2015). Additionally, MIE exposure was found to be high among the current study. Approximately two-thirds of participants endorsed being betrayed by military or political leaders (75.0%; *n* = 214) and over one-third identified betraying their own personal values (38.7%; *n* = 111). Nearly one-quarter of participants also endorsed being involved in transgressions against others such as seeing or being involved in the death of an innocent of war (24.0%; *n* = 70) or seeing or being involved in the death of children (21.8%, *n* = 63). The types of combat experiences endorsed by participants is

consistent with previous investigations of service members' experiences of being attached or ambushed, engaging in killing, and seeing others injured or killed (Hoge et al., 2004; Maguen, Lucenko, et al., 2010; Wilk et al., 2010). Additionally, MIEs endorsed in the current study are congruent with previous research identifying betrayals (e.g., leadership failures and failure to act in accordance with one's values), incidents involving harm to civilians or their property, within-rank violence, inability to prevent death and suffering, and ethical dilemmas/moral conflicts as commonly reported forms of MIEs (Braitman et al., 2018; Drescher et al., 2011; Flipse Vargas et al., 2013).

In addition to having higher levels of combat and MIE exposure, the current sample consisted of veterans the majority of whom had a VA service-connected disability (70.2%). The high level of service-connected participants suggests higher rates of mental and/or physical health concerns among the current sample. A recent survey conducted by the Wounded Warrior project examined data from 34.822 veterans and found that 88% of veterans sampled were receiving VA disability benefits (Fales et al., 2017). They further found that the most commonly reported concerns included PTSD (77.4%), sleep problems (75%), back, neck, and shoulder problems (72.6%), and depression (70%). Rates of service-connected disability in the current study appear to be slightly lower than those found in the Wounded Warrior Project survey but still emphasize the current sample's heightened physical and mental health challenges.

Associations between Combat, MIEs, and Alcohol Use and Drug Abuse Symptoms

Combat and other dangerous or potentially dangerous military missions place service members at greater risk of engaging in or witnessing morally ambiguous or ethically challenging situations that may deviate from a service member's realm of moral and ethical understanding.

Increased attention has focused on the moral and ethical challenges facing combat veterans and has given rise to the study of MIEs and moral injury. The consideration of the moral/ethical difficulties associated with combat has yielded a wealth of research focused on the implications of exposure to MIEs and the development of moral injury. Research has previously demonstrated that MIE exposure is associated with increased alcohol use and drug abuse symptoms (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019; Robbins, 2016). Although research on the associations between MIEs and substance use is burgeoning, most of the research has come from the author's lab utilizing community samples of veterans. Given the lack of investigations with veterans connected to the VA, the first aim of the study was to replicate and extend upon previous research demonstrating a significant relationship between combat exposure, MIEs, hazardous alcohol use, and drug abuse symptoms by examining these associations in a sample of predominately VA service-connected, Iraq and Afghanistan combat veterans recruited by the VA.

MIEs and combat. One aspect of the first aim was to determine whether combat experiences were associated with MIE exposure among Iraq and Afghanistan combat veterans. It was predicted that exposure to combat would be related to MIE exposure. As predicted, combat exposure was positively associated with MIEs. This finding suggests that more exposure to combat increases the likelihood of exposure to MIEs. This finding is consistent with previous research supporting the positive relationship between combat and MIE exposure (Battles, et al., 2019; Currier, McCormick, & Drescher, 2015; Drescher et al., 2011; Flipse Vargas et al., 2013; Robbins, 2016). There is a higher risk of having engaged in or been exposed to MIEs among the

most recent cohort of veterans who served in Operation Iraqi Freedom (OIF; Iraq), Operation Enduring Freedom (OEF; Afghanistan), and Operation New Dawn (OND; Iraq and Afghanistan; Frankfurt & Frazier, 2016; Grossman, 2009; Litz et al., 2009). This risk was likely heightened because recent combat against insurgents utilized more unconventional tactics (e.g., improvised explosive device (IEDs) and guerilla warfare) in an urban/close quarters environment (see Frankfurt & Frazier, 2016 for discussion). Use of such unconventional combat tactics resulted in service members being exposed to more volatile and non-contingent violence which may have failed to conform to their established beliefs about warfare (Flipse Vargas et al., 2013; Frankfurt & Frazier, 2016; Grossman, 2009; Litz et al., 2009; Shay, 2002, 2014). Thus, previous research and the current findings support that Iraq and Afghanistan combat veterans with more combat exposure tend to also experience more MIEs.

Experiencing morally uncertain and ethically obscure combat situations make it more difficult for military personnel to determine the most judicious course of action towards both combatants and non-combatants. Although service members may act in ways that are justified in war, these actions, which often must be made quickly, can have a significant psycho-spiritual impact (Litz et al., 2009; Farnsworth et al., 2014; Shay 2002). Service members who experience inner conflict in response to MIEs are faced the task of reconciling their discomfort and expectations of social condemnation and rejection (Higgins, 1987; Jinkerson, 2016; Litz et al., 2009). Both theoretical and empirical support have identified that exposure to MIEs gives rise to the core symptoms of the moral injury syndrome (e.g., guilt, shame, and loss in trust) which, in turn, may elicit secondary outcomes of MIE exposure, including substance use (Battles et al., 2018, Battles et al., 2019; C. J. Bryan et al., 2017; Buechner, 2014; Dennis et al., 2017; Drescher

et al., 2011; Flipse Vargas et al., 2013; Frankfurt & Frazier, 2016; Grossman, 2009; Jinkerson, 2014; Kopacz et al., 2016; Litz et al., 2009, 2013; Nash & Litz, 2013; Tangney et al., 2007).

Drug abuse symptoms. Another goal of the first study aim was to examine whether combat and MIE exposure were correlated with drug abuse symptoms. It was hypothesized that more exposure to both combat and MIEs would be positively correlated with greater drug abuse symptoms. As expected, MIEs were positively correlated with drug abuse symptoms such that more MIE exposure was associated with greater endorsement of drug abuse symptoms. Although a positive correlation was found between MIEs and drug abuse symptoms, combat was not significantly correlated with drug abuse symptoms. The lack of a significance was surprising given previous research supporting the relationship between combat and drug abuse symptoms (Bohnert et al., 2014; Bray et al., 2009; Bray et al., 2010; Eisen et al., 2012; Kelley et al., 2015; Seal et al., 2012). It is possible that the lack of association between combat and drug abuse symptoms was because inclusion criteria for the current study required that all participants had experienced at least one combat situation. The second aim of the current study was to further explore the effects of combat and MIE exposure on drug abuse symptoms. It was hypothesized that both combat exposure and MIEs would have a significant effect on drug abuse symptoms such that greater combat and MIE exposure would be associated with more drug abuse symptoms. Support was found for the second hypothesis in that MIE exposure had a significant and positive effect on drug abuse symptoms. MIE exposure increased the likelihood that combat veterans would report one or more drug abuse symptom. Further, for each additional MIE experienced the odds of endorsing one or more drug abuse symptoms increased by 6%. However, contrary to predictions, combat exposure did not have a significant effect on drug

abuse symptoms. The current findings suggest that MIE exposure may be a more salient factor impacting drug abuse symptoms compared to combat exposure.

Drug abuse is a growing concern among both active duty and veteran populations (Bonn-Miller et al., 2012; Bray et al., 2010; Eisen et al., 2012). While ample research has demonstrated an association between trauma, PTSD, and drug abuse symptoms (Bohnert et al., 2014; Bray et al., 2009; Bray et al., 2010; Eisen et al., 2012; Kelley et al., 2015; Seal et al., 2012), to the author's knowledge, only four studies to date have examined the relationship between moral injury and drug abuse (Battles et al., 2018; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019). All four studies found positive associations between MIEs and drug abuse symptoms. Therefore, the present study sought to extend these early findings by examining the associations between MIEs and drug abuse symptoms among predominately VA service-connected, Iraq and Afghanistan combat veterans. The current finding that MIEs increases the likelihood of one or more drug abuse symptom among recent-era combat veterans adds to our existing knowledge about the relationships between MIEs and drug abuse symptoms in recent-era veterans. Although it was not possible to determine causality in the present cross-sectional study, these findings support arguments that moral injury may increase the likelihood of drug abuse symptoms. If this is the case, this would support theories that contend that drug abuse may be a mechanism to cope with distress elicited by MIEs. Specifically, the stress-coping theories (Khantzian, 1985; Wills & Shiffman, 1985), tension-reduction model (Sher & Levenson, 1982), and motivational model (Cox & Klinger, 1988) argue that stress plays an important role in motivating substance use in that individuals may use both licit and illicit substances to manage or ameliorate negative emotions and distress.

Despite the efforts by the DoD, VA, and other agencies to reduce issues with drug use and drug-related consequences, rates of veteran substance abuse continue to rise, particularly among the most recent cohort of veterans (i.e., OEF/OIF/OND; Hudson et al., 2017). In the current study, 12% of combat veterans endorsed one or more drug abuse symptoms. The percentage of participants that endorsed drug abuse symptoms appears higher than other studies. Among a nationally representative sample of veterans, an estimated 4.4% of veterans reported any illicit drug use in the past month (Wagner et al., 2007). Comparing types of drug use, 3.5% of veterans reported smoking marijuana in the past month compared to 1.7% who reported using illicit drugs other than marijuana (Wagner et al., 2007). Although the current study did not differentiate the type of drugs being abused, the high rate of drug abuse symptoms reported in the present study may be because the study sample consisted of Iraq and Afghanistan combat exposed veterans, majority of whom had a VA service-connected disability. Combat veterans, particularly those from the most recent conflicts (i.e., OEF/OIF/OND), have higher rates of both physical disabilities and psychological disorders compared to non-combat veterans (Bray et al., 2010; Hoge et al., 2004; Hudson et al., 2017) which may motivate greater substance use compared to veterans from other eras.

Deployment related factors, including combat and MIE exposure, likely play a role in the heightened level of drug abuse symptoms reported in the current study. Previous research has demonstrated that deployments, combat exposure, and MIE exposure are connected to increased substance misuse (Battles et al., 2018; Braitman et al., 2018; Cerdá et al., 2014; Forkus et al., 2019; Kelley, Braitman, et al., 2019; Kelley et al., 2015; Seal et al., 2012). Combat exposure is an important risk factor in the development of illicit drug abuse (Fischer, 1991; Reifman &

Windle, 1996) with combat exposed veterans reporting higher rates of illicit drug use compared to non-combat veterans (Bray et al., 2010). Given previous research about the combat-drug use relationship, it was surprising to discover the combat exposure was not related to drug abuse symptoms in the current study. That said, certain types of combat experiences are more strongly linked to drug misuse. Exposure to atrocities of war and MIEs are shown to be particularly salient in increasing the risk of drug abuse symptoms (Battles et al., 2018; Braitman et al., 2018; Currier, Holland, Jones, & Sheu, 2014; Forkus et al., 2019; Kelley, Braitman, et al., 2019). The current findings that MIEs, but not combat exposure, are associated with drug abuse symptoms is consistent with previous research on the potency of certain types of combat-related events.

In addition to the impact of MIE exposure on drug abuse symptoms, the current investigation found that participant's rank within the military was a significant predictor of drug abuse symptoms. Consistent with previous findings (Bray et al., 2009; Seal et al., 2012), lower rank (e.g., Private, Private First Class, Airman, Seaman Apprentice) was associated with a greater likelihood endorsing one or more drug abuse symptoms. Among active duty members, illicit drug use is shown to differ by military pay grade (i.e., military rank; Bray et al., 2009) such that the highest reported drug use is found among those ranking E1 to E3, with 14% endorsing drug use. Similar rates were found among those in pay grades E4 to E6, with 13% reporting illicit drug use. Illicit drug use is also shown to decrease as pay grade increases (Bray et al., 2009). Being an enlisted service member is implicated as being the strongest predictor of substance use with those in pay grades E1 to E3 being 30 times more likely than senior officers to use illicit drugs (Bray & Hourani, 2007). Empirical findings also indicate that lower enlisted service members (E1-E3) are six times more likely to report heavy alcohol use and 4.2 times

more likely to smoke cigarettes compared to senior officers (Bray & Hourani, 2007). There are several possible reasons why lower ranking enlisted service members may be experiencing higher rates of drug abuse. It has been suggested that changes in recruitment efforts to meet challenging recruitment goals are tapping into a population with higher rates of pre-existing alcohol and drug abuse, such as non-college graduates and low-income individuals (Bray & Hourani, 2007). Veterans who came from and reintegrated back into low-income communities may be particularly at risk for drug abuse symptoms given the widespread availability of drugs, establish substance use habits, and less regulated lifestyle than in the military (Golub & Bennett, 2014). The continued misuse of substances among enlisted veterans may also be associated with reintegration problems such as family distress and employment problems which may place greater stress on the veteran to cope (Bohnert et al., 2011; Golub & Bennett, 2014). Additionally, the high rate of drug abuse symptoms among lower ranking personnel may also be tied to the stressors experienced during the conflicts in Iraq and Afghanistan (Bray & Hourani, 2007). Enlisted service members tend to be more heavily involved in the execution of combat-related operations and are therefore more likely to experience the consequences of war. Engaging in and witnessing more combat-related stressors may be playing a role in the higher drug abuse symptoms seen among lower ranking combat veterans in the current study. The current findings highlight the increased drug abuse risk among lower ranking Iraq and Afghanistan combat veterans.

Hazardous alcohol use. Another goal of the first study aim was to examine whether combat and MIE exposure were correlated with hazardous alcohol use. It was hypothesized that more exposure to both combat and MIEs would be positively correlated with greater hazardous

alcohol use. As hypothesized, MIEs were positively correlated with hazardous alcohol use such that more MIE exposure was associated with higher hazardous alcohol use. Interestingly, combat exposure was only positively correlated with alcohol dependence. This finding is consistent with previous research suggesting that combat exposure has a more significant effect on combat veterans developing harmful alcohol use patterns (Bray et al., 2010; Bray, Brown, & Williams, 2013). Excessive alcohol use is a pervasive problem within the active duty and veteran population. In a recent review of data from the Center for Disease Control and Prevention's National Health Interview Survey from 2013 through 2017, researchers found that military members have the highest rate of binge drinking compared to other industries (e.g., mining, construction, manufacturing; Delphi Behavioral Health Group, 2019). Findings from this report are supported by many empirical studies. For instance, in a recent study of community veterans, most of whom had deployed to Iraq or Afghanistan, researchers reported that 74.4% of men and 66.0% of women met criteria for probable alcohol use disorder (Kelley, Braitman, et al., 2019).

Given these concerning levels of alcohol use among military members, the present study investigated the influence of MIE exposure on rates of hazardous alcohol use and found greater MIE exposure to be associated with higher hazardous alcohol use. Although it was not possible to determine causality, these findings provide additional support to arguments that moral injury may lead to hazardous alcohol use. Research has shown that stressors associated with military service, including frequent deployments, operational pressures, and combat-related MIE exposure, are associated with higher alcohol misuse (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; Bray, Brown, & Lane, 2013; Bray et al., 2010; Burnett-Zeigler et al.,

2011; Clarke-Walper et al., 2014; Forkus et al., 2019; Institute of Medicine, 2012; Jacobson et al., 2008; Kelley, Braitman, et al., 2019; Robbins, 2016). Further, Bray, Brown, and Williams (2013) found that the degree of combat exposure was associated with hazardous alcohol use as those with greater combat exposure reported significantly higher rates of heavy (26.8%) and binge (54.8%) drinking. Although in the current study, combat exposure was not associated with hazardous alcohol use (measured collectively across subscales of the Alcohol Use Disorder Identification Test), combat exposure was significantly associated with alcohol dependence which is consistent with previous research implicating combat's role in riskier forms of drinking (Bray et al., 2010; Bray, Brown, & Williams, 2013). In addition to combat, previous research has consistently demonstrated that MIE exposure is associated with higher levels of alcohol use (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019; Robbins, 2016). Further, the current finding that MIE exposure has a significant effect on hazardous alcohol use fits with both Litz et al.'s (2009) conceptual model and Jinkerson's (2016) syndromal model that substance abuse may be understood as a secondary consequence of exposure to MIEs and moral injury.

In addition to the impact of MIE exposure on hazardous alcohol use, the current investigation found that participant's race had a significant effect on hazardous alcohol use. Participants who identified as persons of color reported higher rates of alcohol use and were more likely to report higher alcohol use compared to Caucasian participants. Previous research has demonstrated that drinking behaviors and values about alcohol are tied to racial and cultural values (Dawson, 1998). However, contrary to the current findings, previous investigations found the highest rates of problematic drinking among non-Hispanic Caucasian service members

compared to other racial/ethnic groups (Bray et al., 2009; Jacobson et al., 2008). In contrast, African Americans tend to report higher rates of marijuana use compared to other race/ethnicities (Pacek, Malcolm, & Martins, 2012). The differences found in the current study may be attributed to the nature of the current sample. Participants who identified as persons of color reported significantly greater rates of both trauma-related guilt and PTSD symptoms compared to Caucasian participants. This finding reflects that persons of color in the current sample experienced higher emotional distress which may have contributed to the higher hazardous alcohol use in that participants of color may have been more motivated to use alcohol to cope with their PTSD symptoms and feelings of guilt. Findings of differences in rates of PTSD and trauma-related guilt across race in the current study are consistent with previous research demonstrating that African American combat veterans have higher rates of PTSD (Frueh, Brady, & de Arellano, 1998; Roberts, Gilman, Breslau, & Koenen, 2011). While African American combat veterans tend to report greater PTSD symptoms, research has also suggested that these differential rates may be a function of differential rates of traumatic stressors and other pre-existing conditions (Frueh et al., 1998; Roberts et al., 2011). The current study found no differences in rates of combat or MIE exposure between participants who identified as Caucasian or persons of color. That said, the current investigation did not evaluate for pre-military or post-military trauma which may potentially be influencing the heightened level of distress and alcohol misuse seen in the current sample. In an evaluation of substance use patterns in a sample of mostly African American veterans, 68.4% of veterans reported drinking prior to the military, 80% reported drinking while in the military, and 60.2% reported continued alcohol use after separating from the military (Golub & Bennett, 2014). In the current study, additional

demographic factors were examined but no racial differences were found in terms of age, gender, marital status, working status, military service status, branch of service, number of deployments, or military rank. The current findings highlight the heightened risk among veterans who identify as persons of color to experience greater PTSD symptoms, trauma-related guilt, and hazardous alcohol use.

Mediating role of morally injurious experiences. The third aim of the study was to examine the potential mediating role of MIE exposure on the association between combat exposure and hazardous alcohol use. It was hypothesized that, controlling for PTSD symptoms and covariates, MIE exposure would mediate the relationship between combat exposure and hazardous alcohol use such that MIEs would be a significant pathway through which combat exposure was associated with hazardous alcohol use. As hypothesized, exposure to MIEs mediated the relationship between combat exposure and hazardous alcohol use after controlling for PTSD symptoms and covariates (i.e., race, military rank, and age). This finding suggests that exposure to MIEs may be a mechanism through which combat exposure is associated with hazardous alcohol use among Iraq and Afghanistan combat veterans. The association between the predictor (i.e., combat exposure) and the criterion (i.e., hazardous alcohol use) was reduced and in fact, was no longer significant when MIEs was included in the model. Current findings are consistent with research demonstrating that MIE exposure and moral injury have a significant indirect effect on hazardous alcohol use (Battles et al., 2018; Battles et al., 2019; Robbins, 2016).

The present findings provide additional support that MIEs are a pathway through which hazardous alcohol use may develop in recent-era combat veterans. Stressors associated with combat deployments (e.g., operational stressors, morally ambiguous or ethically challenging

threats) are known to impact service members by increasing the risk of negative mood states that may contribute to substance misuse (Prigerson et al., 2002; Shipherd et al., 2005). Researchers believe that military members may use alcohol to provide relief from the psychological and physiological symptoms of warzone trauma (Al'Absi, 2007; Dixon et al., 2009; Hoge et al., 2004; Jacobsen et al., 2001; Schumm & Chard, 2012) as military deployments and combat exposure have been correlated with increased substance use in service members post-deployment (Bray, Brown, & Williams, 2013; Bray et al., 2010; Burnett-Zeigler et al., 2011; Clarke-Walper et al., 2014; Institute of Medicine, 2012). The increased risk of alcohol abuse appears to compound with those who experience multiple deployments being at greater risk for alcohol use problems (Browne et al., 2008; Hooper et al., 2008; Kelley et al., 2013; Kelley et al., 2015; Maguen, Lucenko, et al., 2010; Wilk et al., 2010). Similar to combat exposure, MIEs are shown in previous research and in the current study to influence rates of alcohol abuse in combat veterans with those who experience more MIEs reporting greater hazardous alcohol use (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019; Robbins, 2016). It is possible that some service members and veterans may utilize alcohol and drugs in an attempt to ameliorate distress associated with moral conflict elicited by exposure to MIEs. Many theories of substance use postulate that stress and trauma play an important role in motivating addictive substance abuse such that traumatic stressors may drive individuals to use alcohol or drugs to cope with emotional distress (Koob & Le Moal, 1997; Leventhal & Cleary, 1980; Marlatt & Gordon, 1985; Russell & Mehrabian, 1975; Shiffman, 1982; Wills & Shiffman, 1985). If, as argued by Litz et al. (2009), Jinkerson (2016), and others, exposure to MIEs elicit the core symptoms of moral injury (e.g., guilt and shame), these

symptoms may increase motivation to use substances to manage or alleviate moral conflict and distress. The current findings highlight the increased substance abuse risk among MIE exposed Iraq and Afghanistan combat veterans. As described in the available models of moral injury (Jinkerson, 2016; Litz et al., 2009), moral injury symptoms may be the next step in the pathways through which MIE exposure is related to hazardous alcohol use and drug abuse symptoms. The potential role of moral injury symptoms in the development of substance abuse motivated the current study to further explore the role of trauma-related guilt.

Implications of Trauma-related Guilt

Trauma-related guilt is shown to have a detrimental impact on veterans' functioning (Jinkerson & Battles, 2019; Kubany, 1994; Marx et al., 2010; Nazarov et al., 2015; Park et al., 2012; Tripp & Mc-Devitt-Murphy, 2016). Among combat veterans, trauma-related guilt is shown to be significantly related with MIE exposure, depressive symptoms, anxiety symptoms, suicidality, and PTSD symptoms (Dennis et al., 2017; Frankfurt et al., 2017; Jinkerson & Battles, 2019). Although research has shown that trauma-related guilt is associated with mental health concerns, to the author's knowledge, research has yet to investigate the impact of trauma-related guilt on substance use outcomes. Given the lack of available research the final aims of the current study were to examine trauma-related guilt and its associations with combat, MIEs, hazardous alcohol use, and drug abuse symptoms among Iraq and Afghanistan combat veterans, who were primarily service-connected.

Combat and MIE exposure. One aspect of the fourth aim of the current investigation was to explore the relationship between trauma-related guilt and combat and MIE exposure. It was hypothesized that trauma-related guilt would be positively correlated with both combat and

MIE exposure. As predicted, trauma-related guilt was positively correlated with both combat and MIE exposure such that more combat and MIE exposure was associated with greater trauma-related guilt. Trauma-related guilt, as measured in the current study, represents an aversive conscious emotion that involves self-reproach and remorse for one's thoughts, feelings or actions, and a sense of wrongdoing as if one has violated moral principles (Hoffman, 1994; Kubany et al., 1995; Wright, 1971). As discussed previously, violence and killing are harsh realities in war and encounters with the aftermath of battle are enduring aspects of a service member's combat experience. Combat situations, particularly those seen in more recent combat engagements (i.e., OEF/OIF), are marked with significant moral and ethical ambiguity that may conflict with military personnel's expectations and beliefs which may, in turn, evoke significant distress (Litz et al., 2009). Distress elicited by exposure to these challenging combat situations can manifest as trauma-related guilt (Dean, 1990; Glover, 1984, 1988; Henning & Frueh, 1997; Leskela et al., 2002; Marx et al., 2010; Nazarov et al., 2015; Opp & Samson, 1989; Parson, 1986; Williams, 1987). Consistent with previous research, the current findings highlight the strong connection between MIE exposure and trauma-related guilt.

Although the moral injury syndrome was not directly evaluated in the current investigation, guilt is conceptualized as a core symptom of moral injury that develops after exposure to or engagement in MIEs (Dennis et al., 2017; Frankfurt & Frazier, 2016; Jinkerson, 2016; Litz et al., 2009). At the time the current data was collected, there were no available measures of moral injury symptoms. Therefore, the current study examined trauma-related guilt as a stand-in for moral injury. The current investigation adds to the growing body of literature on the impact of MIE exposure on trauma-related guilt and further correspond with theoretical

models of guilt as a core symptom of moral injury (Jinkerson, 2016; Litz et al., 2009). Exposure to MIEs is consistently shown to be associated with greater trauma-related guilt (C. J. Bryan et al., 2017; Dennis et al., 2017; Jinkerson & Battles, 2019). Involvement in wartime atrocities (e.g., killing of innocent civilians) is indicated as a particularly salient factor in the development of trauma-related guilt (Dennis et al., 2017). As demonstrated in the current study and in previous research, trauma-related guilt is linked to highly specific experiences during combat.

Hazardous alcohol use and drug abuse symptoms. As stated above, trauma-related guilt is argued to be a core symptom of moral injury and is believed to be a pathway through which secondary outcomes, including substance use, may develop (Frankfurt & Frazier, 2016; Jinkerson, 2016; Litz et al., 2009). Growing support is found for the effects of trauma-related guilt on MIEs and secondary outcomes, such as depressive symptoms, anxiety symptoms, suicidality, and PTSD symptoms (Dennis et al., 2017; Frankfurt et al., 2017; Jinkerson & Battles, 2019). However, to the author's knowledge, no previous research has investigated trauma-related guilt's relationship with MIEs and alcohol or drug abuse symptoms. Given the lack of previous work on associations between trauma-related guilt and substance abuse, the fourth and fifth aims of the current research explored trauma-related guilt's relationship with alcohol and drug abuse symptoms. Specifically, it was hypothesized that (1) trauma-related guilt would be positively correlated with both drug abuse symptoms and hazardous alcohol use, (2) that trauma-related guilt would have a significant effect on drug abuse symptoms, (3) that trauma-related guilt would individually mediate the association between MIE exposure and hazardous alcohol use, and (4) that both MIE exposure and trauma-related guilt would sequentially mediate the association between combat exposure and hazardous alcohol use.

Trauma-related guilt's correlation with alcohol and drug abuse. Correlational findings between trauma-related guilt and alcohol and drug abuse were mixed. Trauma-related guilt was positively correlated with the alcohol dependence and alcohol-related consequences but not alcohol consumption. Findings partially supported the hypothesis and suggest that higher rates of trauma-related guilt are associated with riskier drinking patterns and behaviors but do not alone influence greater alcohol consumption. Interesting results were also found between trauma-related guilt and drug abuse symptoms. Only one trauma-related guilt parcel was found to be significantly associated with drug abuse symptoms. This finding was surprising given that trauma-related guilt was parceled using domain-representative parceling which controls for variance across items. The parcel consisted of items 2 ("I am still distressed about what happened."), 7 ("I did something that went against my values."), 8 ("What I did made sense." – reverse coded), 14 ("I should have known better."), 15 ("I experience severe emotional distress when I think about what happened."), 17 ("I had good reasons for doing what I did." – reverse coded), 22 ("Indicate the intensity or severity of guilt that you typically experience about the event(s)."), 24 (When I am reminded of the event(s), I have strong physical reactions such as sweating, tense muscles, dry mouth, etc."), 27 ("What I did was not justified in any way."), and 28 ("I violated personal standards of right and wrong.").

The content of parcel 2 items tended to reflect appraisals about individual actions and their violation of personal values or beliefs whereas items found in parcel 1 appeared to address personal sense of responsibility and overall experience of guilty feelings and items in parcel 3 focused on negative appraisals of feelings of guilt and sense of self-blame (see Method for item break down). The finding that only trauma-related guilt parcel 2 was significantly correlated

with drug abuse symptoms did not support the hypothesis of the positive correlation between trauma-related guilt and drug abuse symptoms. However, the positive correlation with only parcel 2 does suggest that negative appraisals of one's actions and conflict with internalized values may have a more salient effect on drug abuse symptoms. However, given the issues with collinearity and the nature of domain-representative parceling, the current study was unable to further evaluate these associations. Other factors not examined in the current study, such as additional moral injury symptoms (e.g., shame, loss of trust), are likely at work in influencing rates of combat veteran alcohol consumption and drug abuse symptoms.

Effects of trauma-related guilt on drug abuse symptoms. Another goal of the fourth study aim was to examine the effects of trauma-related guilt on drug abuse symptoms. The current study originally proposed to evaluate the mediational effects of trauma-related guilt on the combat exposure, MIEs, and drug abuse symptoms relationship. However, due to the drug abuse symptom data being transformed into a dichotomous variable because the data was not normally distributed, path analysis was determined to be inappropriate to use in the drug abuse symptom analyses. Therefore, the effects of trauma-related guilt on drug abuse symptoms was examine via hierarchical logistic regression. It was hypothesized that trauma-related guilt would have a significant effect on drug abuse symptoms such that greater trauma-related guilt would be related to one or more drug abuse symptoms. Contrary to expectations, when combat exposure, MIEs, and trauma-related guilt were regressed onto drug abuse symptoms, neither combat exposure nor trauma-related guilt had a significant effect on drug abuse symptoms after controlling for PTSD symptoms, military status, military rank, and age. However, MIE exposure did have a significant effect on drug abuse symptoms such that the odds of endorsing one or

more drug abuse symptom increased by 6% with each additional MIE experienced. The current logistic regression findings mirror correlational results discussed above and add additional support to the notion that drug abuse symptoms are a secondary outcome associated with moral injury. MIE exposure appears to increase the likelihood of Iraq and Afghanistan combat veterans engaging in one or more drug abuse symptoms. Only four studies to date have examined the relationship between moral injury and drug abuse symptoms and found positive associations between MIEs, moral injury symptoms, and drug abuse symptoms (Battles et al., 2018; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019). The current results add to the limited available research regarding moral injury and drug abuse and highlight the increased risk of drug abuse symptoms among MIE exposed combat veterans. Although it was not possible to determine causality, these findings support arguments that moral injury may be associated with drug abuse symptoms.

The current study represents the first empirical examination of the associations between MIE exposure, trauma-related guilt, and drug abuse symptoms. However, the findings counter the self-medication (Khantzian, 1985) and tension-reduction (Conger, 1956) models of substance use which formed the basis of the current hypotheses. These models postulate that individuals use substances to reduce or ameliorate emotional distress. Studies supporting these theories of substance use identify that it is not the traumatic experience itself that impacts substance use but rather the development of trauma-related symptomology that increases individual risk of developing substance use problems (Chilcoat & Breslau, 1998). The perceived need to self-medicate trauma-related distress is believed to be a major factor in individual's substance use and relapsing (Shapiro & Forrest, 2016). The current findings suggest that MIE exposure is an

important factor in combat veteran drug abuse symptoms, but general trauma-related guilt, not tied to specific MIEs, may not play as central of a role in the misuse of drugs. Although the current study explored the connections between MIEs and trauma-related guilt, it did not directly measure guilt resulting from MIE exposure. Previous studies that have evaluated the associations of moral injury symptoms, including guilt, have found moral injury to be related to higher drug abuse symptoms (Battles et al., 2018; Braitman et al., 2018; Kelley, Braitman, et al., 2019). It is possible that guilt that is a direct result of MIE exposure may have a more significant influence on combat veteran drug abuse compared to generalized trauma-related guilt. It is also possible that other symptoms associated with moral injury (e.g., shame), that were not evaluated in the current study, may have a more noticeable influence on drug abuse symptoms.

Mediational effects of trauma-related guilt. The final study aim was to explore trauma-related guilt's relationship with hazardous alcohol use. Specifically, the current investigation's goal was to evaluate the mediational effects of trauma-related guilt on the relationship between combat exposure, MIEs, and hazardous alcohol use. As previously stated, it was hypothesized that (1) trauma-related guilt would individually mediate the relationship between MIE exposure and hazardous alcohol use, after controlling for PTSD symptoms and covariates, and (2) that both MIE exposure and trauma-related guilt would sequentially mediate the relationship between combat exposure and hazardous alcohol use, controlling for PTSD symptoms and covariates. Contrary to expectations, trauma-related guilt did not individually mediate the MIE exposure-hazardous alcohol use association. Additionally, no significant direct effects were found between either MIE exposure or trauma-related guilt on hazardous alcohol use, after controlling for PTSD symptoms, race, military rank, and age. The only significant direct effect in the single

mediator model was between MIE exposure and trauma-related guilt which further highlights the connection between these two constructs. Given the lack of total and direct effects between combat, MIEs, trauma-related guilt, and hazardous alcohol use in the prior analyses, the sequential mediation model was not conducted.

The lack of mediational results with hazardous alcohol use was surprising given theoretical and empirical support for the connections between trauma-related guilt and substance use. Several prominent models of substance use (i.e., stress-coping theory (Khantzian, 1985; Wills & Shiffman, 1985), tension-reduction model (Sher & Levenson, 1982), and motivational model (Cox & Klinger, 1988) emphasize the role that stress and distress play in influencing alcohol and drug abuse. As previously discussed, it is argued that individuals challenged by traumatic stress symptoms may use alcohol and drugs to help cope with their symptoms and distress (Carruth & Burke, 2006; Held, Owens, & Anderson, 2015). For those who drank or used drugs prior to a traumatic event, it is likely that their substance use will increase in response to their trauma (Cerdá, Tracy, & Galea, 2011). Following a traumatic event, individuals may be motivated to use substances to mitigate challenging emotions of guilt and shame (O'Connor, Berry, Inaba, Weiss, & Morrison, 1994). Akin to substance use models, models of moral injury postulate that substance use is a secondary outcome elicited by moral injury symptoms (e.g., guilt) caused by exposure to or engagement in MIEs (Frankfurt & Frazier, 2016; Jinkerson, 2016; Litz et al., 2009). Research has supplied evidence to these theories by demonstrating the positive connections between substance abuse, MIE exposure and moral injury symptoms (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; Forkus et al., 2019; Kelley, Braitman, et al., 2019; Robbins, 2016). Given previous research, it was surprising to find that

trauma-related guilt did not mediate the MIE exposure-hazardous alcohol use relationship in the current study. As previously discussed, the current study did not directly measure guilt resulting from MIE exposure which may have played a role in the lack of significant mediation results. Moral injury symptoms (e.g., guilt) are shown to be related to higher hazardous alcohol use (Battles et al., 2018; Braitman et al., 2018; Kelley, Braitman, et al., 2019). Although it was not measured in the current study, it is possible that guilt that is a direct result of MIE exposure may have a more significant influence on recent-era combat veteran hazardous alcohol use compared to generalized trauma-related guilt.

Conclusions. Although logistic regression and mediational results on trauma-related guilt were not significant, the current study found support for the relationships between MIEs, trauma-related guilt, hazardous alcohol use, and drug abuse symptoms. The present findings represent the first empirical investigation of the associations between MIEs, trauma-related guilt, and alcohol and drug abuse symptoms and suggest a complex interrelationship between these components. There are several possible reasons why the current study did not find direct or indirect effects of trauma-related guilt on substance abuse. First, the lack of significance may be due to variables not examined in the current study. Shame may be playing a significant role in the associations with substance use given that shame is shown to be salient in the development of mental health and substance use complications following trauma (Tangney & Dearing, 2003). Shame, though related to guilt, is a distinct construct that represents a maladaptive emotion that stems from a negative evaluation of the self (Resick, 2001; Tangney & Dearing, 2003). Guilt on the other hand results from a negative evaluation of specific behaviors (Tangney & Dearing, 2003) and is argued by some to be an adaptive emotion as it encourages changes in behavior that

elicited the initial distress (Resick, 2001). Although some researchers, including the author, argue that guilt tied to a traumatic event may ultimately lead to self-condemnation and other mental health concerns (C. Bryan et al., 2013; Hendin & Haas, 1991), it is possible that shame is the more influential motivator of alcohol and drug abuse. Guilty cognitions, when unchallenged, are believed to change into shame cognitions as negative experiences become internalized representation of self (Kubany & Watson, 2003). Further, experiences of trauma-related guilt are often clouded by shame which keeps individuals from adaptively processing their experiences (Tangney & Dearing, 2003). Combat veterans often find it difficult to process their combat-related experiences due to concerns about stigma, alienation, and lack of civilian understanding. They may be particularly at risk for feelings of guilt to become internalized into feelings of shame. While guilt without shame can assist in re-orienting one to their value system when they engage in conflicting actions and lead to behavioral changes, shame is shown to have a more detrimental impact on mental health and functioning (Tangney & Dearing, 2003). The interplay between guilt and shame may help explain the lack of significant findings as the current study did not evaluate trauma-related shame. In addition to shame, other symptoms associated with moral injury (e.g., loss of meaning in life, trust impairment, spiritual/existential crisis, sorrow, anger) may motivate substance use more so than guilt. It is imperative that future research expand upon the current investigation to examine the unique influence of each moral injury symptom on the development of substance abuse in MIE exposed combat veterans.

In addition to the lack of investigation of the role of other moral injury symptoms, it is also possible that the way trauma-related guilt was measured in the current study had an impact on the outcome. The current investigation originally proposed to examine the unique influence

of each trauma-related guilt subscale of the Trauma-related Guilt Inventory (Kubany et al., 1996). However, due to issues with collinearity between the subscales, it was determined that evaluating each subscale would be inappropriate. Therefore, the current study elected to utilize domain-representative parceling as it allowed for heterogeneous parcels that do not share variance to be created (Cole et al., 2016; Hagtvet & Nasser, 2004; Hall et al., 1999; Kishton & Widaman, 1994; Little et al., 2013). This technique allowed for the current study to examine trauma-related guilt as a whole rather than based on the separate subscales. Although this helped to solve the issues with collinearity, it did not allow the study to examine the unique influence of different types of trauma-related guilt on substance use outcomes. Previous research has supported that the unique impact of different types of trauma-related guilt (e.g. guilty cognitions, global guilt) on mental health outcomes (Cunningham et al., 2017; Tripp & McDevitt-Murphy, 2016). Parceling may have limited the capabilities of the current study to detect any significant associations between trauma-related guilt, hazardous alcohol use, and drug abuse symptoms. Additionally, as previously discussed, the current study did not evaluate guilt resulting from MIE exposure because, at the time the present study was developed and data was collected, no measures of moral injury-related guilt had been developed. It is possible that guilt resulting from MIEs may have a stronger influence on combat veterans' alcohol and drug abuse. Measures of moral injury symptoms have been developed and include the Expressions of Moral Injury Scale – Military Version (EMIS-M; Currier et al., 2017) and Moral Injury Symptom Scale – Military Version (MISS-M; Koenig et al., 2018). It is recommended that future research utilize these new measures to explore the influence of moral injury symptoms, including guilt, on alcohol and drug abuse.

Future Research

Research has shown ample support for the influence of moral injury on increased rates of depression, anxiety, suicidality, hazardous alcohol use, and drug abuse symptoms (Battles et al., 2018; Battles et al., 2019; Braitman et al., 2018; A. Bryan et al., 2014; C. J. Bryan et al., 2017; Dennis et al., 2017; Frankfurt et al., 2017; Forkus et al., 2019; Jinkerson & Battles, 2019; Kelley, Braitman, et al., 2019; Lancaster, 2018; Robbins, 2016). While these important works have aided in the fields understanding of moral injury, several critical areas remain to be addressed. Accordingly, there are four primary areas wherein it is imperative for the literature to expand to facilitate a better understanding of moral injury. These include: (1) examination of the appraisal processes impacting the onset and development of moral injury, (2) consideration of cultural influences, (3) identification of protective and risk factors, and (4) enhancement of the evaluation of MIEs and trauma-related guilt.

A fundamental assumption in models of moral injury is that not all MIEs are equally problematic, rather the subjective appraisal of moral wrongness of the event is key to the etiological chain resulting in moral injury and associated secondary outcomes (Drescher & Foy, 2008; Litz et al., 2009). In the process of moral injury development, MIEs are believed to be followed by moral emotions and cognitions (i.e., appraisals, attributions) (Farnsworth et al., 2014; Kopacz et al., 2016). Appraisal that one has violated moral values and beliefs are postulated to create a discrepancy in one's pre- and post-combat schemas, which can lead to negative moral emotions and ultimately to negative mental health outcomes (Farnsworth et al., 2014). The role of appraisals has been supported by research demonstrating that military members often experienced an emergence of guilt and shame about combat-related

decisions/actions after transitioning to civilian life (Currier, McCormick, et al., 2015). Additionally, moral appraisals are shown to predict distress and symptoms associated with moral injury, above and beyond the combat exposure alone (Lancaster & Erbes, 2017). Although it is generally agreed upon that moral appraisals about MIEs are important, few empirical works have examined these issues. It is therefore important for future research to evaluate the role of appraisal processes in the development and maintenance of moral injury and related secondary outcomes.

Culture plays a significant role in the development of an individual's worldview and belief systems which in turn influences the way they assess and appraise life experiences. Given the role of culture in the belief systems and meaning making, it is imperative that cultural factors be examined in relation to moral injury development and presentations. Most moral injury research to date has focused on Caucasian, American male veterans who hold Christian religious beliefs. Moral injury is fundamentally tied to individuals' beliefs about morality, right and wrong, and personal goodness which are heavily influenced by cultural and environmental factors. Given the influence of culture on moral beliefs and values, people's perceptions of MIEs and presentations of moral injury symptoms may dramatically differ across cultural groups, individual experiences, and religious or spiritual belief systems. Some work is beginning to be done regarding group differences in moral injury with preliminary findings demonstrating gender differences in secondary outcomes associated with moral injury (Battles et al., 2019; Robbins, 2016). These studies have laid the groundwork for future investigations to expand upon to illuminate the cultural dimension in the development of moral injury. It is imperative that future research focus on recruiting more demographically diverse research participants.

Exploring the experiences of veterans of color, female veterans, gender nonconforming veterans, non-heterosexual veterans, and those from assorted cultural and/or religious/spiritual backgrounds is a critical need for future investigations as they may have differing experiences, values, and worldviews. For example, religions differ in their expectations of worshipers' behaviors and relationship with God/Deity/Higher Power. Among veterans, these religious differences are shown to influence individuals' ability to self-forgive which, in turn, can impact trauma reactions (Worthington & Langberg, 2012). It is important to examine individual cultural differences as they may influence individual's experiences of and reactions to MIEs and presentation of moral injury and related secondary outcomes.

It is also critical for future research to recognize and examine the cultural diversity within the military. Traditionally, research has examined military members and veterans as a whole representing "military culture" collectively. However, this presents a significant limitation given the wide array of groups within the military. The military is divided into different branches which represent unique cultural groups that are defined and motivated by different values, beliefs, and goals. For example, the core values of the U.S. Marines are "honor, courage, and commitment" (Commandant of the Marine Corps, 1996, p. 1) whereas the core values of the U.S. Air Force are "integrity first, service before self, and excellence in all we do" (U.S. Air Force, 1997, p. 2). The difference value systems within each military branch influence the mindset and motivators that drive their respective service members. Additionally, within each branch, service members are further separated into different cultural groups based upon occupation, rank, and assigned unit. The unit military members are assigned to generally corresponds with their respective occupations and each unit has their own motto which influences the values and beliefs

service members strive to embody. For example, the motto of the U.S. Navy SEALs is "the only easy day was yesterday" whereas the motto for the U.S. Army Special Forces is "de oppresso liber" or "to liberate the oppressed" (Szeldra, 2015). The diversity of culture within the military plays a significant role in the beliefs service members adopt and in how they may appraise their experiences while in the military. Moral injury experiences may be tied to a service member's culture as the groups they are associated with will dictate the types of events they are engaged in or may witness as well as play a role in the way that the appraise their actions or inactions during those events. Given this, it is imperative the future research on moral injury consider the different cultural groups that service members and veterans are associated with and to evaluate the difference in both experiences and presentations of moral injury across these different groups.

There is little available information on risk and resiliency factors of individuals who have experienced morally injurious events (Farnsworth et al., 2014). Determining who is more likely to develop a moral injury, and who is not, is essential to the advancement of both research and clinical initiatives. To facilitate better comprehension of the factors that go into the development, maintenance, and recovery from moral injury, it may be necessary to investigate both military and personal factors. Stressors associated with non-direct combat experiences, such as post-battle experiences (e.g., engagement with refugees, interment of human remains), exposure to nuclear, biological, and chemical agents, and daily operational stress (e.g., long work hours, heavy physical labor), as well as environmental factors within the military, such as leadership quality, unit cohesion, morale, and deployment environment, should be studied to better understand the factors that may place added stress on service members and, in turn,

increase their vulnerability to moral injury. Additionally, personal factors are important to investigate as they too may increase military members susceptibility to moral injury. Viable personal factors may include pre-military life experiences (e.g., childhood trauma), personality traits such as adaptability (i.e., assimilation and accommodation), hardiness, rumination tendencies, mindfulness, trauma history, learning history, and family perspectives. This research would be best served to be approached from an interdisciplinary lens.

Finally, improvements need to be made to the way researchers are evaluating MIE exposure and trauma-related guilt associated with MIEs. First, the available measures of MIEs examine MIE exposure collectively and do not include questions distinguishing the most distressing morally injurious experience. This is a potentially shortcoming of available measures as it does not allow researchers and clinicians to anchor the evaluation of subsequent moral injury symptomology to a specific MIE. Future moral injury research may benefit from utilizing procedures found in PTSD research that requires the identification of an "index trauma" (i.e., most distressing or haunting traumatic experience) in order to have an anchor point to evaluate corresponding symptoms (for examples from PTSD research see the PTSD Symptom Scale – Interview for DSM 5 [PSSI-5; Foa et al., 2016] and the Clinical-Administered PTSD Scale for DSM-5 [CAPS-5; Weathers et al., 2018]). The strategy of anchoring measures to specific MIEs may also be a beneficial strategy for examining trauma-related guilt. The available Trauma-Related Guilt Inventory does not include questions identifying the trauma the guilt symptoms are related to (Kubany et al., 1994). This increases the risk that participants may endorse generalized guilt symptoms rather than guilt symptoms directly tied to a specific traumatic event.

Future research may benefit from altering the instructions of the Trauma-Related Guilt Inventory to anchor participants rating of their guilt symptoms to a specific trauma or MIE.

Clinical Implications

There is a growing awareness about moral injury and its impact on military members well-being. The increased attention on moral injury has allowed for new measures of moral injury symptomology to be developed for public use (e.g., Expressions of Moral Injury Scale – Military Version (EMIS-M; Currier et al., 2017); Moral Injury Symptom Scale – Military Version (MISS-M; Koenig et al., 2018)). However, available measures are lengthy (e.g., both EMIS-M and MISS-M contain 45 items) which presents a problem of functionality in both research and clinical settings. Efforts are being made to construct a brief screening measure, however, at this time, the current author is unaware of an available, validated screening measure of moral injury symptoms. Although a screening measure still needs to be published, the current findings of the high level of MIE exposure and MIEs associations with alcohol and drug use emphasize the need for clinicians evaluate for possible MIE exposure and potential moral injury symptoms among service members and veterans. Consistent with the definition of moral injury provided by Litz and colleagues' (2009) and Jinkerson's (2016) syndrome definition update, multiple authors have proposed that identifying moral injury requires both 1) assessing history for potential MIEs and 2) assessing for current moral injury symptoms (Currier, McCormick, et al., 2015; Jinkerson, 2016). Given that combat exposure and MIEs were correlated in the present study, it is imperative that military members and veterans be screened for exposure to potential MIEs by using one of the available self-report instruments. Further, as suggested by Currier, Holland, Drescher, et al. (2015), for those who screen positive to one or more MIEs, a clinical

interview is recommended to gather additional information on the nature of MIE experiences and subsequent symptomatology.

To adequately assess for these issues, it is imperative that clinicians be familiar with moral injury themes (e.g., post-combat guilt and shame, spiritual crises, demoralization, interpersonal/social dysfunction, viewing actions as unforgiveable) so they can be recognized in the clinical interview (Currier, Holland, Drescher, et al., 2015). It is important for mental health providers who work with military personnel and veterans to understand both the core symptoms that have been proposed as key components of moral injury (Jinkerson, 2016; Litz et al., 2009) as well as the secondary symptoms, including hazardous alcohol use and drug abuse symptoms. Preferably, moral injury would be assessed with instruments that have psychometric validation. However, if such measures are unavailable to clinicians, the proposed core symptoms and corresponding secondary consequences may be assessed individually, which can collectively provide an indirect picture of moral injury. A list of instruments for conducting such an assessment at the present time can be found in Jinkerson (2016). In the future, developing and disseminating valid measures of moral injury symptomatology is critical in ensuring efficient and accurate moral injury assessment.

Given the high level of substance use among military members and veterans (Institute of Medicine, 2012) and the current findings of the influence of MIEs on alcohol and drug abuse symptoms, it is possible that MIE exposure may influence veterans' motivations for and engagement in risky substance use habits. It is therefore important to 1) screen for MIEs and alcohol and drug abuse among all military members and veterans who present for mental health and/or substance use treatment, 2) evaluate pre-military substance use to establish a baseline of

individual use, 3) examine whether post-deployment increases in alcohol and drug use may be in response to MIEs and moral injury symptoms, 4) assess whether hazardous alcohol or drug use may occur in response to triggers such as reliving MIEs or questioning prior military actions/decisions, and 5) understand MIE-related motivations for hazardous alcohol or drug use (e.g., to alleviate negative affect stemming from guilt, shame, or self-punishment [i.e., feeling alienated from or judged by others or higher power may result in individuals feeling as though they should be punished for their actions] for having witnessed or taken part in MIEs). Identifying reasons for hazardous alcohol or drug use may help establish whether substance use is in fact a secondary outcome of moral injury.

It is likewise possible that veterans with moral injury may initially present for substance abuse treatment rather than mental health treatment and this may be especially likely among male veterans (Fox, Meyer, & Vogt, 2015). For this reason, it is important that substance abuse treatment providers screen for exposure to perceived traumatic/MIE events and patterns of traumatic responses (i.e., PTSD, complex trauma, or moral injury) in military personnel. Moral injury may serve as an important contextual factor in the development and maintenance of substance abuse. Constructs, such as self-punishment, shame/guilt, are proposed to be possible substance use motivations. For those substance abuse programs that are equipped to provide full mental health assessment and treatment, additional assessment of moral injury symptoms is recommended. The present findings suggest a strong connection between MIE exposure and substance abuse patterns which has implications for available treatments. Effectively treating substance abuse associated with MIE exposure may be achieved by adapting available substance use treatments, such as Acceptance and Commitment Therapy or Seeking Safety, to include

discussions of the implications of MIE exposure and moral injury symptoms, or utilizing moral injury specific treatments, such as Adaptive Disclosure (Litz et al., 2009), as adjunctive interventions following substance focused treatments. Should PTSD present an additional co-morbidity, treatments, including Prolonged Exposure (Foa, Hembree, & Rothbaum, 2007) and Cognitive Processing Therapy (Monson et al., 2006; Schumm, Monson, O'Farrell, Gustin, & Chard, 2015), may be alternatively appropriate. If an evidence-based treatment for PTSD is used, it is recommended that veterans work towards discontinuing or minimizing their substance use before treatment to allow for full emotional engagement.

Limitations

Certain limitations need to be accounted for when interpreting these results. Primarily, the current study's operationalization of moral injury as exposure to MIEs and feelings of trauma-related guilt limits the ability to generalize these findings as representative of the moral injury symptomology. Although outcome measures of moral injury have been created, they were not publicly available at the time when the current data were collected by the VA. It will be important for future research expanding on this current project to incorporate moral injury outcome measures into their investigations to further elucidate the influence of moral injury on secondary outcome including substance use. Additionally, due to issues with collinearity, the current study elected to use parcel the Trauma-Related Guilt Inventory using domain-representative parceling which limited its ability to evaluate the impact of different forms of trauma-related guilt and may have impacted the overall study results. Additionally, scores on the Trauma-Related Guilt Inventory were relatively low indicating lower endorsement of trauma-related guilt. These low scores may have played a role in the lack of associations found between

trauma-related guilt and substance use outcomes. Similarly, due to issues with normality on the Drug Abuse Screening Test, drug abuse symptoms were measured as a dichotomous variable which may have impacted the study results. Additionally, the present study measured drug abuse symptoms but not measure actual drug use. It would be beneficial for future research to examine current drug use and the type of drug being used. An additional limitation in the current investigation was the way race and ethnicity were examined in the original study conducted by the VA. Available response options for participants to identify their race and ethnicity lacked specificity of racial and ethnic identities and did not allow participants to distinguish between racial identity, cultural heritage, and nationality. In keeping with the American Psychological Association's Guidelines for Reducing Bias (2009, p. 75-76), it would be prudent of future research to expand their evaluation of race and ethnicity by including response options that differentiate race, ethnicity, and nationality and more specific designations (e.g., Mexican American, Central American, Iranian). An additional limitation is that the current investigation is a correlational study and therefore cannot imply causation. Additionally, the present study was cross-sectional necessitating the need for longitudinal studies to replicate and extend these findings. Along these lines, the original study investigators at the VA did not evaluate participant's substance use prior to entering the military or prior to deployment therefore the current study was unable to determine if the reported substance use significantly changing over the course of a combat deployment or over the life-course of military service. Additionally, the original study did not evaluate participants' pre-military experiences (e.g., childhood trauma), therefore the current study was unable to determine the influence of other stressful or traumatic events on the current outcomes. Although the validity and reliability of these measures were

assessed, it is possible that the observed effects were strengthened by shared method variance. Additionally, all combat veterans retrospectively reported on combat exposure, MIEs, trauma-related guilt, hazardous alcohol use, and drug abuse symptoms, which may be subject to memory biases. Future research assessing these variables utilizing different methods and experimental designs, such as longitudinal designs or clinical samples, would increase confidence in these findings as well as increase the ability to make causal conclusions.

CHAPTER V

CONCLUSIONS

The current investigation provides empirical support to existing theories that substance abuse is a potential secondary outcome of exposure to MIEs. Most notably, more exposure to MIEs effected greater drug abuse symptoms and, further, MIEs mediated the relationship between combat exposure and hazardous alcohol use. Further, the current investigation presented the first empirical examinations of the impact of trauma-related guilt on substance use outcomes. Trauma-related guilt was positively associated with hazardous alcohol use but not drug abuse symptoms. Additionally, though an association was found between trauma-related guilt and hazardous alcohol use, trauma-related guilt did not mediate the combat exposure-hazardous alcohol use relationship.

Existing research on underlying mechanisms of substance abuse provides additional conceptual support for substance abuse motivations in service members and veterans with exposure to MIEs and/or feelings of trauma-related guilt. Given the observed relationships between MIEs and alcohol and drug abuse symptoms, it is possible that combat exposure and moral injury may contribute to hazardous alcohol and drug use symptoms among recent-era combat veterans. Although additional research is needed, the current investigation emphasizes the potential impact of MIEs on military members' and veterans' substance use and further suggests that MIEs-related substance abuse is phenomenologically distinct from general substance abuse.

Although our understand of the connections between moral injury, mental health, and substance abuse has grown, it is imperative that future research continue to investigate the

relationships between MIEs, moral injury, and its sequelae, including substance abuse. In understanding these relationships, it may be possible to provide more tailored treatment for psychospiritual concerns. More so, acknowledging the moral and ethical dimensions that contribute to the psychological and behavioral challenges facing combat veterans may allow us a more integrated perspective for meeting the needs of our nation's military members and veterans.

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Appendix A

Demographic Form

1. Gender: ☐Male ☐Female

2. Marital Status: ☐Married/Domestic Partner
   ☐Remarried
   ☐Widowed
   ☐Separated
   ☐Divorced
   ☐Never Married

3. Number of times married: _____

4. Number of times divorced: _____

5. Ethnicity: ☐Hispanic or Latino
   ☐Not Hispanic or Latino

6. Race: ☐Caucasian
   ☐African American
   ☐American Indian or Alaska Native
   ☐Asian
   ☐Native Hawaiian or Other Pacific Islander
   ☐Other

7. Education (Select highest level completed): ☐Elementary
   ☐G.E.D.
   ☐High School Diploma
   ☐Technical/Trade School
   ☐Associate Degree
   ☐Bachelor Degree
   ☐Master Degree
   ☐Doctorate Degree
   ☐Other

8. Total years of education: _____

9. Are you currently working? ☐No
   ☐Part-time

☐Full time

What best characterizes your current status?
☐Unemployed
☐Full-time student
☐Medical disability
☐Retired
☐Other

Please describe: _____

10. Current or most recent employer: _____

    How long? _____ months

11. Current or most recent occupation/job title: _____

12. Are you considered service-connected by the VA? ☐Yes ☐No

    What for? _____

    What percentage? _____

13. Have you filed for service-connected disability? ☐Yes ☐No

    Do you plan to file for disability? ☐Yes ☐No

14. Have you ever been hospitalized for treatment of an emotional or substance use problem, including war stress (PTSD)?

    ☐No
    ☐Yes, at a VA hospital
    ☐Yes, at a non-VA hospital
    ☐Yes, at both a VA and non-VA hospital

15. Have you ever received outpatient treatment (such as seeing a counselor, psychology, or psychiatrist) for an emotional or substance use problems, include war stress (PTSD)?

    ☐No
    ☐Yes, at a VA hospital
    ☐Yes, at a non-VA hospital
    ☐Yes, at both a VA and non-VA hospital

16. Please describe your cigarette smoking status:

☐Current smoker
☐Ex-smoker
☐Never been a smoker

At what age did you start smoking cigarettes? _____

At what age did you last stop smoking cigarettes? _____

How long ago did you stop smoking? _____

How many total years have you smoking cigarettes? _____
(Subtract any years that you may have quit.)

On average, how many cigarettes do you smoke per day? _____

17. Have you even been in jail or prison in your life? ☐No
☐Yes, for less than 2 weeks
☐Yes, for more than 2 weeks

18. During the past 30 days, have you had trouble controlling violent behavior (e.g., hitting someone)? ☐Yes ☐No

19. Are you a twin? ☐Yes ☐No

What kind? ☐Fraternal ☐Identical

Did your twin serve in the military? ☐Yes ☐No

20. Were you adopted? ☐Yes ☐No

21. Is your biological (related by blood) mother living? ☐Yes
☐No
☐I don't know

Are you in contact with her? ☐Yes ☐No

Did she serve in the military? ☐Yes ☐No

22. Is your biological (related by blood) father living? ☐Yes ☐No ☐I don't know

    Are you in contact with him? ☐Yes ☐No

    Did he serve in the military? ☐Yes ☐No

23. Di you have sisters, brothers, half-sisters, half-brothers, or children who served in the military? ☐Yes ☐No

    Sisters _____
    Brothers _____
    Half-sisters _____
    Half-bothers _____
    Children _____

24. Era of military service (check all that apply):

    ☐Pre-World War II (1937-38)
    ☐World War II (1939-45)
    ☐Pre-Korean War (1946-49)
    ☐Korean War (1950-53)
    ☐Between Korean and Vietnam Wars (1954-59)
    ☐Vietnam War (1960-75)
    ☐Post-Vietnam War (1976-89)
    ☐Gulf War (1990-91)
    ☐Post-Gulf War (1991-2001)
    ☐Enduring Freedom (Afghanistan) (2001-Present)
    ☐Iraqi Freedom (Iraq) (2001-9/1-2010)
    ☐New Dawn (Iraq) (9/1/2010-Present)

25. What was your branch of service and service dates? Please list your service in order, with the most recent first.

Branch	Enlistment Date (mm/dd/yyyy)	Discharge Date (mm/dd/yyyy)	Actively Serving

26. Did you serve in Iraq during Operation Iraqi Freedom? ☐Yes ☐No

How long? _____ months

27. Did you serve in Kuwait during Operation Iraqi Freedom? ☐Yes ☐No

How long? _____ months

28. Did you serve in Afghanistan during Operation Enduring Freedom? ☐Yes ☐No

How long? _____ months

29. Did you serve in the region of conflict during the first Gulf War? ☐Yes ☐No

How long? _____ months

30. Were you stationed in the region of conflict during either Operation Iraqi Freedom or Operation Enduring Freedom? ☐Yes ☐No

31. How many tours have you served? _____

32. Did you serve in a war/operation zone? ☐Yes ☐No

What type of unit did you serve in during war-zone service?

☐Combat (line combat unit)
☐Combat support (unit that directly supports combat unit)
☐Service support (non-combat duty in war-zone)

33. Did you ever fire a weapon in a combat situation? ☐Yes ☐No

34. Were you ever under enemy fire? ☐Yes ☐No

35. Were you wounded or injured in a war zone? ☐Yes ☐No

36. Were you awarded any medals? ☐Yes ☐No

37. Were you ever a Prison of War? ☐Yes ☐No

38. Please give the location and dates of overseas service, near a war zone or war zone service. Listing your service in order, with the most recent first.

Location (Country/Region)	Start Date (mm/dd/yyyy)	End Date (mm/dd/yyyy)

39. What was your highest rank while in the military?

☐E-1
☐E-2
☐E-3
☐E-4
☐E-5
☐E-6
☐E-7
☐E-8
☐E-9
☐W-1
☐W-2
☐W-3
☐W-4
☐W-5
☐O-1
☐O-2
☐O-3
☐O-4

☐O-5
☐O-6
☐O-7
☐O-8
☐O-9

40. What was your rank when you left the military?

☐E-1
☐E-2
☐E-3
☐E-4
☐E-5
☐E-6
☐E-7
☐E-8
☐E-9
☐W-1
☐W-2
☐W-3
☐W-4
☐W-5
☐O-1
☐O-2
☐O-3
☐O-4
☐O-5
☐O-6
☐O-7
☐O-8
☐O-9

41. Branch: _____

Rank structure: _____

Major category: _____

Job: _____

Please describe: _____

42. I am currently (check all that apply):

☐On active duty
☐Discharged from the military
☐In the ready reserves
☐In the individual ready reserves
☐In the national guard
☐In the inactive national guard (ING)
☐Retired military
☐Other

Please describe: _____

Data of military discharge (mm/dd/yyyy): _____

Characterization of military service at discharge: ☐General (under honorable conditions)
☐Other than honorable (OTH)

Appendix B

Deployment Risk and Resiliency Inventory – 2 Combat Experiences Scale

The statements below are about your combat experiences during your most recent deployment. As used in these statements, the term "unit" refers to those you lived and worked with on a daily basis during deployment. Please mark how often you experienced each circumstance.

While deployed…	Never	Once or twice	Several times over entire deployment	A few times each month	A few times each week	Daily or almost daily
1. …I went on combat patrols or missions.	1	2	3	4	5	6
2. …I took part in an assault on entrenched or fortified positions that involved naval and/or land forces.	1	2	3	4	5	6
3. …I personally witnessed someone from my unit or an ally unit being seriously wounded or killed.	1	2	3	4	5	6
4. …I encountered land or water mines, bobby traps, or roadside bombs (for example, IEDs).	1	2	3	4	5	6
5. …I was exposed to hostile incoming fire.	1	2	3	4	5	6
6. …I was exposed to "friendly" incoming fire.	1	2	3	4	5	6
7. …I was in a vehicle (for example, a "Humvee", helicopter, or boat) or part of a convoy that was attacked.	1	2	3	4	5	6
8. …I was part of a land or naval artillery unit that fired on enemy combatants.	1	2	3	4	5	6

9. …I personally witnessed enemy combatants being seriously wounded or killed.	1	2	3	4	5	6
10. …I personally witnessed civilians (for example, women and children) being seriously wounded or killed.	1	2	3	4	5	6
11. …I was injured in a combat-related incident.	1	2	3	4	5	6
12. …I fired my weapon at enemy combatants.	1	2	3	4	5	6
13. …I think I wounded or killed someone during combat operations.	1	2	3	4	5	6
14. …I was involved in locating or disarming explosive devices.	1	2	3	4	5	6
15. …I was involved in search or clearing homes, buildings, or other locations.	1	2	3	4	5	6
16. …I participated in hand-to-hand combat.	1	2	3	4	5	6
17. …I was involved in searching and/or disarming potential enemy combatants.	1	2	3	4	5	6

Appendix C

Moral Injury Questionnaire – Military Version

Instructions: Considering your active duty service including warzone deployment, circle the number that indicates how frequently you experienced the following.

Questions	Never	Seldom	Sometimes	Often
1. Things I saw/experienced in war left me feeling betrayed or let-down by military/ political leaders	1	2	3	4
2. I did things in the war that betrayed my personal values	1	2	3	4
3. There were times in the war that I saw/ engaged in revenge/ retribution for things that happened.	1	2	3	4
4. I had an encounter(s) with the enemy that made him/her seem more "human" and made my job more difficult	1	2	3	4
5. I saw/was involved in violations of rules of engagement	1	2	3	4
6. I saw/ was involved in the death(s) of an innocent in the war	1	2	3	4
7. I feel guilt over failing to save the life of someone in war	1	2	3	4
8. I had to make decisions in the war at times when I didn't know the right thing to do	1	2	3	4
9. I feel guilt for surviving when others didn't	1	2	3	4
10. I saw/ was involved in violence that was out or proportion to the event	1	2	3	4
11. I saw/ was involved in the death(s) of children	1	2	3	4
12. I experienced tragic warzone events that were chaotic and beyond my control	1	2	3	4
13. I was sexually assaulted	1	2	3	4
14. I sometimes treated civilian more harshly than was necessary	1	2	3	4
15. I felt betrayed or let-down by trusted civilians during the war	1	2	3	4
16. I saw/ was involved in a "friendly-fire" incident	1	2	3	4
17. I destroyed civilian property unnecessarily during the war	1	2	3	4
18. Seeing so much death has changed me	1	2	3	4
19. I made mistakes in the warzone that led to injury or death	1	2	3	4

20. I came to realize during the war that I enjoyed violence	1	2	3	4

Appendix D

Alcohol Use Disorders Identification Test: Self-Report Version

Because alcohol use can affect your health and can interfere with certain medications and treatments, it is important that we ask some questions about your use of alcohol. Your answers will remain confidential so please be honest.

Circle the box that best describes your answer to each question

Questions	0	1	2	3	4
1. How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
2. How many drinks containing alcohol do you have on a typical day when you are drinking?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
3. How often do you have six or more drinks on one occasion?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
4. How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
5. How often during the last year have you failed to do what was normally expected of you because of drinking?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
7. How often during the last year have you has a feeling of guilt or remorse after drinking?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
8. How often during the last year have you been unable to remember what happened the night before because of your drinking?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week

9. Have you or someone else been injured by your drinking?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week

Appendix E

Drug Abuse Screening Test (DAST)

The following questions concern information about your involvement with drugs. Drug abuse refers to (1) the use of prescribed or "over-the-counter" drugs in excess of the directions, and (2) any non-medical use of drugs. Consider the **past year (12 months)** and carefully read each statement. Then decide whether your answer is YES or NO and check the appropriate choice. Please be sure to answer every question.

Questions	YES	NO
1. Have you used drugs other than those required for medical reasons?		
2. Have you abused prescription drugs?		
3. Do you abuse more than one drug at a time?		
4. Can you always get through the week without using drugs?		
5. Are you always able to stop using drugs when you want?		
6. Have you had "blackouts" or "flashbacks" as a result of drug use?		
7. Do you ever feel bad or guilty about your drug use?		
8. Does your spouse (or parents) ever complain about your involvement with drugs?		
9. Has drug abuse created problems between you and your spouse or your parents?		
10. Have you lost friends because of drug abuse?		
11. Have you neglected your family because of your use of drugs?		
12. Have you been in trouble at work because of drug abuse?		
13. Have you lost a job because of drug abuse?		
14. Have you gotten into fights under the influence of drugs?		
15. Have you engaged in illegal activities in order to obtain drugs?		
16. Have you been arrested for possession of illegal drugs?		
17. Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs?		
18. Have you had medical problems as a result of your drug use (e.g., memory loss, hepatitis, convulsions, bleeding, etc)?		
19. Have you gone to anyone for help for a drug problem?		
20. Have you been involved in a treatment program specifically related to drug use?		

Appendix F

Trauma-Related Guilt Inventory

Response to Trauma (Version All)

Individuals who have experienced traumatic events—such as physical or sexual abuse, military combat, sudden loss of loved ones, serious accidents or disasters, etc.—vary considerably in their response to these events. Some people do not have any misgivings about what they did during these events, whereas other people do. They may have misgivings about something they did (or did not do), about beliefs or thoughts they had, or for having had certain feelings (or lack of feelings). The purpose of this questionnaire is to evaluate your response to a traumatic experience.

Briefly describe what happened:

Please take a few moments to think about what happened. All the items below refer to events related to this experience. Circle the answer that best describes how you feel about each statement.

1. I could have prevented what happened.
Extremely true Very true Somewhat true Slightly true Not at all true

2. I am still distressed about what happened.
Always true Frequently true Sometimes true Rarely true Never true

3. I had some feelings that I should not have had.
Extremely true Very true Somewhat true Slightly true Not at all true

4. What I did was completely justified.
Extremely true Very true Somewhat true Slightly true Not at all true

5. I was responsible for causing what happened.
Extremely true Very true Somewhat true Slightly true Not at all true

6. What happened causes me emotional pain.
Always true Frequently true Sometimes true Rarely true Never true

7. I did something that went against my values.
Extremely true Very true Somewhat true Slightly true Not at all true

8. What I did made sense.
Extremely true Very true Somewhat true Slightly true Not at all true

9. I knew better than to do what I did.
Extremely true Very true Somewhat true Slightly true Not at all true

10. I feel sorrow or grief about the outcome.
Always true Frequently true Sometimes true Rarely true Never true

11. What I did was inconsistent with my beliefs.
Extremely true Very true Somewhat true Slightly true Not at all true

12. If I knew today—only what I knew when the event(s) occurred—I would do exactly the same thing.
Extremely true Very true Somewhat true Slightly true Not at all true

13. I experience intense guilt that relates to what happened.
Always true Frequently true Sometimes true Rarely true Never true

14. I should have known better.
Extremely true Very true Somewhat true Slightly true Not at all true

15. I experience severe emotional distress when I think about what happened.
Always true Frequently true Sometimes true Rarely true Never true

16. I had some thoughts or beliefs that I should not have had.
Extremely true Very true Somewhat true Slightly true Not at all true

17. I had good reasons for doing what I did.
Extremely true Very true Somewhat true Slightly true Not at all true

18. Indicate how frequently you experience guilt that relates to what happened.
Never Seldom Occasionally Often Always

19. I blame myself for what happened.
Extremely true Very true Somewhat true Slightly true Not at all true

20. What happened causes a lot of pain and suffering.
Extremely true Very true Somewhat true Slightly true Not at all true

21. I should have had certain feelings that I did not have.

Extremely true Very true Somewhat true Slightly true Not at all true

22. Indicate the intensity or severity of guilt that you typically experience about the event(s).
None Slight Moderate Considerable Extreme

23. I blame myself for something I did, thought, or felt.
Extremely true Very true Somewhat true Slightly true Not at all true

24. When I am reminded of the event(s), I have strong physical reactions such as sweating, tense muscles,
dry mouth, etc.
Always true Frequently true Sometimes true Rarely true Never true

25. Overall, how guilty do you feel about the event(s)?
Not guilty at all Slightly guilty Moderately guilty Very guilty Extremely guilty

26. I hold myself responsible for what happened.
Extremely true Very true Somewhat true Slightly true Not at all true

27. What I did was not justified in any way.
Extremely true Very true Somewhat true Slightly true Not at all true

28. I violated personal standards of right and wrong.
Extremely true Very true Somewhat true Slightly true Not at all true

29. I did something that I should not have done.
Extremely true Very true Somewhat true Slightly true Not at all true

30. I should have done something that I did not do.
Extremely true Very true Somewhat true Slightly true Not at all true

31. What I did was unforgivable.
Extremely true Very true Somewhat true Slightly true Not at all true

32. 1 didn't do anything wrong.
Extremely true Very true Somewhat true Slightly true Not at all true

Note. Most items are scored 4,3,2, 1, and 0 (from left to right). Seven items are reverse scored (Items 4, 8, 12, 17, 18, 22, and 25). The Global Guilt Scale score = [sum of scores on Items 13, 18(R), 22(R), and 25(R)] divided by 4. The Distress Scale score = (sum of scores on Items 2, 6, 10, 15, 20, and 24) divided by 6. The Guilt Cognitions Scale score = [sum of scores on Items 1,4(R), 5,7,8(R), 9,11, 12(R), 14, 16, 17, 19,21,23,26,27,28,29,30,31, and32(R)]by 22. The

Hindsight-Bias/Responsibility Subscale score = (sum of scores on Items 1, 5,9, 14, 19, 23, and 26) divided by 7. The Wrongdoing Subscale score = (sum of scores on Items 3,7, 11, 16, and 21) divided by 5. The Lack of Justification Subscale score = [sum of scores on Items 4(R).8(R), 12(R),and 17(R)] divided by 4.

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Appendix G

Davidson Trauma Scale

Please identify the trauma which is **most distressing** to you: _____

_____

In the **past week**, how much trouble have you had with the following symptoms?

1) Have you had painful images, memories, or thoughts of the event?

Frequency				
Not at all	Only once	2-3 times	4-6 times	Everyday

Severity				
Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

2) Have you had distressing dreams of the event?

Frequency				
Not at all	Only once	2-3 times	4-6 times	Everyday

Severity				
Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

3) Have you felt as though the event was reoccurring? Was it as if you were reliving it?

Frequency				
Not at all	Only once	2-3 times	4-6 times	Everyday

Severity				
Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

4) Have you been upset by something which reminded you for the event?

Frequency				
Not at all	Only once	2-3 times	4-6 times	Everyday

Severity

Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

5) Have you been avoiding any thoughts or feelings about the event?

Frequency

Not at all	Only once	2-3 times	4-6 times	Everyday

Severity

Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

6) Have you been avoiding doing things or doing into situations that remind you of the event?

Frequency

Not at all	Only once	2-3 times	4-6 times	Everyday

Severity

Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

7) Have you found yourself unable to recall important parts of the event?

Frequency

Not at all	Only once	2-3 times	4-6 times	Everyday

Severity

Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

8) Have you had difficulty enjoying things?

Frequency

Not at all	Only once	2-3 times	4-6 times	Everyday

Severity

Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

9) Have you felt distant or cut-off from other people?

Frequency				
Not at all	Only once	2-3 times	4-6 times	Everyday
Severity				
Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

10) Have you been unable to have sad or loving feelings, or have you generally felt numb?

Frequency				
Not at all	Only once	2-3 times	4-6 times	Everyday
Severity				
Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

11) Have you found it hard to imagine having a long-life span fulfilling your goals?

Frequency				
Not at all	Only once	2-3 times	4-6 times	Everyday
Severity				
Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

12) Have you had trouble falling asleep or staying asleep?

Frequency				
Not at all	Only once	2-3 times	4-6 times	Everyday
Severity				
Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

13) Have you been irritable or had outbursts of anger?

Frequency				
Not at all	Only once	2-3 times	4-6 times	Everyday
Severity				

Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

14) Have you had difficulty concentrating?

Frequency

Not at all	Only once	2-3 times	4-6 times	Everyday

Severity

Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

15) Have you felt on edge, been easily distracted, or had to stay "on guard"?

Frequency

Not at all	Only once	2-3 times	4-6 times	Everyday

Severity

Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

16) Have you been jumpy or easily startled?

Frequency

Not at all	Only once	2-3 times	4-6 times	Everyday

Severity

Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

17) Have you been physically upset by reminders of the event (This includes sweating, trembling, racing heart, shortness or breath, nausea, diarrhea)

Frequency

Not at all	Only once	2-3 times	4-6 times	Everyday

Severity

Not at all distressing	Minimally distressing	Moderately distressing	Markedly distressing Extremely distressing	Not at all distressing

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Curriculum Vitae

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Ph.D. in Clinical Psychology **August 2020 (expected)**
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BACKGROUND

Allison R. Battles is a sixth-year doctoral candidate in the Clinical Psychology doctoral program at the Virginia Consortium Program in Clinical Psychology. Her dissertation research examined the role of morally injurious experiences and trauma-related guilt on substance abuse outcomes among Iraq and Afghanistan combat veterans. She is interested in the etiology and development of trauma-related concerns and comorbidities. She has a specific interest in moral injury and future aspirations of engaging in program evaluation research to explore effective treatments to address moral injury and trauma. She is currently on pre-doctoral internship at the Minneapolis VA Health Care System.

SELECTED PUBLICATIONS

Battles, A. R., Jinkerson, J., Kelley, M. L, Hamrick, H., & Hollis, B. L. (2019). The relationship between exposure to potentially morally injurious experiences, spiritual injury, and alcohol use among combat veterans. *Journal of Traumatic Stress*. Advanced online publication. doi: 10.1002/jts.22404

Jinkerson, J., & **Battles, A. R.** (2018). Empirical support for the moral injury syndrome model in combat veterans. *Traumatology, 25*, 33-40. doi: /10.1037/trm0000163

Battles, A. R., Bravo, A. J., Kelley, M. L., White, T. D., Braitman, A., & Hamrick, H. (2018). Moral injury and PTSD as mediators of the associations between morally injurious experiences and mental health and substance use. *Traumatology, 24*(4), 246-254. doi:10.1037/trm0000153