Published in final edited form as:

Psychol Trauma. 2019 May ; 11(4): 379–382. doi:10.1037/tra0000385.

Killing during Combat and Negative Mental Health and Substance Use Outcomes among Recent-era Veterans: The Mediating Effects of Rumination

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Abstract

Objective—Although killing in combat is associated with negative mental health outcomes and hazardous alcohol use, mechanisms that underlie this risk are not well understood. To our knowledge, this present brief report is the first to use mediation analysis to examine associations between killing in combat, distinct facets of rumination (problem-focused thoughts, counterfactual thinking, repetitive thoughts, and anticipatory thoughts), and negative mental health outcomes (i.e., depression, anxiety, PTSD, suicidality) and hazardous alcohol use.

Method—Participants were a community sample of 283 military personnel (181 males [63.9%]; mean age = 32.61 [$SD=7.10$]) who had deployed in support of recent wars in Iraq or Afghanistan. Participants completed an online self-report survey.

Results—Three rumination facets (i.e., problem-focused thoughts, counterfactual thinking, and anticipatory thoughts) uniquely (controlling for effects of other rumination facets) mediated the associations between killing in combat and negative mental health outcomes and hazardous alcohol use. Taken together, killing in combat was associated with higher levels of each rumination facet, which in turn were distinctly associated with more negative symptoms of mental health and more hazardous drinking (problem-focused thoughts was the only facet to mediate all effects). Beyond these significant mediation effects, killing in combat still had a significant direct effect on every outcome.

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Conclusion—These findings provide preliminary support for associations between killing in combat and negative mental health outcomes and hazardous alcohol use. Further, rumination (particularly problem-focused thoughts) may be an important consideration in the evaluation and care of recent-era combat veterans.

Keywords

military; combat killing; rumination; mental health; alcohol use

Introduction

Killing a combatant or civilian in a warzone or failing to save a life is known to ‘haunt’ some military service members (Maguen et al., 2009) and to convey risk for negative mental health outcomes, such as posttraumatic stress disorder (PTSD), suicidal ideation, and alcohol abuse (Maguen et al., 2010, 2012; Tripp, McDevitt-Murphy, & Henschel, 2016). Understanding why some individuals involved in combat killings experience negative mental health outcomes and hazardous alcohol use is critical for treatment and understanding risk and protective factors. Rumination has been proposed as a mechanism that may explain why some individuals with traumatic experiences develop mental health problems (Michael, Halligan, Clark, & Ehlers, 2007). Excessive dwelling on traumatic events may prevent psychological flexibility (Hayes, Strosahl, & Wilson, 2012), hinder problem solving (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), impede emotional processing (Ehlers & Steil, 1995), and prolong and intensify emotional distress (Ehlers & Clark, 2000). Thus, it is possible that the direct effects between killing in combat and negative mental health outcomes are mediated by elevations in ruminative thinking. However, this has not yet been tested.

The present study examined whether rumination mediated associations between killing in combat and negative mental health outcomes (i.e., depression, anxiety, and PTSD symptoms, suicidality) and hazardous alcohol use among a community sample of military personnel who had deployed in support of recent wars in Iraq or Afghanistan. Given that research has indicated that rumination is a multi-dimensional construct, we examined four distinct rumination facets as potential mediators: problem-focused thoughts (i.e., consistent thinking of causes, consequences, and symptoms of negative affect), counterfactual thinking (i.e., thinking about alternative outcomes/reality), repetitive thoughts (i.e., persistent reflection on negative affect), and anticipatory thoughts (i.e., future-orientated rumination). Although we did not have any *a priori* hypotheses as to which rumination facet would explain the most variance as a mediator, we did anticipate that killing in combat would be associated with more rumination, which in turn would be associated with worse mental health symptoms.

Method

Participants and Procedure

The present study is a secondary data analysis of a larger study involving a community sample of military personnel and civilians (i.e., college students; for more information on recruitment and procedures, see Bravo, Pearson, & Kelley, 2017). For the present study, we

restricted our sample to 283 military personnel (72.4% were former military) who had experienced one or more deployments (defined as 90 days or more) as part of Iraq or Afghanistan, or other deployments (e.g., humanitarian missions). Participants completed an online self-report survey. The majority of participants identified as being White, non-Hispanic ($n=181$; 63.96%), were men ($n=180$; 63.60%), and reported a mean age of 32.61 ($SD=7.10$) years. The Army ($n=144$, 50.9%) and Navy ($n=81$, 28.6%) were the most represented branches. The study was approved by the institutional review board at the participating institution.

Measures

Killing in combat—Killing in combat was assessed with items directly from or slightly modified from the Moral Injury Questionnaire – Military version (MIQ-M; Currier et al., 2015). For the present study, we selected 5 items associated with killing in combat: “I was involved in the death(s) of an innocent in the war”, “I failed to save the life of someone in the war”, “I was involved in the death(s) of children”, “I was involved in a “friendly-fire” incident”, and “I made mistakes in the warzone that led to injury or death”. All items were assessed on a 4-point response scale ranging from 1 (*never*) to 4 (*often*). Item scores were summed, with higher values reflecting higher frequency of killing in combat ($M=9.17$; $SD=3.22$; $\alpha=.87$). An exploratory factor analysis (EFA) was conducted to examine the fit for a proposed single latent factor of *killing in combat*. The single factor EFA model provided an excellent fit to the data: CFI=.995, TLI=.990, RMSEA=.0547 (90% CI [.000, .104]), SRMR=.017, $\chi^2(5)=8.19$, $p=.15$.

Rumination facets—Rumination was assessed with the Ruminative Thought Style Questionnaire (RTSQ; Brinker & Dozois, 2009) measured on a 7-point response scale (1=*Not at all*, 7=*Very Well*). Although originally examined as a single factor, Tanner et al. (2013) revealed four rumination subcomponents: problem-focused thoughts ($M=18.11$; $SD=7.00$; $\alpha=.89$), counterfactual thinking ($M=16.15$; $SD=6.34$; $\alpha=.89$), repetitive thoughts ($M=16.41$; $SD=6.32$; $\alpha=.93$), and anticipatory thoughts ($M=7.85$; $SD=3.15$; $\alpha=.72$). Intercorrelations among subscales ranged from .56 to .77.

Mental health and hazardous alcohol use—For all mental health outcomes, we selected measures that have been shown to be psychometrically sound and widely used in military populations. Depressive symptoms were assessed using the 10-item *Short Form of the Center for Epidemiologic Studies Depression Scale* (CES-D; Kohout, Berkman, Evans, & Cornoni-Huntley, 1993; $M=12.71$; $SD=5.44$; $\alpha=.79$). Anxiety symptoms were assessed using the 14-item *Kremen Anxiety Scale* (KAS; Kremen, 1996; $M=40.49$; $SD=10.98$; $\alpha=.88$). Suicidality was assessed using the 6-item suicidality subscale of the Inventory of Depression and Anxiety Symptoms (IDAS; Watson et al., 2007; $M=14.05$; $SD=5.94$; $\alpha=.91$). PTSD symptoms were assessed using the 20-item Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5; Blevins, Weathers, Davis, Witte, & Domino, 2015; $M=34.85$; $SD=17.95$; $\alpha=.95$). Hazardous drinking was assessed using the 10-item *Alcohol Use Disorders Identification Test* (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993; $M=15.07$; $SD=7.83$; $\alpha=.85$).

Data Analysis Plan

To test the proposed comprehensive mediation model, a single path analysis using *MPlus 7.4* (Muthén & Muthén, 1998–2017) was conducted simultaneously examining mediated paths (i.e., unique indirect effects) for each subcomponent of rumination from killing in combat to negative mental health symptoms and hazardous alcohol use (e.g., killing in combat → problem-focused thoughts → suicidality). Sex, years served in the military, number of deployments to Operation Iraqi Freedom (OIF), number of deployments to Operation Enduring Freedom (OEF), number of humanitarian deployments, and number of other deployments were modeled as predictors of all variables in the model (i.e., covariates). Statistical significance was determined by 95% bias-corrected bootstrapped confidence intervals (based on 10,000 bootstrapped samples) that do not contain zero.

Results

The total, total indirect, specific indirect, and direct effects of the comprehensive mediation model are summarized in Table 1. Within the model, there were eight significant specific indirect effects. In predicting all five emotional health outcomes, indirect effects for problem-focused thoughts accounted for: a) 28.45% of the total effect of killing in combat on depressive symptoms (indirect $\beta=.12$); b) 25.27% of the total effect of killing in combat on anxiety symptoms (indirect $\beta=.10$); c) 7.17% of the total effect of killing in combat on suicidality (indirect $\beta=.04$); d) 19.37% of the total effect of killing in combat on PTSD symptoms (indirect $\beta=.11$); and e) 10.20% of the total effect of killing in combat on hazardous alcohol use symptoms (indirect $\beta=.07$).

In predicting three of the mental health outcomes, anticipatory thoughts accounted for: a) 16.85% of the total effect of killing in combat on anxiety symptoms (indirect $\beta=.07$); b) 9.18% of the total effect of killing in combat on PTSD symptoms (indirect $\beta=.05$); and c) 6.97% of the total effect of killing in combat on hazardous alcohol use (indirect $\beta=.05$). Finally, in predicting anxiety symptoms, counterfactual thinking accounted for 20.77% of the total effect of killing in combat (indirect $\beta=.09$). Beyond these significant mediation effects, killing in combat still had significant direct effects on every outcome: depressive symptoms ($\beta=.22$), anxiety symptoms ($\beta=.12$), suicidality ($\beta=.40$), PTSD symptoms ($\beta=.31$), and hazardous alcohol use ($\beta=.53$).

Discussion

Supporting previous research (Maguen et al., 2009, 2010, 2012; Tripp et al., 2016), our findings suggest that bearing responsibility for death in a warzone is associated with PTSD, depression, anxiety symptoms, suicidality, and hazardous alcohol use. Our results extend previous research by demonstrating that, after controlling for demographic variables, rumination appears to be a key mechanism of negative post-deployment outcomes. Interestingly, outcomes were uniquely mediated by specific sub-domains of rumination.

Problem-focused thought, which is linked to psychological distress and non-productive coping strategies (Tanner et al., 2013), was a mediator for all outcomes. Anticipatory thought was a mediator for anxiety, PTSD symptoms, and hazardous alcohol use. The

relationship between anticipatory thoughts and both anxiety and PTSD is consistent with the future-orientation of this scale and frameworks which conceptualize worry as future-oriented rumination (Ehring & Watkins, 2008). Counterfactual thinking, which has been associated with non-productive coping, regret, shame, and guilt (see Tanner et al., 2013) also was a mediator of anxiety. This particular facet of rumination might be expected after killing in combat. Taken together, our findings suggest that distinct ruminative facets may explain the association between killing in combat and distinct mental health outcomes.

Limitations

This study has several limitations. Despite the support for mediation, our data are cross-sectional and observational; thus, causation or a true mechanism of change cannot be established. Recall for combat-related events, mental health, and alcohol use may be under- or over-reported. However, recall of combat events has previously been shown to be reliable (Bramsen et al., 2001). Further, among a subset of combat veterans who took part in the National Vietnam Veterans Readjustment Study, self-report of killing in combat was not related to the Lie-scale of the MMPI (MacNair, 2002), indicating deception or deliberate under-reporting is not likely in the current study. Our findings may not generalize to the broader military population. Future research is needed to examine the role of military branch and occupation.

Conclusions

Our results extend previous research by demonstrating that the association between killing in combat and negative mental health symptoms may be, in part, due to heightened rumination, and particularly, problem-focused thoughts. These findings also support future clinical efforts to work toward reducing problem-focused thoughts among military personnel, particularly combat veterans, who report killing in combat. Research efforts using longitudinal research designs involving the broader military population (e.g., active duty component, deployed service members) are needed to further support our findings.

Acknowledgments

This work was supported by a grant from the American Psychological Association to Michelle L. Kelley from the Society for Military Psychology (Division 19). Abby L. Braitman is supported by a research career development award (K01-AA023849) from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Adrian J. Bravo is supported by a training grant (T32-AA018108) from NIAAA.

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Clinical Impact Statement

Prior research suggests that military personnel who have killed in combat are at increased risk for mental health problems and substance use. Our findings suggest that rumination may be an important treatment target in this population.

Table 1

Summary of total, indirect, and direct effects of transgressions and rumination facets on emotional outcomes in a comprehensive mediation model

Outcome Variables:		Depressive Symptoms		Anxiety Symptoms		Suicidality		PTSD Symptoms		Hazardous Alcohol	
Predictor Variable: Killing in combat	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	
Total	.413	0.30, 0.51	.412	0.29, 0.52	.530	0.42, 0.63	.564	0.45, 0.66	.645	0.56, 0.72	
Total indirect ^a	.196	0.12, 0.28	.289	0.19, 0.38	.130	0.08, 0.19	.258	0.17, 0.35	.117	0.07, 0.18	
Specific indirect:											
Problem-focused Thoughts	.117	0.06, 0.19	.104	0.05, 0.17	.038	0.01, 0.08	.109	0.06, 0.17	.066	0.03, 0.12	
Counterfactual Thinking	.009	-0.08, 0.09	.086	0.03, 0.17	.048	-0.02, 0.12	.058	-0.01, 0.13	.044	-0.02, 0.11	
Repetitive Thoughts	.024	-0.03, 0.09	.030	-0.01, 0.08	.023	-0.02, 0.07	.039	-0.01, 0.10	-.039	-0.10, 0.01	
Anticipatory Thoughts	.045	-0.004, 0.10	.069	0.02, 0.12	.021	-0.02, 0.07	.052	0.01, 0.10	.045	0.01, 0.09	
Direct	.217	0.11, 0.33	.123	0.03, 0.22	.400	0.29, 0.51	.306	0.22, 0.40	.528	0.43, 0.63	
Direct Effects: Rumination Facets											
Problem-focused Thoughts	.396	0.28, 0.53	.351	0.23, 0.46	.129	0.03, 0.24	.369	0.27, 0.47	.223	0.10, 0.34	
Counterfactual Thinking	.024	-0.20, 0.22	.228	0.07, 0.39	.127	-0.05, 0.29	.156	-0.03, 0.31	.119	-0.05, 0.28	
Repetitive Thoughts	.090	-0.10, 0.29	.109	-0.06, 0.27	.084	-0.07, 0.24	.141	-0.03, 0.32	-.142	-0.31, 0.02	
Anticipatory Thoughts	.117	-0.01, 0.25	.181	0.06, 0.29	.055	-0.05, 0.17	.135	0.01, 0.25	.118	0.01, 0.22	

Note. Significant associations are in bold typeface for emphasis and were determined by a 95% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero.

^aReflects the combined indirect associations within the model. Killing in combat was significantly positively associated with each rumination facet: problem-focused thoughts ($\beta = .30$), counterfactual thinking, ($\beta = .38$), repetitive thoughts ($\beta = .27$), and anticipatory thoughts ($\beta = .38$).