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Anger and PTSD

Dysregulated anger and heightened levels of aggression are prominent among Veterans and civilians with posttraumatic stress disorder (PTSD). Two decades of research with Veterans have found a robust relationship between the incidence of PTSD and elevated rates of anger, aggression, and violence. When considering anger in the context of PTSD it is important to note that previously the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* combined the behavioral and emotional aspects of anger in Criterion D₃. However, splitting these two dimensions of anger between Criterion D₄ (anger emotion) and Criterion E₁ (aggression) in the fifth edition of the *DSM (DSM-5)* allows us to disentangle the emotion of anger and the behaviors related to anger (i.e., aggressive outbursts, violence). This distinction may have utility when considering the assessment and treatment of anger symptoms in the context of PTSD (Friedman, 2013). Factor analysis has supported that the PTSD symptoms of anger and aggression load on separate factors and are both significantly associated with PTSD diagnosis (Koffel et al., 2012).

While the strongest associations between anger and PTSD have been found with Veterans (Orth & Wieland, 2006), dysregulated anger has been observed across many types of trauma, occupations, nationalities and cultures (Forbes et al., 2013). Furthermore, research has provided evidence that PTSD plays a mediating role in the relationship between combat exposure and aggression (MacManus et al., 2015). Below is a selective review of recent research on anger and PTSD. We will first present research highlighting negative outcomes associated with dysregulated anger in individuals with PTSD, including risk for aggression and suicide. Next, we will summarize

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recent research on assessing anger and aggression. We will then discuss treatments for PTSD and anger, and their effects on reducing anger outcomes, followed by a brief review of some recent studies using technology and novel approaches to target anger. We will end with some conclusions and suggestions for future research.

Impact of Anger

Anger has been found to contribute to a range of difficulties among individuals with PTSD, including aggressive behavior, interpersonal conflict and most recently suicide risk. For example, recent research with military soldiers found that risk of aggression was elevated among soldiers with PTSD and high levels of anger, but not among those with low anger (Wilk et al., 2015). Furthermore, anger appears to play a mediating role in the relationship between PTSD and various presentations of aggression. For example, trait anger has been shown to contribute to the relationship between PTSD and verbal and physical aggression (Bhardwaj, 2019). Additionally, research has provided evidence that combat exposure is associated with aggression and violent behavior, with various studies finding that violent combat experience predicts risk-taking behaviors, criminal behavior, and physical aggression with a significant other (MacManus et al., 2015). Most recently, research has examined anger as an emotional risk factor for suicide (Hawkins et al., 2014; Wilks et al., 2019). Through a longitudinal design Dillon and colleagues (2020a) recently found evidence that anger mediates the relationship between PTSD and suicide, even after accounting for demographic factors and depression. Recent research has suggested that the association between PTSD and suicide is driven by comorbid

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depression (e.g., DeBeer et al., 2016), so it is notable that the studies presented here all covaried for depression diagnosis or symptom severity, suggesting that anger uniquely contributes to suicide risk in the context of PTSD (Dillon et al., 2020a; Hawkins et al. 2014; Wilks et al., 2019). Overall, there is evidence that among individuals with PTSD, comorbid dysregulated anger significantly increases risk for engaging in both interpersonal and self-directed aggression. Furthermore, increased anger appears to play a mediating role between PTSD and these negative outcomes (e.g., Bhardwaj, 2019; Dillon et al., 2020b). These studies highlight the importance of assessing and treating comorbid anger in individuals with PTSD.

Assessment of Anger

In their review of tools for assessing posttraumatic anger, Taft and colleagues (2012) note that the U.S. Department of Defense (DoD) and the Department of Veterans Affairs (VA) have recommended use of standardized anger measures, specifically the STAXI (State-Trait Anger Expression Inventory). The STAXI-2 is comprised of 57 items and includes both state and trait anger scales, the former evaluating an individual's present experience of anger and the latter evaluating an individual's anger disposition over the course of one's life. Additionally, the STAXI-2 measures anger expression, anger suppression, and anger control. The STAXI has been used in veteran and military samples (Mackintosh et al., 2017; Van Voorhees et al., 2019) and shows at least adequate discriminant validity (Taft et al., 2012). One consideration is that while it has been widely used in research, the STAXI involves a comprehensive anger assessment, which may not be feasible for time-pressured healthcare providers to complete in clinical practice.

For this reason, a shorter called the Dimensions of Anger Scale (DAR-5) has been developed by Forbes et al. (2014). The DAR-5 consists of 5 items that measure, for the past four weeks, an individual's level of anger frequency, intensity, duration, antagonism toward others, and interference with social functioning (Forbes et al., 2014). In a sample of $N = 164$ male Veterans, the DAR-5 demonstrated high internal reliability (Cronbach's $\alpha = .86$). Importantly, the DAR-5 had strong convergent validity with the STAXI (all correlations were $p < .001$ except for State Anger where $p = .002$), meaning the DAR-5 can be used as a valid screening and assessment measure of anger among Veterans with PTSD. Of note, Forbes et al. (2014) found a clinical cut-off score of 12 on the DAR-5 based on this study and previous research, further supporting its use in clinical practice.

Another aspect of anger assessment that should be considered in the context of PTSD is whether anger stems from the trauma itself (i.e., does the assessment target post-traumatic anger in particular). Toward this end, Sullivan et al., (2019) developed a 19-item Trauma-related Anger Scale. This scale first prompts individuals to think about a stressful or traumatic event and then asks them to rate how they function *after the event*. Factor analysis revealed four dimensions of post-traumatic anger: 1) anger giving a sense of control or energy; 2) thought and emotional avoidance relating to anger; 3) anger in response to threat; and 4) anger in response to pity. Although it was validated in $N = 435$ undergraduate students, the Trauma-related Anger Scale was psychometrically sound, with excellent internal consistency and good evidence of validity, and thus shows promise as a tool for potential use in patients with PTSD. At a minimum, the Trauma-related Anger Scale is beneficial for

reminding the field and clinicians that some anger domains may stem from trauma and PTSD and may be different from anger an individual experienced beforehand or throughout their whole life (see Olatunji et al., 2010).

Anger measures reviewed thus far largely focus on assessing the emotional aspects of anger. With respect to assessing aggression or violent behavior, a 5-item trauma-informed tool called the Violence Screening and Assessment of Needs (VIO-SCAN) was developed to assess violence in the context of PTSD and anger for military veterans (Elbogen et al., 2014). The VIO-SCAN instrument queries about PTSD accompanied by frequent experiences of anger, as well as about personally witnessing someone in combat being seriously wounded or killed. The instrument also asks about financial stability, alcohol misuse, and a history of violence or criminal arrests. Using two independent sampling frames (national random sample survey of 1,090 veterans and in-depth assessments of 197 dyads of veterans and collateral informants), the VIO-SCAN yielded area-under-the-curve (AUC) statistics ranging from .74 - .80, indicating large effect sizes in analyses predicting violence. The VIO-SCAN is not a comprehensive violence risk assessment tool and does not fully replace informed clinical decision-making. Instead, the screen provides clinicians with a rapid, systematic method to review empirically supported risk factors and to collaboratively develop a plan to reduce risk and increase successful reintegration in the community.

Residual Anger Following PTSD Treatment

While evidence-based treatments for PTSD also reduce anger, there is often significant residual anger. In a recent study examining changes in anger and aggression after treatment for PTSD among active duty servicemembers, Miles and colleagues (2019) found small to moderate reductions in state anger and aggression. The majority of servicemembers continued to endorse state anger (78%) and psychological aggression (93%) at post treatment and reductions in PTSD were only moderately correlated with reductions in anger and aggression.

Schnurr and Lunney (2019) examined residual PTSD symptoms in female Veterans and servicemembers following prolonged exposure (PE) or present-centered therapy (PCT) for PTSD. Results highlighted the persistence of problematic anger in this population. Even among those who recovered from PTSD, irritability/anger was the most likely symptom to remain (60.7% still endorsed at post-treatment). This finding was similar to Larsen and colleagues (2019) who found that irritability/anger was among the highest remaining symptom at posttreatment for women who completed PTSD treatment. Taken together, these studies suggest that additional treatment for anger may be warranted after completing PTSD treatment.

Anger Treatment Studies in PTSD Samples

The majority of anger treatment research for individuals with PTSD has been conducted with Veteran samples using a cognitive behavioral therapy (CBT) approach. One intervention for anger that has been used widely with veterans is a 12-session group CBT protocol that was developed by the Substance Abuse and Mental Health Services Administration over 20 years ago but recently updated (SAMHSA, 2019). This anger management treatment uses relaxation as well as cognitive and communication skills interventions to help participants develop coping strategies to

control their anger. Delivered in-person or via videoconferencing, it has produced clinically significant reductions in anger symptoms among Veterans with PTSD (Kalkstein et al., 2018; Mackintosh et al., 2017; Morland et al., 2010).

Despite evidence that CBT effectively reduces anger in Veterans, few studies have included a control group; however, Shea and colleagues (2013) conducted a randomized pilot study that compared a CBT-based individual anger management intervention with a supportive intervention. Among male Iraq and Afghanistan war Veterans with anger problems and PTSD hyperarousal symptoms, they found that CBT led to greater improvements in anger outcomes and interpersonal and social functioning than supportive therapy (Shea et al., 2013). More recently, Van Voorhees and colleagues (2019) compared group CBT with group PCT in Veterans with PTSD. Participants exhibited large anger reductions, with no differences between treatment modalities. Notably, this small pilot study was the first anger management study for Veterans to include women, despite evidence that women Veterans experience similar levels of anger. Among women participants ($n = 11$), there was significantly less improvement in anger and all of the women assigned to the CBT arm dropped out of treatment, expressing dissatisfaction with this treatment modality (Van Voorhees et al., 2019).

Regarding mechanisms of action contributing to anger outcomes, Mackintosh and colleagues (2014) conducted secondary analysis of a group CBT trial (Morland et al., 2010) and found that improvements in arousal calming skills, but not development of cognitive coping and behavioral control skills, were associated with reduction in anger symptoms (Mackintosh et al., 2014). Further, arousal calming skills facilitated participants' ability to use other anger regulation skills.

Given the importance of arousal calming skills in reducing anger, approaches that prioritize these skills may be particularly useful for Veterans with PTSD and problematic anger. One such treatment is compassion focused therapy (CFT). In a recent open label pilot study of group CFT among Veterans with PTSD and problematic anger, participants exhibited decreased anger symptoms following treatment, with small to medium effect sizes (Grodin et al., 2019).

Novel Approaches for Treating Anger in PTSD

Novel approaches and delivery methods for anger treatments may be warranted to enhance treatment engagement and effectiveness. For example, the VA has developed a free, self-help anger treatment, based on the 12-session SAMHSA protocol entitled Anger & Irritability Management Skills (AIMS; Greene et al., 2014). AIMS is self-paced and can be accessed on any device that has internet access.

Mackintosh and colleagues (2017) investigated whether the addition of a mobile application to group CBT for anger would enhance outcomes. In this trial, half of the Veterans with PTSD were randomly assigned to use a mobile application designed to support the group treatment by enabling skill practice, monitoring of symptoms, and using psychophysiological sensor data. Overall, the group CBT led to large reductions across outcomes. The use of the app did not lead to greater improvements but did appear to facilitate homework completion and increase treatment engagement compared to those who were assigned to group treatment only (attrition rate was 7% vs. 20%), although this difference did not reach statistical significance.

Interventions to target specific processes central to information processing theories of anger in PTSD may also be useful adjunctive treatments. One such process is the tendency to interpret ambiguous interpersonal situations as hostile, known as the hostile interpretation bias (HIB). Dillon and colleagues (in press) recently piloted a computer-based interpretation bias modification intervention for Veterans with PTSD. In this small pilot study, Veterans experienced large reductions in HIB and anger after completing eight 15-minute sessions of computer-based treatment. This intervention is currently being developed as a mobile intervention for Veterans with PTSD.

Conclusions and Future Directions

Dysregulated anger has consistently been associated with PTSD, with the strongest associations found among military samples. Anger in PTSD is associated with interpersonal conflict, aggressive behavior, and suicide risk. While there is evidence that PTSD treatments reduce anger, there is often significant residual anger after treatment completion. Cognitive behavioral therapy for anger may be effective to reduce PTSD-related anger in veterans, though additional research is needed to better understand anger in women with PTSD.

Treatments for anger in PTSD, while leading to significant reductions on some anger outcomes need further development in order to maximize clinical and functional outcomes. It will be important in future research to develop evidence-based treatments grounded in theory to further our understanding and treatment of anger in PTSD across multiple trauma populations. Some researchers have applied technology and other novel approaches to improve access to and effectiveness of anger treatments. Additional research in these areas may help to improve the treatment and quality of life of individuals with PTSD. Further research is needed to examine the relative contributions of PTSD, depression, and anger on suicide risk. Additionally, it will be important to evaluate whether reducing anger among individuals with PTSD leads to reductions in behavioral aggression and suicide risk, as well as better functional outcomes and quality of life.

FEATURED ARTICLES

Bhardwaj, V., Angkaw, A. C., Franceschetti, M., Rao, R., & Baker, D. G. (2019). **Direct and indirect relationships among posttraumatic stress disorder, depression, hostility, anger, and verbal and physical aggression in returning veterans.** *Aggressive Behavior, 45*(4), 417–426. doi:10.1002/ab.21827 Hostility, anger, and aggression are conceptually related but unique constructs found to occur more often among veterans with posttraumatic stress disorder (PTSD) than among civilians or veterans without PTSD. However, the pathways between PTSD, depression, hostility, anger, and aggression have not been comprehensively characterized. Therefore, drawing on a sample of returning Operation Enduring Freedom/Operation Iraqi Freedom combat veterans ($N = 175$; 95% male; mean age 30 years), this study sought to examine the direct and indirect relationships among PTSD, depression, hostility, anger, and four types of aggression: verbal, and physical toward self, others, and objects. Functional modeling of direct effects was done using multiple least-squares regression and bootstrapped mediation analyses were carried out to test indirect effects. Results indicate

that PTSD is not the overall direct contributor to different forms of aggression, supporting the mediating role of depression and trait anger. Depression symptoms explain part of the relationships between PTSD and verbal aggression, physical aggression toward objects, and physical aggression toward self and trait anger explains part of the relationships between PTSD and verbal aggression, physical aggression toward objects, and physical aggression toward others. Our findings support the importance of assessing for anger, depression, and different types of aggression among veterans presenting for PTSD treatment to develop individualized treatment plans that may benefit from early incorporation of interventions.

Dillon, K. H., Medenblik, A. M., Mosher, T. M., Elbogen, E. B., Morland, L. A., & Beckham, J. C. (2020). **Using interpretation bias modification to reduce anger in veterans with posttraumatic stress disorder: A pilot study.** *Journal of Traumatic Stress*. Advance online publication. doi:10.1002/jts.22525 Difficulty controlling anger is the most commonly reported reintegration concern among veterans with posttraumatic stress disorder (PTSD). One of the mechanisms associated with problematic anger is a tendency to interpret ambiguous interpersonal situations as hostile, known as the hostile interpretation bias (HIB). A computer-based interpretation bias modification (IBM) intervention has been shown to successfully reduce HIB and anger but has not been tested in veterans with PTSD. The current study was a pilot trial of this IBM intervention modified to address problematic anger among veterans with PTSD. Veterans with PTSD and a high level of anger ($N = 7$) completed eight sessions of IBM treatment over the course of 4 weeks. Participants completed self-report questionnaires at pre and posttreatment assessment visits, as well as a treatment acceptability interview at posttreatment. Veterans experienced large reductions in hostile interpretation bias and anger from pre- to posttreatment, d $s = 1.03$ – 1.96 , although these estimates may be unstable due to the small sample size. The feasibility for recruitment, retention, and treatment completion were high. Questionnaire and interview data demonstrated that most participants were satisfied with the treatment and found it helpful and easy to use. Overall, IBM for anger was feasible and acceptable to veterans with PTSD and was associated with reductions in hostile interpretations and self-reported anger outcomes. Further research examining this approach is warranted.

Dillon, K. H., Van Voorhees, E. E., Dennis, P. A., Glenn, J. J., Wilks, C. R., Morland, L. A., Beckham, J. C., & Elbogen, E. B., (2020). **Anger mediates the relationship between posttraumatic stress disorder and suicidal ideation in veterans.** *Journal of Affective Disorders*, 269, 117–124. <https://doi.org/10.1016/j.jad.2020.03.053> *Background:* Theoretical models and cross-sectional empirical studies of suicide indicate that anger is a factor that may help explain the association between posttraumatic stress disorder (PTSD) and suicide, but to date no longitudinal studies have examined this relationship. The current study used longitudinal data to examine whether changes in anger mediated the association between changes in PTSD symptomatology and suicidal ideation (SI). *Methods:* Post 9/11-era veterans ($N = 298$) were assessed at baseline, 6-months, and 12-month time points on PTSD symptoms, anger, and SI. Analyses covaried for age, sex, and depressive symptoms. Multilevel structural equation modeling was used to examine the three waves of data. *Results:* The effect of change in

PTSD symptoms on SI was reduced from $B = 0.02$ ($p = .008$) to $B = -0.01$ ($p = .67$) when change in anger was added to the model. Moreover, the indirect effect of changes in PTSD symptoms on suicidal ideation via changes in anger was significant, $B = 0.02$, $p = .034$. The model explained 31.1% of the within-person variance in SI. *Limitations:* Focus on predicting SI rather than suicidal behavior. Sample was primarily male. *Conclusions:* Findings suggest that the association between PTSD and SI is accounted for, in part, by anger. This study further highlights the importance of anger as a risk factor for veteran suicide. Additional research on clinical interventions to reduce anger among veterans with PTSD may be useful in reducing suicide risk.

Elbogen, E. B., Cueva, M., Wagner, H. R., Sreenivasan, S., Brancu, M., Beckham, J. C., & Van Male, L. (2014). **Screening for violence risk in military veterans: Predictive validity of a brief clinical tool.** *American Journal of Psychiatry*, 171, 749–757. doi:10.1176/appi.ajp.2014.13101316 *Objective:* Violence toward others is a serious problem among a subset of military veterans. The authors evaluated the predictive validity of a brief decision support tool to screen veterans for problems with violence and identify potential candidates for a comprehensive risk assessment. *Method:* Data on risk factors at an initial wave and on violent behavior at 1-year follow-up were collected in two independent sampling frames: a national random-sample survey of 1,090 Iraq and Afghanistan veterans and in-depth assessments of 197 dyads of veterans and collateral informants. Risk factors (lacking money for basic needs, combat experience, alcohol misuse, history of violence and arrests, and anger associated with posttraumatic stress disorder) were chosen based on empirical support in published research. Scales measuring these risk factors were examined, and items with the most robust statistical association with outcomes were selected for the screening tool. Regression analyses were used to derive receiver operating characteristic curves of sensitivities and specificities, with area under the curve providing an index of predictive validity. *Results:* The resultant 5-item screening tool, called the Violence Screening and Assessment of Needs (VIO-SCAN), yielded area-under-the-curve statistics ranging from 0.74 to 0.78 for the national survey and from 0.74 to 0.80 for the in-depth assessments, depending on level of violence analyzed. *Conclusions:* Although the VIO-SCAN does not constitute a comprehensive violence risk assessment and cannot replace fully informed clinical decision making, it is hoped that the screen will provide clinicians with a rapid, systematic method for identifying veterans at higher risk of violence, prioritizing those in need a full clinical workup, structuring review of empirically supported risk factors, and developing plans collaboratively with veterans to reduce risk and increase successful reintegration in the community.

Forbes, D., Alkemade, N., Hopcraft, D., Hawthorne, G., O'Halloran, P., Elhai, J. D., McHugh, T., Bates, G., Novaco, R. W., Bryant, R., & Lewis, V. (2014). **Evaluation of the Dimensions of Anger Reactions-5 (DAR-5) Scale in combat veterans with posttraumatic stress disorder.** *Journal of Anxiety Disorders*, 28(8), 830–835. doi:10.1016/j.janxdis.2014.09.015 After a traumatic event many people experience problems with anger which not only results in significant distress, but can also impede recovery. As such, there is value to include the assessment of anger in routine post-trauma screening procedures. The Dimensions of Anger Reactions-5

(DAR-5), as a concise measure of anger, was designed to meet such a need, its brevity minimizing the burden on client and practitioner. This study examined the psychometric properties of the DAR-5 with a sample of 163 male veterans diagnosed with Posttraumatic Stress Disorder. The DAR-5 demonstrated internal reliability ($\alpha = .86$), along with convergent, concurrent and discriminant validity against a variety of established measures (e.g. HADS, PCL, STAXI). Support for the clinical cut-point score of 12 suggested by Forbes et al. (2014, Utility of the dimensions of anger reactions-5 (DAR-5) scale as a brief anger measure. *Depression and Anxiety*, 31, 166–173) was observed. The results support considering the DAR-5 as a preferred screening and assessment measure of problematic anger.

Hawkins, K. A., Hames, J. L., Ribeiro, J. D., Silva, C., Joiner, T. E., & Cogle, J. R. (2014). **An examination of the relationship between anger and suicide risk through the lens of the interpersonal theory of suicide.** *Journal of Psychiatric Research*, 50, 59–65. doi:10.1016/j.jpsychires.2013.12.005 Research has implicated a relationship between anger and suicidality, though underlying mechanisms remain unclear. The current study examined this relationship through the lens of the interpersonal theory of suicide (ITS). According to the ITS, individuals who experience thwarted belongingness, perceived burdensomeness, and elevated acquired capability for suicide are at increased risk for death by suicide. The relationships between anger and these variables were examined and these variables were examined as potential mediators between anger and suicidal ideation and behavior. Additionally, exposure to painful and provocative events was examined as a potential mediator between anger and acquired capability. As part of intake at a community mental health clinic, 215 outpatients completed questionnaires assessing depression, suicidal ideation, anger, perceived burdensomeness, thwarted belongingness, and acquired capability. Regression analyses revealed unique relationships between anger and both thwarted belongingness and perceived burdensomeness, covarying for depression. The association between anger and acquired capability trended toward significance. The links between anger and suicidal ideation and behavior were fully mediated by thwarted belongingness and perceived burdensomeness, but this effect was driven by perceived burdensomeness. Additionally, the link between anger and acquired capability was fully mediated by experience with painful and provocative events. In conclusion, results suggest that anger is uniquely associated with perceived burdensomeness and thwarted belongingness. Anger is associated with suicidal ideation and behavior via perceived burdensomeness and with greater acquired capability for suicide via experiences with painful and provocative events. Treatment for problematic anger may be beneficial to decrease risk for suicide.

Mackintosh, M.-A., Morland, L. A., Frueh, B. C., Greene, C. J., & Rosen, C. S. (2014). **Peeking into the black box: Mechanisms of action for anger management treatment.** *Journal of Anxiety Disorders*, 28(7), 687–695. doi:10.1016/j.janxdis.2014.07.001 We investigated potential mechanisms of action for anger symptom reductions, specifically, the roles of anger regulation skills and therapeutic alliance on changes in anger symptoms, following group anger management treatment (AMT) among combat veterans with posttraumatic stress disorder (PTSD). Data were drawn from a published randomized controlled trial of AMT conducted with a

racially diverse group of 109 veterans with PTSD and anger symptoms residing in Hawaii. Results of latent growth curve models indicated that gains in calming skills predicted significantly larger reductions in anger symptoms at post-treatment, while the development of cognitive coping and behavioral control skills did not predict greater symptom reductions. Therapeutic alliance had indirect effects on all outcomes mostly via arousal calming skills. Results suggest that generalized symptom reduction may be mediated by development of skills in calming physiological arousal. In addition, arousal reduction skills appeared to enhance one's ability to employ other anger regulation skills.

Mackintosh, M.-A., Niehaus, J., Taft, C. T., Marx, B. P., Grubbs, K., & Morland, L. A. (2017). **Using a mobile application in the treatment of dysregulated anger among veterans.** *Military Medicine*, 182(11-12), e1941–e1949. doi:10.7205/MILMED-D-17-00063 *Objective:* Anger is a symptom of post-traumatic stress disorder (PTSD) associated with a range of clinical and functional impairments, and may be especially prevalent among veterans with PTSD. Effective anger management therapies exist but may be undermined by poor engagement or lack of treatment availability. Finding ways to engage veterans in anger management therapy or to improve access can be helpful in improving clinical outcomes. This randomized controlled trial compared anger management treatment (AMT) with AMT augmented by a mobile application (app) system, Remote Exercises for Learning Anger and Excitation Management (RELAX). *Methods:* Participants were 58 veterans enrolled in 12 sessions of either AMT alone or AMT with the RELAX system (AMT + RELAX). The RELAX system includes the RELAX app, a wearable heart rate monitor, a remote server, and a web-based therapist interface. RELAX allows the user to practice skills, monitor symptoms, and record physiological data. The server collects data on app use. A web-based interface allows the therapist to access data on between-session practice, and skills use. Measures administered at baseline, post-treatment, and 3- and 6-month follow-up include state and trait anger, dimensions of anger, PTSD, depression, interpersonal functioning, and satisfaction. We used multilevel modeling to account for the nesting of time points within participants and participants within treatment groups. Predictors were Treatment Condition (AMT + RELAX and AMT), Linear Time (baseline, post-treatment, 3- and 6-month follow-up), and Quadratic Time and Treatment Condition \times Linear Time interaction. All analyses were conducted using SPSS 21 (Armonk, New York). Approval was obtained from the institutional review board. *Results:* Across groups, the treatment dropout rate was 13.8%; of those who remained in treatment, 90% received an adequate dose of treatment (10 or more sessions). There were no significant differences between groups on attendance or treatment completion. Participants in both treatments demonstrated statistically significant and clinically meaningful reductions in anger severity and significant post-treatment reductions in PTSD. Veterans did not report significant changes in depression or interpersonal functioning. Veterans in the AMT + RELAX group reported spending significantly less time on homework assignments, and they rated the AMT + RELAX app as helpful and easy to use, with these ratings improving over time. *Conclusion:* Findings suggest that AMT + RELAX was beneficial in reducing anger symptoms and promoting efficient use of the between-session practice; however, AMT + RELAX did not outperform AMT. This study is an important contribution as it is one of the first randomized

controlled trials to study the efficacy of a technology-enhanced, evidence-based psychotherapy for anger management. Findings are limited because of small sample size and modifications to the technology during the trial. However, the results highlight the possible benefits of mobile app-supported treatment, including increasing the accessibility of treatment, lowering therapist workload, reducing costs of treatment, reducing practice time, and enabling new activities and types of treatments. This study presents preliminary evidence that mobile apps can be a valuable addition to treatment for patients with anger difficulties. Future research should evaluate how much therapist involvement is needed to support anger management.

MacManus, D., Rona, R., Dickson, H., Somaini, G., Fear, N., & Wessely, S. (2015). **Aggressive and violent behavior among military personnel deployed to Iraq and Afghanistan: Prevalence and link with deployment and combat exposure.** *Epidemiologic Reviews*, *37*, 196–212. doi:10.1093/epirev/mxu006 A systematic review and meta-analyses were conducted on studies of the prevalence of aggressive and violent behavior, as well as of violent offenses and convictions, among military personnel following deployment to Iraq and/or Afghanistan; the relationship with deployment and combat exposure; and the role that mental health problems, such as post-traumatic stress disorder (PTSD), have on the pathway between deployment and combat to violence. Seventeen studies published between January 1, 2001, and February 12, 2014, in the United States and the United Kingdom met the inclusion criteria. Despite methodological differences across studies, aggressive behavior was found to be prevalent among serving and formerly serving personnel, with pooled estimates of 10% (95% confidence interval (CI): 1, 20) for physical assault and 29% (95% CI: 25, 36) for all types of physical aggression in the last month, and worthy of further exploration. In both countries, rates were increased among combat-exposed, formerly serving personnel. The majority of studies suggested a small-to-moderate association between combat exposure and postdeployment physical aggression and violence, with a pooled estimate of the weighted odds ratio = 3.24 (95% CI: 2.75, 3.82), with several studies finding that violence increased with intensity and frequency of exposure to combat traumas. The review's findings support the mediating role of PTSD between combat and postdeployment violence and the importance of alcohol, especially if comorbid with PTSD.

Miles, S. R., Dillon, K. H., Jacoby, V. M., Hale, W. J., Dondanville, K. A., Wachen, J. S., Yarvis, J. S., Peterson, A. L., Mintz, J., Litz, B. T., Young-McCaughan, S., & Resick, P. A. (2020). **Changes in anger and aggression after treatment for PTSD in active duty military.** *Journal of Clinical Psychology*, *76*(3), 493–507. doi:10.1002/jclp.22878 *Objective:* To examine whether treating posttraumatic stress disorder (PTSD) reduces anger and aggression and if changes in PTSD symptoms are associated with changes in anger and aggression. *Method:* Active duty service members ($n = 374$) seeking PTSD treatment in two randomized clinical trials completed a pretreatment assessment, 12 treatment sessions, and a posttreatment assessment. Outcomes included the Revised Conflict Tactics Scale and state anger subscale of the State-Trait Anger Expression Inventory. *Results:* Treatment groups were analyzed together. There were small to moderate

pretreatment to posttreatment reductions in anger (standardized mean difference [SMD] = -0.25), psychological aggression (SMD = -0.43), and physical aggression (SMD = -0.25). The majority of participants continued to endorse anger and aggression at posttreatment. Changes in PTSD symptoms were mildly to moderately associated with changes in anger and aggression. *Conclusions:* PTSD treatments reduced anger and aggression with effects similar to anger and aggression treatments; innovative psychotherapies are needed.

Schnurr, P. P., & Lunney, C. A. (2019). **Residual symptoms following prolonged exposure and present-centered therapy for PTSD in female veterans and soldiers.** *Depression & Anxiety*, *36*(2), 162–169. doi:10.1002/da.22871 *Background:* Despite the effectiveness of evidence-based treatments for posttraumatic stress disorder (PTSD), some symptoms, such as sleep disturbance, can be difficult to treat regardless of treatment type. *Methods:* We examined residual PTSD symptoms in 235 female veterans and soldiers who were randomized to receive 10 weekly sessions of either Prolonged Exposure (PE) or Present-Centered Therapy (PCT). PTSD symptoms were assessed using the Clinician-Administered PTSD Scale. Analyses examined the effects of PE and the effects of clinically significant improvement (loss of diagnosis, operationalized as meaningful symptom reduction and no longer meeting diagnostic criteria). *Results:* Both treatments resulted in reductions in PTSD symptoms. PE had lower conditional probabilities than PCT of retaining intrusive memories, avoidance of people/places, detachment/estrangement, and restricted range of affect. Loss of diagnosis had lower conditional probabilities of almost all symptoms, although hyperarousal symptoms—especially irritability/anger (60.7%) and sleep difficulties (50.9%)—were the most likely to remain. *Conclusions:* Results are consistent with previous findings on sleep difficulties being difficult to treat, but also show that hyperarousal symptoms overall may not be resolved even after substantial improvement. Additional strategies may be needed to treat the full range of PTSD symptoms in some patients.

Shea, M. T., Lambert, J., & Reddy, M. K. (2013). **A randomized pilot study of anger treatment for Iraq and Afghanistan veterans.** *Behaviour Research and Therapy*, *51*(10), 607–613. doi:10.1016/j.brat.2013.05.013 *Objective:* Anger and aggression are serious problems for a significant proportion of veterans who have served in combat. While prior research has suggested that cognitive behavioral treatments may be effective for anger problems, there are few controlled studies of anger treatment in veterans and no studies of anger treatment focusing exclusively on veterans from the Iraq and Afghanistan wars. This randomized pilot study compared an adapted cognitive behavioral intervention (CBI) to a supportive intervention (SI) control condition for the treatment of anger problems in veterans returning from deployment in Iraq or Afghanistan. *Methods:* 25 veterans with warzone trauma, problems with anger, and one or more additional hyperarousal symptoms were randomized and 23 started treatment (CBI, $n = 12$; SI, $n = 11$). Outcome measures were administered at pre- and post-treatment and at 3 months post-treatment. *Results:* CBI was associated with significantly more improvement than SI on measures of anger and interpersonal functioning. Gains were maintained at follow-up. *Conclusions:* Findings suggest that CBI may be more effective than

an active control providing psychoeducation, relaxation, and supportive therapy for treating anger problems in returning veterans. The findings need to be replicated in an adequately powered and more diverse sample.

Sullivan, C., Jones, R. T., Hauenstein, N., & White, B. (2019). **Development of the trauma-related anger scale.** *Assessment, 26*(6), 1117–1127. doi:10.1177/1073191117711021 Anger is a pervasive problem following traumatic events. Previous research has demonstrated a moderate relationship between anger and posttraumatic stress disorder (PTSD), yet findings also highlight that anger has not been rigorously measured in the context of PTSD. Thus, this study concerns the development of a complimentary measure to assess anger in the context of PTSD. Participants were 435 undergraduate students. The participants were given a battery including the proposed scale and measures of trauma exposure, PTSD, anger, depression, anxiety, and social desirability. Exploratory factor analyses revealed a hierarchical, four-factor model provided the best fit to the data. The scale appeared psychometrically sound, with excellent internal consistency, good evidence of validity, and good model fit. This scale may provide implications for clinical work, specifically for the assessment and tracking of anger symptoms connected to PTSD. Additionally, this scale may assist with research by predicting treatment outcomes, aggression, and PTSD.

Taft, C. T., Creech, S. K., & Kachadourian, L. (2012). **Assessment and treatment of posttraumatic anger and aggression: A review.** *Journal of Rehabilitation Research & Development, 49*(5), 777–788. doi:10.1682/JRRD.2011.09.0156 The Department of Veterans Affairs (VA) and Department of Defense's (DOD) recently published and updated Department of Veterans Affairs/Department of Defense VA/ DOD Clinical Practice Guideline for Management of PostTraumatic Stress includes irritability, severe agitation, and anger as specific symptoms that frequently co-occur with PTSD. For the first time, the guideline includes nine specific recommendations for the assessment and treatment of PTSD-related anger, irritability, and agitation. This article will review the literature on PTSD and its association with anger and aggression. We highlight explanatory models for these associations, factors that contribute to the occurrence of anger and aggression in PTSD, assessment of anger and aggression, and effective anger management interventions and strategies.

Wilk, J. E., Quartana, P. J., Clarke-Walper, K., Kok, B. C., & Riviere, L. A. (2015). **Aggression in US soldiers post-deployment: Associations with combat exposure and PTSD and the moderating role of trait anger.** *Aggressive Behavior, 41*(6), 556–565. doi:10.1002/ab.21595 Anger and aggression are among the most common issues reported by returning service members from combat deployments. However, the pathways between combat exposure and anger and aggression have not been comprehensively characterized. The present study aimed to characterize the relationship between trait anger, combat exposure, post-deployment PTSD, and aggression. U.S. Army soldiers ($N=2,420$) were administered anonymous surveys assessing combat exposure, current PTSD symptoms and aggression, as well as trait anger items 3 months after returning from deployment to Afghanistan. PTSD symptom levels were related to aggression at higher levels of trait anger, but not evident among soldiers who had lower levels of trait

anger. The pathway from combat exposure to PTSD, and then to aggression, was conditional upon levels of trait anger, such that the pathway was most evident at high levels of trait anger. This was the first study to our knowledge that concurrently modeled unconditional and conditional direct and indirect associations between combat exposure, PTSD, trait anger, and aggression. The findings can be helpful clinically and for developing screening protocols for combat exposed Soldiers. The results of this study suggest the importance of assessing and managing anger and aggression in soldiers returning from combat deployment. Anger is one of the most common complaints of returning soldiers and can have debilitating effects across all domains of functioning. It is imperative that future research efforts are directed toward understanding this phenomenon and developing and validating effective treatments for it.

Wilks, C. R., Morland, L. A., Dillon, K. H., Mackintosh, M.-A., Blakey, S. M., Wagner, H. R., VA Mid-Atlantic MIRECC Workgroup, & Elbogen, E. B. (2019). **Anger, social support, and suicide risk in U.S. military veterans.** *Journal of Psychiatric Research, 109*, 139–144. doi:10.1016/j.jpsychires.2018.11.026 There have been considerable efforts to understand, predict, and reduce suicide among U.S. military veterans. Studies have shown that posttraumatic stress disorder (PTSD), major depression (MDD), and traumatic brain injury (TBI) increase risk of suicidal behavior in veterans. Limited research has examined anger and social support as factors linked to suicidal ideation, which if demonstrated could lead to new, effective strategies for suicide risk assessment and prevention. Iraq/Afghanistan era veterans ($N = 2467$) were evaluated in the ongoing Veterans Affairs Mid-Atlantic Mental Illness Research, Education and Clinical Center (MIRECC) multi-site Study of Post-Deployment Mental Health on demographic and psychological variables. Analyses revealed that suicidal ideation in veterans was positively associated with anger and negatively associated with social support. These results remained significant in multivariate logistic regression models controlling for relevant variables including PTSD, MDD, and TBI. Examining interrelationships among these variables, the analyses revealed that the association between PTSD and suicidal ideation was no longer statistically significant once anger was entered in the regression models. Further, it was found that TBI was associated with suicidal ideation in veterans with MDD but not in veterans without MDD. These findings provide preliminary evidence that suicide risk assessment in military veterans should include clinical consideration of the roles of anger and social support in addition to PTSD, MDD, and TBI. Further, the results suggest that suicide prevention may benefit from anger management interventions as well as interventions aimed at bolstering social and family support as treatment adjuncts to lower suicide risk in veterans.

ADDITIONAL CITATIONS

Forbes, D., McHugh, T., & Chemtob, C. (2013). **Regulating anger in combat-related post-traumatic stress disorder.** In Fernandez, E. (Ed.), *Treatments for anger in specific populations: Theory, application, and outcome* (pp. 57–73). Oxford University Press. This chapter discusses both the role anger plays in PTSD and how PTSD shapes the expression of Anger. Additionally, it addresses how anger

is crucial in the expression of aggressive behavior related to PTSD. While anger is seen across all populations who experience trauma, military combat experience plays an additional role in shaping the relationship between PTSD and anger.

Friedman, M. J. (2013). **Finalizing PTSD in DSM-5: Getting here from there and where to go next.** *Journal of Traumatic Stress, 26*, 548–556. doi:10.1002/jts.21840 The author discusses changes made to the diagnostic criteria for PTSD from the DSM-IV to DSM-5. The rationales for changes made regarding Criterion A, symptom clusters, and dissociative and preschool subtypes are discussed.

Gonzalez, O. I., Novaco, R. W., Reger, M. A., & Gahm, G. A. (2016). **Anger intensification with combat-related PTSD and depression comorbidity.** *Psychological Trauma: Theory, Research, Practice, and Policy, 8*(1), 9–16. doi:10.1037/tra0000042 This study examined the behavioral health data for 2,077 treatment-seeking soldiers. The authors noted that anger was intensified in those who met screen-threshold criteria for PTSD and MDD, compared to those who met criteria for MDD only, PTSD only, or did not meet criteria for MDD nor PTSD. This study demonstrates the need to assess for anger in veterans as there is a high prevalence of comorbidity of PTSD and MDD in this population.

Grodin, J., Clark, J. L., Kolts, R., & Lovejoy, T. I. (2019). **Compassion focused therapy for anger: A pilot study of a group intervention for veterans with PTSD.** *Journal of Contextual Behavioral Science, 13*, 27–33. doi:10.1016/j.jcbs.2019.06.004 This single arm pilot study investigated the use of group Compassion Focused Therapy (CFT) to treat 22 VA patients with both anger problems and PTSD. Researchers observed decreases in anger symptoms, PTSD symptoms, and fears of compassion. Additionally, patients reported that CFT was relevant and enjoyable.

Gvion, Y., & Apter, A. (2011). **Aggression, impulsivity, and suicide behavior: A review of the literature.** *Archives of Suicide Research, 15*(2), 93–112. doi:10.1080/13811118.2011.565265 This review examined the literature on the relationship between impulsivity, aggression, and suicide. Impulsivity and aggression were found to be highly associated with suicidal behavior in both psychiatric and non-psychiatric populations, as well as across diagnoses. While it is apparent that impulsivity and aggression are related, the dynamics of this relationship require further investigation.

Kalkstein, S., Scott, J. C., Smith, R. V., & Cruz, J. (2018). **Effectiveness of an anger control program among veterans with PTSD and other mental health issues: A comparative study.** *Journal of Clinical Psychology, 74*, 1422–1430. doi:10.1002/jclp.22631 In a study examining the effectiveness of SAMHSA's Anger Management for Substance Abuse and Mental Health Clients program in treating veterans with and without PTSD, the authors found significant improvements in anger regardless of PTSD diagnosis. However, researchers did not observe any significant changes in PTSD symptoms.

Koffel, E., Polusny, M. A., Arbisi, P. A., & Erbes, C. R. (2012). **A preliminary investigation of the new and revised symptoms of posttraumatic stress disorder in DSM-5.** *Depression and Anxiety, 29*(8), 731–738. doi:10.1002/da.21965 This study reviewed and

assessed changes made to diagnostic criteria for PTSD for the DSM-5. The results found that the PTSD symptom in the DSM-5 criteria that showed the greatest change from pre- to post-deployment was anger. Anger was most strongly associated with PTSD while negative expectations and aggressive behaviors were equivalently associated with PTSD, depression, and substance use.

Larsen, S. E., Fleming, C. J. E., & Resick, P. A. (2019). **Residual symptoms following empirically supported treatment for PTSD.** *Psychological Trauma: Theory, Research, Practice, and Policy, 11*(2), 207–215. doi:10.1037/tra0000384 Residual symptoms were examined in a sample of female rape survivors who completed either cognitive processing therapy (CPT) or prolonged exposure (PE) through a treatment study. Findings indicated that the most common residual PTSD symptoms after treatment were detachment, insomnia, and distress as a result of trauma reminders. These results emphasize the need to examine and treat residual symptoms.

Morland, L. A., Greene, C. J., Rosen, C. S., Foy, D., Reilly, P., Shore, J., He, Q., & Frueh, B. C. (2010). **Telemedicine for anger management therapy in a rural population of combat veterans with posttraumatic stress disorder: A randomized noninferiority trial.** *Journal of Clinical Psychiatry, 71*(7), 855–863. doi:10.4088/jcp.09m05604blu This randomized non-inferiority trial compared the use of group anger management therapy delivered in person to group anger management therapy delivered via video-teleconference. Both groups evidenced significant decreases in anger symptoms. There were no significant between-group differences for attrition, adherence, nor satisfaction; however, the in-person group did report higher group therapy alliance. This study provides support for the use of group therapy delivered via video-teleconference to treat PTSD-related anger issues.

Olatunji, B. O., Ciesielski, B. G., & Tolin, D. F. (2010). **Fear and loathing: A meta-analytic review of the specificity of anger in PTSD.** *Behavior Therapy, 41*(1), 93–105. doi:10.1016/j.beth.2009.01.004 This meta-analysis examined the association between anger and PTSD compared to the relationship between anger and anxiety disorders in general. Compared to controls those with anxiety disorders evidenced greater difficulties with anger. Furthermore, PTSD was found to be associated with significantly worse anger issues compared to all other anxiety disorders; although, the association between PTSD and anger did fluctuate based on the anger domain measured.

Orth, U., & Wieland, E. (2006). **Anger, hostility, and posttraumatic stress disorder in trauma-exposed adults: A meta analysis.** *Journal of Consulting and Clinical Psychology, 74*(4), 698–706. doi:10.1037/0022-006X.74.4.698 This meta-analysis examined studies that investigated the relationship between PTSD and anger-hostility. The relationship between PTSD and anger-hostility was stronger with increased time since the trauma and in those whose trauma involved a military combat experience.

Substance Abuse and Mental Health Services Administration. (2019). *Anger management for substance use disorder and mental health clients: Participant workbook.* <https://store.samhsa.gov/product/Anger-Management-for-Substance-Use-Disorder-and-Mental-Health-Clients-Participant-Workbook/PEP19-02-01-002>

This updated workbook is a companion piece to the Anger Management Manual; it summarizes the information presented in each session of the 12-week Anger Management Program and provides worksheets for completing exercises.

Taft, C. T., Watkins, L. E., Stafford, J., Street, A. E., & Monson, C. M. (2011). **Posttraumatic stress disorder and intimate relationship problems: A meta-analysis.** *Journal of Consulting and Clinical Psychology, 79*(1), 22–33. doi:10.1037/a0022196 This meta-analysis found associations between PTSD and intimate relationship conflict, intimate relationship physical aggression, and intimate relationship psychological aggression. Furthermore, the associations between PTSD and intimate relationship conflict and PTSD and intimate relationship physical aggression were stronger in military samples as compared to civilian samples.

U.S. Department of Veterans Affairs. (n.d.). *AIMS: Anger & irritability management skills.* <https://www.veterantraining.va.gov/aims/>

Van Voorhees, E. E., Dillon, K. H., Wilson, S. M., Dennis, P. A., Neal, L. C., Medenblik, A. M., Calhoun, P. S., Dedert, E. A., Caron, K., Chaudhry, N., White, J. D., Elbogen, E., & Beckham, J. C. (in press). **A comparison of group anger management treatments for combat veterans with PTSD: Results from a quasi-experimental trial.** *Journal of Interpersonal Violence.* doi:10.1177/0886260519873335 This quasi-experimental trial compared the use of group CBT and group PCT to treat combat veterans with PTSD and anger problems. Researchers observed significant decreases in anger and PTSD symptoms that did not differ significantly between the CBT and PCT groups. These results support the use of group CBT and group PCT to decrease anger in combat veterans with PTSD.

Wilks, C. R., Khalifian, C. E., Glynn, S. M., Morland, L. A. (2020) **The impact of anger experiences and expression on veteran suicidal thoughts in intimate couple relationships.** Advance online publication. *Journal of Clinical Psychology.* Veterans and their significant others were assessed on anger and suicidal ideation. The results evidenced that both the veterans' and significant others' verbal expression of anger was associated with the veterans' suicidal ideation; however, the significant others' physical expression of anger was related to the veterans' suicidal ideation. Furthermore, the veterans' angry temperament was associated with their suicidal ideation.

Worthen, M., Rathod, S. D., Cohen, G., Sampson, L., Ursano, R., Gifford, R., Fullerton, C. Galea, S., & Ahern, J. (2015). **Anger and posttraumatic stress disorder symptom severity in a trauma-exposed military population: Differences by trauma context and gender.** *Journal of Traumatic Stress, 28*(6), 539–546. doi:10.1002/jts.22050 In this study researchers compared the association between anger and PTSD in a sample of military servicemembers with nondeployment related traumas and a sample of military servicemembers with deployment related traumas. The results evidenced that for men those with deployment related traumas evidenced greater associations between PTSD and anger. However, in women there was a stronger association between PTSD and anger for those who had a nondeployment related trauma.