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Post-Traumatic Stress Disorder, Depression, and Aggression in OEF/OIF Veterans

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ABSTRACT Aggression is a problem among some combat veterans. Post-traumatic stress disorder (PTSD) is associated with physical aggression in veterans, and co-occurring depression increases the risk of committing aggressive acts. Few studies have examined the impact of PTSD on various forms of aggression. While using a standardized multidimensional measure of aggression, this study examines the impact of depressive symptoms on the relationship between PTSD and various forms of aggression in Operation Enduring Freedom or Operation Iraqi Freedom (OEF/OIF) veterans. Depressive symptoms are hypothesized to mediate the relationship between PTSD and four types of aggression: (1) physical aggression toward others, (2) physical aggression toward objects, (3) physical aggression toward self, and (4) verbal aggression. Seventy-two OEF/OIF veterans completed assessment batteries and clinical interviews upon enrollment into a postdeployment mental health clinic. Study results partially supported the study hypotheses; depressive symptoms indirectly mediated the relationship between PTSD and two forms of aggression: verbal aggression and physical aggression toward self. In contrast to some prior studies of intimate partner violence in veterans with PTSD, no mediation relationship between depression and physical aggression toward others was found. Study results have implications for the development of interventions to treat aggressive behaviors in OEF/OIF veterans with PTSD and depression.

INTRODUCTION

Anger and aggression are associated with postcombat problems among military veterans and active duty service members.^{1,2} Anger is an emotional manifestation marked by hostile impulses and the perception of blocked goals, which includes particular cognitive, physiological, motivational, and behavioral components.³ In contrast, aggression refers to the behavioral expression of anger that can take the form of physical or verbal acts.³ Specifically, individuals can direct physical aggression toward self, others, or objects. Verbal aggression can range from shouting angrily to threatening physical violence.⁴

Media reports of violence perpetrated by combat veterans have increased popular interest in the influence of war on aggressiveness in U.S. service members.⁵ Existing literature suggests that post-traumatic stress disorder (PTSD) is associated with intimate partner violence in veterans^{1,6-8} as well as physical aggression in general.^{6,9} In a nationally representative study, one-third of Vietnam veterans with PTSD engaged in partner violence in the previous year, at a rate 2 to 3 times higher than those without PTSD.¹⁰ Physical aggression can lead to negative consequences, such as injury, death, and increased medical and mental health costs.¹¹⁻¹⁴ For example, women exposed to violence in adolescence had significantly increased odds of heavy illness burden 19 years later.¹⁵ Furthermore, the few studies that have investigated nonphysical aggression suggest that Vietnam veterans with PTSD exhibit more psychological aggression (nonverbal acts that symbolically hurt the other person)¹⁶ and verbal aggression than those without the disorder.^{9,17}

Despite increasing evidence of aggressive behavior associated with PTSD, especially in military veterans and service members, and the addition of new-onset post-traumatic

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behavior to the PTSD diagnosis,¹⁸ there is scant research about the scope of the problem. Most relevant studies address Vietnam and World War II veterans who exhibit physical and psychological aggression toward intimate partners.^{2,8,9,19,20} Noninterpersonal forms of violence (e.g., aggression toward objects and aggression toward self) have received little study, but those studies that do exist suggest a cause for concern with regard to aggression toward self.^{21,22} One investigation did note that PTSD significantly increased rates of suicidal ideation in Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) veterans, but failed to examine self-harm behaviors or specify the number of suicide attempts in their sample.²³ Another study examining risk factors for suicidal ideation and self-harm behaviors in troops returning from Iraq found that postdeployment PTSD symptoms predicted desire for self-harm, whereas depression predicted thoughts about suicide.²² The authors, however, only used one-question measures to assess suicidal ideation and desire for self-harm.

Assessment procedures represent a significant limitation in existing aggression research; current literature relies on nonstandardized measures of aggression that fail to consider aggression as a multifaceted construct.^{1-3,7,8,17,22} For example, Taft et al.^{2,8} used a 6-item measure that assessed physical and verbal aggression but only reported a global score of aggression in general. It is necessary to standardize, classify, and quantify aggression multidimensionally to broaden our understanding, improve prediction, and measure intervention outcomes for aggression.⁴ Multidimensional measures of aggression offer a more nuanced understanding of the scope and types of aggressive behavior.

Although PTSD is associated with aggression, depressive symptoms may mediate the link between PTSD and aggressive behaviors. In one study, depression was observed to increase the relative risks for marital violence and verbal aggression in World War II prisoners of war with PTSD (relative risks increase from 2.06 to 4.51 and from 1.61 to 4.24, respectively).²⁰ When examining a treatment-seeking group of veterans, Taft et al.⁸ found that dysphoric symptoms partially accounted for aggression in veterans diagnosed with PTSD. In another study, both depression and PTSD uniquely predicted aggression as well as intimate partner violence, but when considering the diagnoses together, depression did not have a significant impact on aggressiveness in veterans.¹⁹ Given that results appear mixed as to the role depression plays in predicting aggression in veterans with PTSD,^{8,19} combined with findings suggesting that when compared with women, men's aggressive behavior was more associated with depressive symptoms,^{24,25} it is important to address the combined effect of depression and PTSD on aggression in veterans. Moreover, by using a standardized multidimensional measure of aggression with OEF/OIF veterans, this study aims to expand the literature beyond intimate partner violence to all forms of aggression potentially exhibited by service members returning from Iraq and Afghanistan.

Since 2001, over 1.6 million U.S. troops have served in Afghanistan or Iraq conflicts through OEF/OIF. Reported prevalence rates of PTSD in OEF/OIF veterans vary, but studies report that 14% of treatment-seeking veterans²⁶ and 6 to 21% of service members returning from Iraq and Afghanistan²⁷ meet criteria for PTSD. Furthermore, one study examining U.S. Army soldiers upon return from Iraq or Afghanistan estimated that 13 to 15% of OEF/OIF service members had clinically significant symptoms for depression without PTSD and 24% have clinically significant levels of comorbid PTSD and depression.²⁸ Although irritability is a symptom of PTSD, aggressive behaviors may relate to numerous issues common to OEF/OIF veterans and service members, such as mental health and substance use issues, traumatic brain injury, and combat exposure.²⁹

Emerging research suggests that, like earlier World War II and Vietnam veteran cohorts, OEF/OIF veterans with PTSD symptoms endorse higher severity of anger, hostility, and aggression¹⁷ than veterans without or fewer PTSD symptoms. Still, existing research relies on global indexes of aggression and fails to incorporate standardized, multidimensional measures. Moreover, the few studies that have examined depression mediating the relationship between aggression and PTSD in veterans either depended on nonstandardized questionnaires that screen for verbal and physical acts of aggression⁸ or used standardized measures designed to assess physical and psychological intimate partner violence.^{19,20} Some research has suggested that depression may impact the relationship between aggression and PTSD,^{8,20} with one study of intimate partner violence noting that depression moderated the effects between PTSD and both verbal and physical aggression.²⁰ Despite the results and gaps in current research, no studies have tested whether depression mediates the relationship between PTSD and several multidimensional forms of aggression.

Given findings and limitations in existing literature, gaining an understanding of the impact of PTSD and depression on multidimensional aspects of aggression has important clinical implications for assessment and the development of intervention programs for OEF/OIF combatants and veterans. This study aims to use a standardized, multidimensional measure of aggression to understand the extent to which depressive symptoms explain the relationship between PTSD and aggression in veterans of the OEF/OIF conflicts. We hypothesize depressive symptoms to mediate the relationship between PTSD and four types of aggression: (1) verbal aggression, (2) physical aggression toward self, (3) physical aggression toward objects, and (4) physical aggression toward others.

METHODS

Study Sample

This study cohort is part of a larger cross-sectional evaluation of OEF/OIF veterans registering for care in the Veterans Affairs (VA) San Diego Healthcare System.³⁰ The study

sample includes all individuals who both screened positive for PTSD upon VA enrollment and subsequently completed a mental health assessment in the OEF/OIF postdeployment clinic. Participants included 72 OEF/OIF combat veterans (93% men; ages 21–56, median 27; 43% Caucasian, 14% African American, 25% Hispanic, 14% Asian American, and 4% Other). The sample self-identified as the following: 36% Army, 3% Air Force, 42% Marines, 6% National Guard, and 14% Navy. Regarding their most recent status, 14% were identified as reservists, and 81% of the sample were discharged from military service within 3 years of study assessment. Using categorical severity scoring for PTSD and depression study assessments (see Procedure and Measures section), 67% of the sample met PTSD diagnostic criteria. Depression levels were 18% minimal, 19% mild, 32% moderate, and 31% severe. Participants endorsed at least one incidence of the following behaviors in the past month: 88% verbal aggression, 28% physical aggression toward self, 63% physical aggression toward objects, and 31% physical aggression toward others (see Table I). Ethics committees of the local VA and university approved the retrospective study of the clinical enrollment data.

Procedure and Measures

During mental health assessment, study participants completed a clinical interview and several self-report questionnaires.

Retrospective Overt Aggression Scale

The Retrospective Overt Aggression Scale (ROAS)⁴ is a retrospective adaptation of the Overt Aggression Scale (OAS),^{4,31} which was chosen for this study for its ability to assess multiple and separate dimensions of aggression. The ROAS asks examinees to rate the frequency with which they engaged in specific aggressive acts in the past month. The ROAS assesses aggression on a 5-point Likert-type scale. Ratings on specific behaviors fall onto one of four subscales with subscale scoring weighted based on severity of aggressive behavior (subscale scoring range indicated): (1) verbal aggression (e.g., yells; makes clear threats; 0–40), (2) physical aggression toward others (e.g., swings at others; causes severe injury; 0–56), (3) physical aggression toward self (e.g., picks skin; makes deep cuts; 0–72), and (4) physical aggression toward objects (e.g., slams doors; sets fires; 0–56). The

ROAS shows good internal consistency ($\alpha = 0.75$), excellent inter-rater reliability ($r = 0.96$), and high intra-class correlations.^{32,33} The ROAS has high concurrent validity with the original OAS⁴ as well as similar measures of irritability ($r_s = 0.85–0.96$) and hostility ($r_s = 0.70–0.85$).³¹

Clinician-Administered PTSD Scale

The Clinician-Administered PTSD Scale (CAPS),^{34,35} a structured interview designed to assess PTSD, provided a total score continuous measure of PTSD symptoms and also categorical diagnostic groupings. The CAPS shows good psychometric properties in numerous studies and is considered to be the “gold standard” in PTSD assessment. Inter-rater reliability for continuous scores ($\alpha \geq 0.90$) and internal consistency ($\alpha_s = 0.80–0.90$) are repeatedly agreeable. The CAPS shows high sensitivity and specificity, high test-retest reliability, and strong convergence with other PTSD self-report measures.^{35,36}

Beck Depression Inventory, Second Edition

The total score of the Beck Depression Inventory, Second Edition (BDI-II)³⁷ provided a continuous measure of depressive symptoms and subcategories of depression severity through 21 self-report items that address the cognitive, emotional, and somatic manifestations of depression. The BDI-II shows good reliability and validity with a variety of populations.³⁷ The BDI-II also shows high internal consistency ($\alpha = 0.91$) and convergent validity with the first edition of the BDI ($r = 0.93$).³⁸

Statistical Analysis

To examine preliminary relationships among hypothesized study variables, Pearson bivariate correlations were conducted among symptoms of PTSD and depression, and aggression (verbal aggression, physical aggression toward objects, physical aggression toward self, and physical aggression toward others) variables. To examine depression symptoms as a mediator in the relationship between PTSD symptoms and aggression, Baron and Kenny’s³⁹ multiple regression method of testing mediation was conducted for each of the four aggression outcome variables using SPSS. Supporting significant mediation results from Baron and Kenny’s method, the Sobel⁴⁰ test statistic of the indirect effect of the mediator was

TABLE I. Pearson Bivariate Correlations and Descriptives for Study Variables

Variable	1	2	3	4	5	M	SD
1. PTSD Symptoms	—	—	—	—	—	65.89	26.36
2. Depression	0.62***	—	—	—	—	23.49	11.86
3. Verbal Aggression	0.44***	0.50***	—	—	—	10.06	9.66
4. Physical Aggression Toward Self	0.13	0.31**	0.36**	—	—	3.27	8.00
5. Physical Aggression Toward Objects	0.44***	0.34**	0.55***	0.31**	—	6.96	10.80
6. Physical Aggression Toward Others	0.27*	0.33**	0.66***	0.31**	0.62***	4.50	10.81

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

conducted using the SPSS macro developed by Preacher and Hayes.⁴¹

RESULTS

Bivariate Correlations

Pearson bivariate correlations and descriptive statistics were computed among variables in the hypothesized mediation models (see Table I). Predictor variables included PTSD symptoms (CAPS total) and depression symptoms (BDI-II total). The criterion variables included the 4 ROAS factors: (1) verbal aggression, (2) physical aggression toward self, (3) physical aggression toward objects, and (4) physical aggression toward others. With the exception of the nonsignificant correlation between PTSD symptoms and physical aggression toward self ($p = 0.13$), bivariate relationships among the variables were significant ($ps \leq 0.05$) and in the expected direction among the predictor and criterion variables.

Hypothesis Testing

Verbal Aggression

The first mediation analysis examined the relationship between PTSD symptoms and verbal aggression as mediated by depression symptoms (see Fig. 1). Using Baron and Kenny's four-step multiple regression method, PTSD symptoms significantly predicted verbal aggression (Step 1; $b = 0.44$, $SE = 0.04$, $t = 3.98$, $p < 0.001$); PTSD symptoms significantly predicted depression symptoms (Step 2; $b = 0.28$, $SE = 0.04$, $t = 6.64$, $p < 0.001$); and depression symptoms significantly predicted verbal aggression while controlling for PTSD symptoms (Step 3; $b = 0.31$, $SE = 0.11$, $t = 2.87$, $p = 0.005$). Finally, in support of mediation, the relationship between PTSD symptoms and verbal aggression became nonsignificant while controlling for the hypothesized mediator of depression symptoms (Step 4; $b = 0.07$, $SE = 0.05$, $t = 1.50$, $p = 0.137$). Further, the Sobel test indicated a significant indirect effect of depression symptoms as a mediator ($z = 2.55$, $SE = 0.01$, $p = 0.01$).

Physical Aggression Toward Self

The second mediation analysis examined depression symptoms mediating the relationship between PTSD symptoms and physical aggression toward self (see Fig. 2). Although PTSD symptoms did not significantly predict physical aggression toward self (Step 1; $b = 0.04$, $SE = 0.04$, $t = 1.05$, $p = 0.296$), Step 1 is not considered necessary to establish an indirect effect if Steps 2 and 3 are significant.⁴²⁻⁴⁴ PTSD symptoms significantly predicted depression symptoms (Step 2); and depression symptoms significantly predicted physical aggression toward self while controlling for PTSD symptoms (Step 3; $b = 0.26$, $SE = 0.10$, $t = 2.58$, $p = 0.012$). Finally, in support of an indirect effect, the strength of the relationship between PTSD symptoms and physical aggression toward self was reduced when controlling for the hypothesized mediator of depression symptoms (Step 4; $b = -0.03$, $SE = 0.04$, $t = -0.72$, $p = 0.478$). The Sobel test indicated that depression symptoms had a significant indirect effect on the relationship between PTSD symptoms and physical aggression toward self ($z = 1.95$, $SE = 0.01$, $p = 0.05$).

Physical Aggression Toward Objects

The third mediation analysis examined the relationship between PTSD symptoms and physical aggression toward objects as mediated by depression symptoms. PTSD symptoms significantly predicted physical aggression toward objects (Step 1; $b = 0.18$, $SE = 0.04$, $t = 4.11$, $p < 0.001$), and PTSD symptoms significantly predicted depression symptoms (Step 2). However, because depression symptoms did not significantly predict physical aggression toward objects while controlling for PTSD symptoms (Step 3; $b = 0.09$, $SE = 0.13$, $t = 0.73$, $p = 0.469$), a critical criterion for establishing mediation was not met.

Physical Aggression Toward Others

The fourth mediation analysis examined the relationship between PTSD symptoms and physical aggression toward others as mediated by depression symptoms. PTSD symptoms

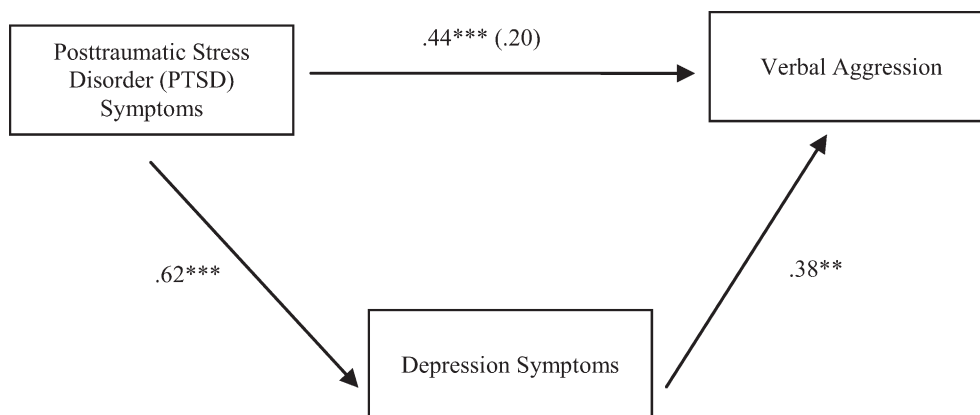


FIGURE 1. Standardized regression coefficients for the indirect effect of depression symptoms on the relationship between PTSD symptoms and verbal aggression. The standardized regression coefficient between PTSD and verbal aggression controlling for depression is in parentheses. ** $p \leq 0.01$, *** $p \leq 0.001$.

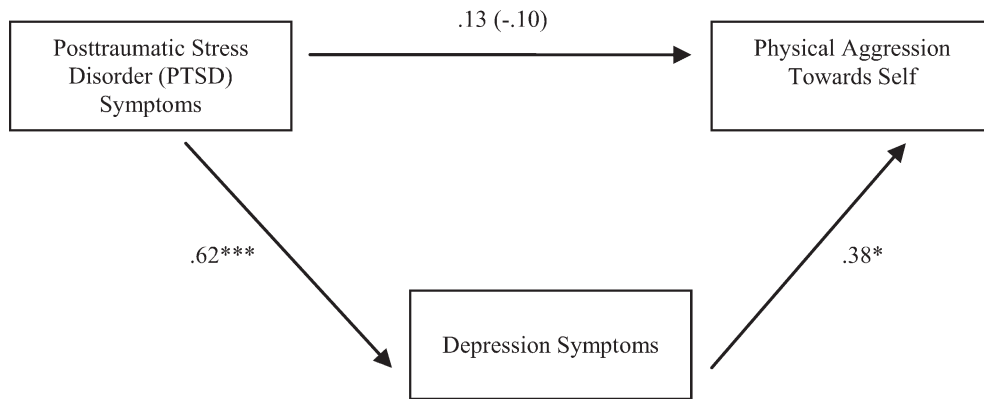


FIGURE 2. Standardized regression coefficients for the indirect effect of depression symptoms on the relationship between PTSD symptoms and physical aggression toward self. The standardized regression coefficient between PTSD and physical aggression toward self-controlling for depression is in parentheses. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

significantly predicted physical aggression toward others (Step 1; $b = 0.11$, $SE = 0.05$, $t = 2.33$, $p = 0.023$), and PTSD symptoms significantly predicted depression symptoms (Step 2). However, criteria for establishing mediation was not met because depression symptoms did not significantly predict physical aggression toward others while controlling for PTSD symptoms (Step 3; $b = 0.25$, $SE = 0.13$, $t = 1.88$, $p = 0.065$).

DISCUSSION

This was the first study to concurrently examine the relationships among PTSD, depression symptoms, and multifaceted forms of aggression in OEF/OIF veterans. Depressive symptoms indirectly affected the relationship between PTSD and two forms of aggression, verbal aggression and physical aggression toward self, in support of our study hypothesis (see Figs. 1 and 2). These findings are consistent with those of the existing literature, in which depressive symptoms accounted for, or increased the risk of, veterans with PTSD perpetrating verbal abuse in intimate partnerships.^{8,20} Because of the lack of literature addressing aggression toward self in military veterans, the impact of depression on the relationship between PTSD and aggression toward self has not been addressed by previous studies.^{21,22} At the same time, given findings that depression, PTSD, and aggression have uniquely and concurrently predicted suicidal ideation, suicide attempts, and self-harm behavior in both the military^{22,23,45,46} and general population,⁴⁷⁻⁴⁹ the findings that depression symptoms mediate the relationship between symptoms of PTSD and aggression toward self are notable and highlight the need for self-harm evaluation of veterans and service members with co-occurring PTSD and depression who report suicidal ideation.

Consistent with existing literature,^{6,17,19,50} symptoms of PTSD and depression were independently associated with physical aggression toward others, but contrary to our study hypotheses, depression symptoms did not mediate the relationship between PTSD symptoms and physical aggression toward others or objects. These findings are consistent with

one study that observed that although depression and PTSD both uniquely predicted aggression, when considered together, depression did not significantly impact the presence of physical aggression.¹⁹ In contrast, other studies have found depression to mediate the relationship between PTSD and physical aggression toward others.⁸ Differing methodology may account for the fact that our nonsignificant findings differ from current literature. For instance, Taft et al.⁸ recruited participants from a population of veterans seeking PTSD evaluations, 81% of whom sought PTSD-related disability services. When compared to the methodology in the current study, such a recruitment strategy may yield a more symptomatic sample motivated to be forthcoming about the negative impact PTSD has on psychosocial functioning.

Similarly, symptoms of PTSD and depression uniquely predicted physical aggression toward objects, but contrary to our study hypotheses, depression symptoms did not impact the relationship between PTSD symptoms and physical aggression toward objects. To the authors' knowledge, no existing research specifically addresses the relationship between PTSD, depression, and aggression toward objects; therefore, this study provides a unique contribution to the literature by providing information regarding this form of aggression as it relates to symptoms of PTSD and depression in veterans.

The indirect effect of depression symptoms on the relationship between PTSD symptoms and aggression implies several clinical considerations. Although the presence of anger and aggression is a symptom of PTSD, current results suggest that depression symptoms explain part of the relationships between PTSD symptoms and two forms of aggression: verbal aggression and, to a lesser extent, aggression toward self. Concurrent PTSD and depression in veterans may necessitate closer monitoring as well as direct inquiry regarding self-harm and acts of verbal aggression. Empirically supported treatments for PTSD and depression exist independently; however, treatment protocols concurrently addressing the highly comorbid disorders may be warranted for OEF/OIF veterans with problems related to aggression.^{28,51} Although evidence-based

treatments for PTSD often lead to reduction in depression symptoms as well,⁵² explicitly addressing depression among OEF/OIF veterans with PTSD may have a direct impact on acts of verbal aggression and physical aggression toward self.²³ Given the complex presentation of returning veterans, results support the evaluation of a broader range of treatment outcomes—including aggression—and targeting mechanisms (e.g., guilt or shame) that may underlie co-occurring PTSD and depression.⁵³ Further, when assessing aggression in veterans and active duty service members, it is important to consider a multifaceted aggression construct and the impact of PTSD and depression symptoms.

Although this is the first study to concurrently assess PTSD symptoms, level of depression, and multifaceted forms of aggression among OEF/OIF veterans, results should be interpreted in light of several limitations. By deriving cross-sectional data from a retrospective sample of treatment-seeking veterans who presented for VA enrollment and assessment in a mental health clinic, the study sample may not be fully representative of all OEF/OIF veterans or veterans clinically diagnosed with PTSD and depression. As this study was predominantly men, results may not fully generalize to female veterans. Furthermore, by relying on a retrospective self-report measure of aggression, the participants may not have accurately reported aggressive acts.

Based on the limitations of this study, future directions for research could further explain the connection between PTSD, depression, and aggression. Future researchers should replicate this study's findings and further examine the generalizability of results among veterans diagnosed with PTSD and depression, female veterans, and civilians to further assess the relationship with aggression. Measures of aggression could incorporate other reports, direct observation, or daily logs. Development and examination of prevention or intervention programs for OEF/OIF veterans reporting problems with PTSD, depression, and aggression are beneficial long-term goals.

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